

PROJECT SPECIFICATIONS FOR:

SAN BERNARDINO CITY UNIFIED SCHOOL DISTRICT Del Rosa Full Day Kinder Classrooms

Construction Documents
November 3, 2020

FOR:

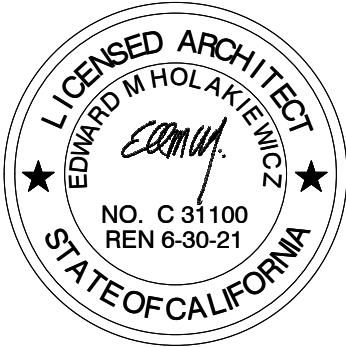
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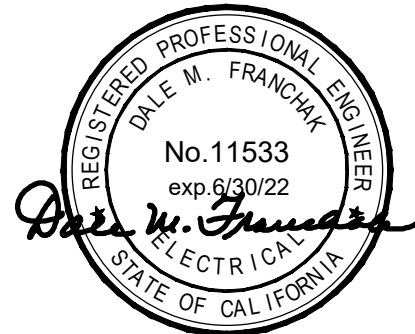
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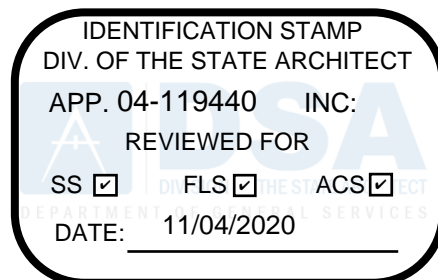


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**SECTION 01 11 00
SUMMARY OF WORK**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Summary of the Work of these Contract Documents for the construction of:

PROJECT: Del Rosa Full Day Kinder Classrooms

Architect: Architects Mosher Drew

Contact: Ed Holakiewicz

Email: edh@mosherdrew.com

1.02 GENERAL

- A. Work under this Contract includes furnishing all labor, materials, services and transportation which is required for completion of the Project at FXX-XX Del Rosa Full Day Kinder Classrooms in accordance with the Contract Documents.

- B. The Contract Time for completion shall be that shown in the Construction Progress Schedule.

Once the CONTRACTOR has received a notice to proceed, the CONTRACTOR shall complete the work **within 180 Calendar Days** from receipt of the notice to proceed. It is expressly understood that time is of the essence.

- C. At the FXX-XX Del Rosa Full Day Kinder Classrooms, some of the work may be performed within a portion of an active school campus. All work shall be conducted in a manner that does not impact the health and safety of school staff, students, site workers and project personnel, adjacent property owners, and/or the general public. Contractor shall at all times employ safety practices and environmental controls which take into consideration the fact that work is being performed on an active school campus. All work shall be performed in a manner which maximizes safety.

- D. Contract Drawings: The Drawings provided with and identified in the Project Manual are the Drawings referenced in the Agreement.

1. The location, extent and configuration of the required construction and improvements are shown and noted on Drawings.
 - a. The Drawings are referenced in the Agreement.
 - b. An index of Drawings is included in the set of Drawings.
2. Drawings are arranged into series according to design discipline. Such organization and all references to trades, subcontractor, specialty contractor or supplier shall not control the Contractor in dividing the

- Work among subcontractors or in establishing the extent of the Work to be performed by any trade.
3. Where the terms "as shown", "as indicated", "as noted", "as detailed", "as scheduled", or terms of like meaning, are used in the Drawings or Specifications, it shall be understood that reference is being made to the Drawings referenced in the Agreement.
 4. Where reference to the word "plans" is made anywhere in Drawings, Specifications and related Contract Documents, it shall be understood to mean the Drawings referenced in the Agreement.
- E. Contractor's Safety Performance Requirement: SBCUSD places safety and safe work practices at a premium, especially in regard to operations on active District campuses.
- F. All work shall be performed in a manner that minimizes impact to the environment, minimizes waste and maximizes the amount of salvageable material recovered throughout the project(s).
- G. All work shall be performed in a manner that minimizes noise and vibration impacts to the adjacent classrooms, school operations and surrounding neighborhood. In some cases, loud or high vibration activities may have to be rescheduled to accommodate school instructional or testing activities. Such activities may require work on weekends, during holiday breaks, or other times when the campus is not occupied. Cost of rescheduling and of off hours' work shall be at Contractor's expense. Holiday break periods for the 2021-22 school year are as follows:
- Spring Break 3/22/21 – 4/2/21
 - Memorial Day: 5/24/21
 - Summer Break: Begins 6/07/20, Ends 7/30/21
 - Independence Day: 7/05/21
 - Labor Day: 9/06/21
 - Veterans Day: 11/11/21
 - Thanksgiving Recess: 11/22/20-11/26/21
 - Winter Recess: 12/20/21-1/07/22
- H. All work shall be performed in a manner that protects existing infrastructure, landscaping, furnishings, equipment, and other structures or items designated to remain.
- I. All work shall be performed in a manner that meets the District's expectation for safe work execution, as well as adherence to schedule and project budget.

1.03 SUMMARY SCOPE OF WORK

The complete Scope of Work shall be as detailed in project contract documents, exhibits and attachments, project General Conditions, RFP documents and attachments, project drawings and specifications. A brief summary of the Scope of Work is provided below:

A. **Site Work:**

Site work at the FXX-XX Del Rosa Full Day Kinder Classrooms campus includes:

Removal of existing buildings, revising retaining wall, updating/relocation of playground and landscaping areas, construction of walkway canopy and paved pathways.

B. **Buildings:**

Work on campus buildings includes demolition of existing building structures and installation of four new modular classroom structures. Upgrade of finishes in one existing classroom structure.

C. **COVID-19 Safety**

All Contractor employees, subcontractors and visitors shall be required to comply with SBCUSD **COVID-19 Safety Plan** (see *RFP Division 00 Attachment 13 - COVID-19 Safety Plan*) prior to entering any SBCUSD campus, jobsite or work location

1.04 BIDDER'S INVESTIGATIONS

A. **Bidder's Investigation:**

Bidder shall visit site and become familiar with site conditions at the project site.

1. Bidder may, at Bidder's own expense and prior to bidding, make soil surveys and investigations Bidder considers necessary, following written notification to and approval by the District representative.
2. Bidder assumes risk that soil and underground conditions may be other than that indicated in soil investigation data.

B. **Procedures:**

1. Obtain authorization from authorized District Representative prior to start of borings or subsurface investigations.
2. Immediately upon completion of Bidder's subsurface investigation, return site areas affected by investigations to condition existing prior to start of Bidder subsurface investigations as directed by District Representative.

1.05 WORK COMPONENTS

The following work components are required by the Contract, Technical Specifications and Bid Proposal Exhibits and text of this RFP:

A. Activities Prior to Start of On-site Work:

1. Obtain ALL permits necessary to perform the scope of work.
2. Prepare and file all required notifications, including but not limited to South Coast Air Quality Management District (SCAQMD) Rule 1403 required notifications. SCAQMD Notifications must be filed at least 10 days before the start of work.
3. Submit and fully adhere to Contractor's health and safety plan in full compliance with CalOSHA, SCAQMD, and project specifications. Site work may not proceed until this plan is delivered to and accepted by District.
4. District has contracted a survey of asbestos, lead-based paint and other hazardous wastes to confirm presence of these materials. (See survey reports – Attached in Specifications).
5. Identify and procure the services of licensed waste haulers and properly permitted Waste Disposal/Management Facilities for the transportation and disposal of all material generated during hazardous materials abatement and demolition activities.
6. Submit a detailed work schedule for the project for review and acceptance by District.

B Hazardous Material Abatement and/or Mitigation:

A recent hazardous materials survey was conducted at the Del Rosa Full Day Kinder Classrooms campus by Ninyo and Moore. Findings are summarized in their report of May 15, 2020, "**Hazardous Building Materials Survey.**" Hazardous material abatement and/or mitigation activities are to include abatement of, but are not limited to, the following materials as listed in sections 1.05 B.1, 2, and 3 below:

1. Asbestos Containing Materials (ACMs): Asbestos was detected in the following locations:
 - a. See report referenced.
2. Lead-Based Paint (LBP) and Lead containing items: Lead was detected above concentrations greater than 1.0 mg/cm² in the following:
 - a. See report referenced.
3. Other Hazardous Materials:
 - a. Any and all existing fluorescent light bulbs that will be impacted by demolition and or renovation activities should be removed, disposed of or recycled as Mercury containing waste. All such light tubes should be handled and containerized properly, in a manner to prevent breaking and potentially releasing mercury.
4. Contractor shall be responsible for the all required employee training, regulatory agency notifications, jobsite signage as well as proper removal and disposal of any/all hazardous materials designated to be removed or that are encountered in the course of the project(s).

5. Any/all hazardous materials abatement work completed while campus is occupied shall be completed between the hours of 4:00 p.m. and 7:00 a.m., or during holidays, weekends or other days when school is not in session.

C. Campus Systems to Remain Operational

1. All campus systems and utilities shall remain operational throughout the project, including but not limited to:
 - a) Electrical service
 - b) Water
 - c) Irrigation
 - d) Storm drains
 - e) Sewer
 - f) Natural gas
 - g) Telephone
 - h) Data (Ethernet, Wi-Fi and or cable service)
 - i) Public Address System
 - j) Campus synchronized clocks & bells
 - k) Security system(s)
 - l) including cameras, sensors, and electronic strikes
2. Fire Alarm Systems shall remain operational.

In the event of any alarm condition, or if required for testing or fire drill procedures, Contractor shall allow District and/or fire personnel immediate access to fire alarm control panel(s).
3. Campus synchronized clock and bells system shall remain operational.

In the event that campus administration staff need to adjust clock or bell schedules, Contractor shall allow District personnel access to the bell system control panel(s).
4. The campus public address amplifier shall remain operational.
5. Data switches, equipment and data cabling from Electrical Room to other campus buildings shall remain operational throughout the duration of the project.

D. Demolition

1. All employees engaged in selective demolition activities shall be instructed regarding the contents of the Contractor's Health & Safety Plan(s).
2. Any/all demolition shall be performed in a manner that emphasizes and maximizes the safety of students, staff, area residents as well as project personnel and support staff.
3. Demolition shall be performed in a manner that does not encroach upon or cause damage to adjacent properties and structures.

4. Demolition shall be performed in a manner that facilitates safe and efficient handling and load out of materials for disposal.
5. The sequence of Demolition, material stockpiling, loadout, transport, and disposal shall be performed in a manner that promotes a smooth workflow to meet schedule milestones.
6. Contactor shall take measures to protect in place adjacent trees and landscaping designated to remain.

E. Construction

1. All employees engaged in construction activities shall be instructed regarding the contents of the Contractor's Health & Safety Plan(s).
2. Any/all construction shall be performed in a manner that emphasizes and maximizes the safety of students, staff, area residents as well as project personnel and support staff.
3. Any/all construction shall be performed in full compliance with project plans, specifications, and documents.
4. Any/all construction shall be performed in full compliance with regulatory requirements.

1.06 SEQUENCING OF WORK

- A. Proper regulatory notifications must be filed and Health & Safety plans be submitted, and permits be secured prior to commencing site work. Proof of filing of regulatory agency notifications will be required prior to start of work.
- B. Installation of perimeter fencing and screening must be completed prior to initiation of other site activities.
- C. Hazardous Materials Abatement work must be completed, inspected and approved by the District representative and/or District consultant prior to the start of any demolition.

1.07 PERMITS, LICENSES AND FEES

A. Permits:

1. For Work included in the Contract, Contractor shall obtain all permits from authorities having jurisdiction including but not limited to City of San Bernardino, serving utility companies and other state and local regulatory agencies.
2. District will reimburse Contractor for amount charged for such permits, without mark-up.

B. Licenses and certifications:

1. Contractor shall obtain and pay all licenses and certifications associated with project demolition, abatement and construction activities, such as business licenses, contractors' licenses and vehicle and equipment licenses.
2. All costs for licenses shall be included in the Contract Sum.

C. Assessments:

1. District will pay all assessments and utility service connection fees. Costs of assessments shall not be included in the Contract Sum.

D. Test and Inspection Fees:

1. Contractor shall pay all fees charged by authorities having jurisdiction and from serving utility companies and agencies, for tests and inspections conducted by those authorities, companies and agencies.
2. District will reimburse Contractor for actual amount of such fees, without mark-up.

END OF SECTION

SECTION 01 11 14
WORK SEQUENCE and PHASING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Requirements for phasing of the Work include logistics, phasing, and completion of designated phases prior to commencement of subsequent phases.

1.02 RELATED SECTIONS

- A. Summary of the Work
- B. Project Coordination and Meetings
- C. Submittals
- D. Construction Progress Schedule
- E. Construction Facilities
- F. Temporary Controls
- G. Contract Closeout

1.03 SUBMITTALS

- A. Prior to commencement of the Work, CONTRACTOR shall prepare and submit to the DISTRICT a Project Logistics Plan, including a Logistics Site Plan, showing in detail the Contractor's Work Sequence/Phasing plan, in the same size and scale as the architectural site plan, including, but not limited to, the following, items:
 - 1. Truck access route to and from the Project site, in accordance with local ordinances.
 - 2. Location of any overhead wire restrictions for power, street lighting, signal, and/or cable.
 - 3. Local sidewalk access and street closure requirements.
 - 4. Protection of sidewalk pedestrians and vehicular traffic.
 - 5. Project site fencing and access gate locations.
 - 6. Construction parking.
 - 7. Material staging and/or delivery areas.
 - 8. Material storage areas.
 - 9. Temporary trailer locations.
 - 10. Temporary service location and proposed routing of all temporary utilities.
 - 11. Location of temporary and/or accessible fire protection
 - 12. Trash removal and location of dumpsters.
 - 13. Concrete pumping locations.
 - 14. Crane locations.
 - 15. Location of portable sanitary facilities.
 - 16. Mixer truck wash out locations.
 - 17. Traffic control signage.
 - 18. Perimeter and site lighting.
 - 19. Provisions for Storm Water Pollution Prevention Plan – SWPPP
 - 20. Stockpile and/or lay down areas.

- #### 1.04 PHASING OF THE WORK --GENERAL

- ## 1.05 PHASING OF THE WORK – SPECIFIC

- END OF SECTION**

SECTION 01 11 40 WORK RESTRICTIONS

PART 1 – GENERAL

SECTION INCLUDES:

- Contractor's Use of Premises
- Access Roads
- Parking
- Work Hours
- Restrictions on Noise, Dust, and Odor Emissions
- Restrictions on Air Emissions of Toxic Chemicals
- Protection of Existing Utilities

CONTRACTOR'S USE OF PREMISES:

- A.** Contractor shall confine all operations, including the storage of materials, to the designated areas of the Project Site as shown in the Drawings, or as otherwise approved in writing by the Owner's Representative. Contractor shall be responsible for arranging for, and paying the costs of, any necessary off-site storage. No Impacted Materials shall be stored or stockpiled outside of the Project Site.
- B.** Contractor's use of the premises shall be limited to the Work being performed under the Specifications and Drawings.
- C.** Contractor shall be responsible for the security and safety of Contractor's equipment and facilities. Owner and the Owner's Representative shall not be liable for loss or damage of Contractor's tools, vehicles, equipment, or materials, whatever the cause. Such loss or damage shall not be sufficient reason for changes in the Project Schedule.
- D.** Contractor shall be responsible for any damage to roadways, facilities, (unless otherwise marked for removal), or structures on, or adjacent to, the site due to negligence, carelessness, actions, errors, or omissions on the part of the Contractor.

ACCESS ROADS:

- A.** Contractor vehicles shall enter and exit the site only at the location designated or as otherwise approved in writing by the Owner's Representative.
- B.** Contractor shall be responsible for obtaining any permits and paying any fees necessary for Contractor's use of public streets or roads.
- C.** Contractor shall abide by local, state, and federal regulations, including, but not limited to, any flaggers and signage for impeded traffic flow on public streets.
- D.** Contractor shall, at all times, provide for unimpeded access for emergency vehicles to the Project Site and nearby properties.

PARKING:

- A.** Contractor shall park construction vehicles and construction equipment only in areas designated for such purpose in accordance with Specifications.
- B.** Contractor employees shall park personal vehicles only in an employee parking area as designated by the Owner's Representative.
- C.** Vehicles shall not be parked in any locations where they impede traffic or access to areas where Work is being conducted.

WORK HOURS:

- A.** Normal Work Hours (for activities other than hazardous materials abatement) will be 7:00 a.m. to 5:00 p.m. Monday through Friday, or as determined in advance of Work between the Owner's Representative and Owner. Work hours established by any ordinance, law, or regulation shall supersede the requirements of this Specification.
- B.** Hazardous materials abatement activities shall not be conducted during normal school hours. Hazardous materials abatement activities shall occur on school holidays or weekends or, on school days, between the hours of 4:00 p.m. and 7:00 a.m.
- C.** Should alternate or extended work hours be approved, Contractor shall conduct all Work during daylight hours so that the Work can be conducted safely and the Owner's Representative can effectively observe the Work, or Contractor may furnish adequate lighting for activities conducted by prior written approval of the Owner's Representative. Contractor shall provide adequate lighting at all times, as deemed necessary by the Owner's Representative for safety reasons, provided that the Contractor can demonstrate that light levels in the Work area meet or exceed OSHA Regulations.
- D.** Contractor may conduct regular equipment maintenance during hours outside of the Normal Work Hours defined in this Section. The Contractor shall notify the Owner's Representative of such activities.
- E.** Contractor personnel shall not work on site alone.
- F.** Any variation from Normal Work Hours, or work on weekends or holidays shall be subject to approval by the Owner's Representative and Owner. Contractor shall submit notice to the Owner's Representative no less than 24 hours prior to requesting any necessary variation from Normal Work Hours, to allow for adequate review and coordination of staff. Contractor's notice to the Owner's Representative and Owner shall include Work activities to be conducted outside of Normal Work Hours, the hours and days that those activities shall be conducted, and the requested duration of the change in Normal Work Hours.
- G.** Emergency repairs of equipment outside of Normal Work Hours may be performed without 24-hour notice, but Contractor shall verbally notify the Owner's Representative prior to such emergency maintenance.

RESTRICTIONS ON NOISE, DUST, AND ODOR EMISSIONS:

- A.** Contractor is responsible for conducting all Work in accordance with all applicable Laws and Regulations concerning work hours, noise or sound levels including but not limited to the requirements of the City of San Bernardino. Work involving high noise or high

vibration levels may be restricted so as not to conflict with school testing and/or instructional activities.

- B.** Contractor is responsible for conducting all Work in accordance with all applicable Laws and Regulations concerning airborne dust emissions including but not limited to the requirements of SCAQMD and the City of San Bernardino.
- C.** Contractor is responsible for conducting all Work in accordance with all applicable Laws and Regulations concerning odor emissions including but not limited to the provisions of the City of San Bernardino.
- D.** Contractor shall control the Work at all times such that noise, dust, and odor measurements do not exceed the Action Levels in the Specifications, Contractor's Health and Safety Plan and or regulatory limits.
- E.** The Owner's Representative and Owner shall have authority to direct Contractor to stop Work or modify Work methods or activities as necessary to comply with the Health and Safety Plan, to prevent interruption to school testing or instructional activities, or should the Owner's Representative deem odor emissions, noise levels, or dust emissions be excessive.

1.07. RESTRICTIONS ON AIR EMISSIONS OF HAZARDOUS OF TOXIC MATERIALS:

- A.** Contractor shall be responsible for conducting all Work in accordance with Laws and Regulations concerning airborne emissions of hazardous dusts or toxic chemicals including but not limited to the requirements of SCAQMD, California DTSC and the City of San Bernardino.
- B.** Contractor shall control the Work at all times such that concentrations of airborne constituents measured at the perimeter of the work area are below the Action Levels set forth in the Health and Safety Plan and/or regulations.
- C.** The District and/or Owner's Representative shall have authority to direct the Contractor to stop Work or modify Work methods or activities as necessary to enforce compliance with the Action Levels for airborne emissions of toxic chemicals.

1.08. PROTECTION OF EXISTING UTILITIES:

- A.** Contractor shall contact and cooperate with utility companies to locate and mark all utilities (including pipelines, cables, power poles, and other structures) on the site prior to beginning the Work. Utility location shall be in compliance with Specifications, Drawings and Contract documents.
- B.** Contractor shall comply with the requirements of specific utility protection Laws or Regulations.
- C.** All utilities shall be protected from damage during construction, unless otherwise indicated to be removed or abandoned. If damaged, the utilities shall be repaired as required by the utility's Owner at the Contractor's expense.
- D.** If a utility is encountered or otherwise made known to the Contractor prior to beginning the Work, the Contractor shall promptly take necessary steps to assure that the utility is not damaged, and give written notice to the Owner's Representative. The Owner's Representative shall then review the conditions and determine the extent, if any, to which

a change is required in the Contract Documents to reflect and document the consequences of the existence of the utility.

- E.** Contractor will be aware of and plan to prevent damage to underground utilities that might be caused by walking heavy equipment across the site. The Contractor will prevent mitigation measures in their costs and work plan to prevent damage to underground utilities.

END OF SECTION

**SECTION 01 20 00
PRICE AND PAYMENT PROCEDURES**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Payment Procedures
- B. Schedule of Values

1.02 RELATED SECTIONS

- 1. Construction Progress Schedule
- 2. Contract Closeout
- 3. Allowances

1.03 SCHEDULE OF VALUES

- A. Submit a Schedule of Values to the ARCHITECT for review and approval within 10 calendar days after the date of DISTRICT-CONTRACTOR Agreement. Submit in electronic Excel spreadsheet format.
- B. In the Schedule of Values, the Contract Sum shall be broken down into specific elements of the Work, as follows, coded in accordance with the DISTRICT'S coding structure.
 - 1. General Contractor's Overhead and Profit
 - 2. Site Mobilization
 - 3. Bonds and Insurance
 - 4. Field Supervision
 - 5. Project Close-Out (Section of General Requirements)
 - 6. Other General Conditions and General Requirements
 - 7. Demolition
 - 8. Site Clearing and Preparation
 - 9. Site Earthwork
 - 10. Site Improvements (Paving, etc.)
 - 11. Site Utilities
 - 12. Landscape Irrigation
 - 13. Landscape Planting
 - 14. Hazardous Materials Abatement
 - 15. HVAC Work

16. Plumbing
 17. Fire Protection Sprinklers
 18. Electrical Power Rerouting
 19. Electrical Site Lighting
 20. Fire Alarm and Smoke Detection Systems
 21. Electrical Communications and Security Systems
- C. On projects of more than one building, provide separate schedules for each building.
- D. The percent-complete values from the approved cost-loaded Construction Progress Schedule shall provide the basis for each Application for Payment. Before each Application, update the Progress Schedule with all approved Change Orders.

1.04 APPLICATION FOR PAYMENT

- A. Submit Application for Payment to the ARCHITECT and IOR for review, in electronic format. Upon approval submit three (3) signed and original copies of each certified application. All copies shall be complete, including the updated Schedule of Values or Construction Progress Schedule, releases and similar attachments. Transmit each copy with a transmittal form listing attachments and recording appropriate information related to the application, in a manner acceptable to ARCHITECT
- B. Each certified Application for Payment shall be consistent with previous applications and payments as reviewed by ARCHITECT and IOR; paid for by OWNER.
- C. Payment Application Times: The period of Work covered by each Application for Payment is based on the payment date for each progress payment as specified in the General Conditions. The period covered by each Application for Payment is the previous month.
- D. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with the first certified Application for Payment include, but are not limited to, the following:
1. Certified Schedule of Values or Cost-Loaded Schedule
 2. Performance and payment bonds
 3. List of principal suppliers and fabricators
 4. Worker Compensation certificates
 5. Auto Insurance

6. Hazardous Material Insurance Certificates
 7. Construction Progress Schedule
 8. Submittal Schedule
 9. Emergency Contact List
 10. Copies of authorizations and licenses from governing authorities for performance of the Work
- E. Application for Payment at Substantial Completion: Following OWNER issuance of the certificate of Substantial Completion, submit an Application for Payment together with the following:
1. Occupancy permits and similar approvals by authorities having legal jurisdiction over the Work
 2. Removal of temporary facilities and services
 3. Testing, adjusting and balance records
 4. Removal of surplus materials, rubbish, and similar elements
 5. Meter readings
 6. Start-up performance reports
 7. OWNER training and orientations
 8. Change-over information related to OWNER occupancy, use, operation, and maintenance
 9. Final cleaning
 10. Ensure that incomplete Work is not accepted and will be completed without undue delay
 11. Advice on shifting insurance coverage
 12. List of defective Work, recognized as exceptions to certificate of Substantial Completion
 13. Change of door locks to OWNER system
- F. Final Payment Application: Administrative actions and submittals that must precede or coincide with submittal of the final Application for Payment include, but are not limited to, the following:
1. Completion of Contract Closeout requirements
 2. Project record and other closeout documents
 3. Completion of final punch list items
 4. Delivery of extra materials, products and or stock
 5. Identification of unsettled claims

6. Proof that taxes, fees, and similar obligations are paid
7. Evidence of payment and release of liens
8. Operating and maintenance instruction manuals
9. Consent of surety to final payment
10. Waivers and releases
11. Warranties, guarantees and maintenance agreements

G. Retention

1. Retention will be released no sooner than 35 days and not later than 60 days after Notice of Completion has been recorded with the County Recorder's Office.

END OF SECTION

SECTION 01 25 13
PRODUCT SUBSTITUTION PROCEDURES

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Product options.
- B. Substitution procedures.

1.2 DEFINITIONS

- A. Requests for changes in products, materials, or equipment required by Contract Documents proposed by the Contractor prior to and after award of the Contract are considered requests for substitutions. The following are not considered substitutions:
 - 1. Revisions to Contract Documents requested by the Owner or Architect.
 - 2. Specified options of products, materials, and equipment included in Contract Documents.

1.3 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers with Provision for Substitution: Products of manufacturers named and meeting specifications with substitution of products or manufacturer only when submitted under provisions of this section.
- C. Products Specified by Naming One or More Manufacturers without Provision for Substitution: No substitution allowed.

1.4 LIMITATIONS ON SUBSTITUTIONS SUBMITTED PRIOR TO THE RECEIPT OF BIDS

- A. The Bid shall be based upon the standards of quality established by those items of equipment and/or materials which are specifically identified in the Contract Documents.
- B. Architect may consider requests for substitutions of specified equipment and/or materials only when requests are received by Architect prior to the date established for the receipt of bids as stipulated in Document 00 21 13 - Instructions to Bidders.
- C. Consideration by Architect of a substitution request will be made only if request is made in strict conformance with provisions of this section.
- D. Burden of proof of merit of requested substitution is the responsibility of the entity

requesting the substitution.

- E. It is the sole responsibility of the entity requesting the substitution to establish proper content of submittal for requests for substitutions. Incomplete submittals will be rejected.
- F. Architect's decision on substitution requests are final and do not require documentation or justification.
- G. When substitution is not accepted, provide specified product.
- H. Substitute products shall not be included within the bid without written acceptance by Addendum.

END OF SECTION

1.5 LIMITATIONS ON SUBSTITUTIONS SUBMITTED AFTER THE AWARD OF THE CONTRACT

- A. The Contract is based upon the standards of quality established by those items of equipment and/or materials which are specifically identified in the Contract Documents.
- B. Consideration by Architect of substitution requests received after the established date of the receipt of bids or contract award will only be made when one or more of the following conditions are met and documented:
 - 1. Specified item fails to comply with regulatory requirements.
 - 2. Specified item has been discontinued.
 - 3. Specified item, through no fault of the Contractor, is unavailable in the time frame required to meet project schedule.
 - 4. Specified item, through subsequent information disclosure, will not perform properly or fit in designated space.
 - 5. Manufacturer declares specified product to be unsuitable for use intended or refuses to warrant installation of product.
 - 6. Substitution would be, in the sole judgement of the Architect, a substantial benefit to the Owner in terms of cost, time, energy conservation, or other consideration of merit.
- C. Notwithstanding the provisions of Article 1.4 of this section and the above, the Architect may consider a substitution request after the date of the receipt of bids or contract award, if in the sole discretion of the Architect, there appears to be just cause for such a request. The acceptance of such a late request does not waive any other requirement as stated herein.
- D. Consideration by Architect of a substitution request will be made only if request is made in strict conformance with provisions of this section.
- E. Substitutions will not be considered when they are indicated or implied on shop drawings or product data submittals without separate written request as required by provisions of this section.
- F. Review of shop drawings does not constitute acceptance of substitutions indicated or implied on shop drawings.
- G. Substitutions will not be considered when requested or submitted directly by subcontractor or supplier.
- H. Substitutions will not be considered as a result of the failure to pursue the work promptly or coordinate activities properly.

- I. Burden of proof of merit of requested substitution is the responsibility of the Contractor.
- J. It is the sole responsibility of the Contractor to establish proper content of submittal for requests for substitutions. Incomplete submittals will be rejected.
- K. Owner shall receive full benefit of any cost reduction as a result of any request for substitution.
- L. Architect's decision on substitution requests is final and does not require documentation or justification.
- M. When substitution is not accepted, provide specified product.
- N. Substitute products shall not be ordered or installed without written acceptance.

1.6 REGULATORY REQUIREMENTS

- A. It shall be the responsibility of the entity requesting the substitution to obtain all regulatory approvals required for proposed substitutions.
- B. All regulatory approvals shall be obtained for proposed substitutions prior to submittal of substitution request to Architect.
- C. All costs incurred by the Owner in obtaining regulatory approvals for proposed substitutions to include the costs of the Architect and any authority having jurisdiction over the project shall be reimbursed to the Owner. Costs of these services shall be reimbursed regardless of final acceptance or rejection of substitution.
- D. Substitutions of materials or work procedures which affect the health, safety and welfare of the public shall have prior approval of the Division of the State Architect (DSA) field representative.

1.7 SUBSTITUTION REPRESENTATION

- A. In submitting a request for substitution, the entity requesting the substitution makes the representation that he or she:
 - 1. Has investigated the proposed substitution and has determined that it meets or exceeds the quality level of the specified product.
 - 2. Will provide the same warranty or guarantee for the substitution as for the specified product.
 - 3. Will coordinate installation and make changes to other work which may be required for the work to be completed with no additional cost to the Owner.
 - 4. Waives claims for additional cost or time extension which may subsequently become apparent.

5. Will reimburse Owner for the cost of Architect's review or redesign services associated with substitution request.

1.8 SUBMITTAL PROCEDURE

- A. Submit six copies of each request.
- B. Submit request with Architect's Substitution Request Form. Form may be obtained at the office of the Architect. Substitution requests received without request form will be returned unreviewed.
- C. Limit each request to one proposed substitution.
- D. Request to include sufficient data so that direct comparison of proposed substitution can be made.
- E. Provide complete documentation for each request. Documentation shall include the following information, as appropriate, as a minimum:
 1. Statement of cause for substitution request.
 2. Identify product by specification section and article number.
 3. Provide manufacturer's name, address, and phone number. List fabricators, suppliers, and installers as appropriate.
 4. List similar projects where proposed substitution has been used, dates of installation and names of Architect and Owner.
 5. List availability of maintenance services and replacement materials.
 6. Documented or confirmation of regulatory approval.
 7. Product data, including drawings and descriptions of products.
 8. Fabrication and installation procedures.
 9. Samples of proposed substitutions.
 10. Itemized comparison of significant qualities of the proposed substitution with those of the product specified. Significant qualities may include size, weight, durability, performance requirements and visual effects.
 11. Coordination information, including a list of changes or modifications needed to other items of work that will become necessary to accommodate proposed substitution.
 12. Statement on the substitutions effect on the construction schedule.

13. Cost information including a proposal of the net change, if any, in the Contract sum if the substitution is submitted after the receipt of bids or contract award.
 14. Certification that the substitution is equal to or better in every respect to that required by the Contract Documents and that substitution will perform adequately in the application intended.
 15. Waiver of right to additional payment or time that may subsequently become necessary because of failure of substitution to perform adequately.
- F. Inadequate warranty, vagueness of submittal, failure to meet specified requirements, or submittal of insufficient data will be cause for rejection of substitution request.

1.9 ARCHITECT'S REVIEW

- A. Within 14 days of receipt of request for substitution, the Architect will accept or reject proposed substitution.
- B. If a decision on a substitution cannot be made within the time allocated, the product specified shall be used.
- C. There shall be no claim for additional time for review of proposed substitutions.
- D. Final acceptance of a substitution submitted prior to the date established for the receipt of bids will be in the form of an addendum.
- E. Final acceptance of a substitution submitted after the award of the contract will be in the form of a Change Order.

2. PART 2 PRODUCTS

Not Used.

3. PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01 26 00
CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements for making modifications to the contract including:
 - 1. Change Orders
 - 2. Construction Change Documents (see General Conditions)
 - 3. Contract Credits
 - 4. Contract Additions
 - 5. Construction Change Directives
 - 6. Immediate Change Directives (see General Conditions)
 - 7. Instructions
- B. Modifications:
 - 1. Provide full written data required to evaluate contract modifications, including breakdown of labor, material, equipment and description of work with unit costs for each category.
 - 2. Maintain detailed records of work done on a time-and-material basis.
 - 3. Provide full documentation for all proposed Change Orders to the Architect for his review.
- C. Designate in writing the member of Contractor's organization:
 - 1. Who is authorized to accept changes in the Work.
 - 2. Who is responsible for informing others in the Contractor's employ of the authorization of changes in the Work.

1.02 RELATED SECTIONS

- A. Addenda: All issued Addendums
- B. Agreement: The amounts of unit prices if any as established in the Contract.
- C. General Conditions Article 7, Changes in the Work.
- D. Section 01 30 00 - Administrative Requirements for Submittal Procedures.
- E. Section 01 60 00 - Product Requirements

1.03 REFERENCES

- A. Change Order Requirements per Title 24 Part 1 CCR.
 - 1. Change Orders: Changes or alterations of the approved plans or specifications after a contract for the work has been awarded are to be made by means of Change Orders. State the reason for the change and provide supplementary drawings where necessary.

Change Orders must be manually signed by the Architect or Engineer in general responsible charge of observation of the work or by the Architect or Engineer delegated responsibility for observation of the portion of the work affected by the Change Order.

2. Change Orders are required to bear the approval of the School Board or their authorized representative upon delegated authority.

1.04 PRELIMINARY PROCEDURES

- A. The Architect or School District may initiate changes by submitting a Request for Proposal. The request will include:
 1. Detailed description of the Change, Products, and location of the change in the Project. Changes may include additions and deletions from the Contract.
 2. Supplementary or revised Drawings and Specifications.
 3. The projected time span for making the change and a specific statement as to whether overtime work is, or is not, authorized.
 4. A specific period of time during which the requested price will be considered valid.
 5. Such request is for information only, and is not an instruction to execute the changes, nor to stop Work in progress.
- B. Contractor may initiate changes by submitting a written Change Order Request to the Architect or School District containing:
 1. Description of the proposed change.
 2. Statement of the reason for making the changes.
 3. Statement of the effect on the Contract Sum/ Contract Price and the Contract Time.
 4. Statement of the effect on the Work of separate contractors with breakdown of costs for labor, materials and equipment.
 5. Documentation supporting any change in Contract Sum/ Contract Price or Contract Time, as appropriate.

1.05 CONSTRUCTION CHANGE DIRECTIVES

- A. In lieu of Proposal Request, the School District through the Construction Manager may issue, a Construction Change Directive (also referred to as an Immediate Change Directive in the General Conditions) for Contractor to proceed with a change which shall state a basis for adjustment, if any, in the Contract Sum/ Contract Price or Contract Time, or both.
- B. Authorization will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change, and will designate the method of determining any change in the Contract Sum/ Contract Price and any change in Contract Time.
- C. The School District and Architect will sign and date the Construction Change Directive as authorization for the Contractor to proceed with the changes.

- D. Contractor may sign and date the Construction Change Directive to indicate agreement with the terms therein.

1.06 DOCUMENTATION OF PROPOSALS AND CLAIMS

- A. Support each quotation for a lump-sum proposal, and for each unit price which has not previously been established, with sufficient substantiating data to allow the Engineer and School District to evaluate the quotation.
- B. On request provide additional data to support time and cost computations:
 - 1. Labor required in hours with unit costs.
 - 2. Equipment required.
 - 3. Products required in units
 - a. Recommended source of purchase and unit cost.
 - b. Quantities required
 - 4. Taxes, insurance and bonds.
 - 5. Credit for Work deleted from Contract, similarly documented.
 - 6. Overhead and profit.
 - 7. Justification for any change in Contract Time.
- C. Support each claim for additional costs, and for work done on a time and material basis, with documentation as required for a lump-sum proposal, plus additional information:
 - 1. Name of the School District's authorized agent who ordered the work, and date of the order.
 - 2. Dates and times work was performed, and by whom.
 - 3. Time record, summary of hours worked, and hourly rates paid.
 - 4. Receipts and invoices for:
 - a. Equipment used, listing dates and times of use.
 - b. Products used, listing of quantities.
 - c. Subcontracts
- D. Document requests for Substitution of Products as specified in Section 01 60 00.

1.07 CONSTRUCTION CREDITS

- A. Work deleted and no work has been completed by the Contractor: Work deleted from the contract is to be credited back to the District and subtracted from the contract amount. Credits are to be included in Change Orders.
 - 1. Contractor shall credit back to the District total value for the work deleted from the contract. Cost of credits shall be determined by the amount stated in the Contractor's Schedule of Values.
 - 2. Where the value of credits cannot be determined from the Contractor's Schedule of values, total value of the credit is to be determined by the cost of materials, labor, overhead and profit, insurance, bonds, etc. All General Contractor, Subcontractor and Material Supplier levels of the Contract are to be included in the total value of credits back.

3. No amount at any level of the contract shall be withheld from credits for overhead and profit, insurance, bonds, time delays, construction schedule changes and administrative expenses.
- B. Work deleted and a portion of the work has been completed by the Contractor: Work deleted from the contract is to be credited back to the District and subtracted from the contract amount. Credits are to be included in Change Orders.
 1. Contractor shall credit back to the District the total value of the work deleted from the contract less any work already completed on the credit item. Cost of credits shall be determined by the amount stated in the Contractor's Schedule of Values less any work already completed. Completed work may include cost of shop drawings, submittals, site preparation, partially completed work on the credit item or other expenses related to the item.
 2. Where the value of credits cannot be determined from the Contractor's Schedule of values, total value of the credit is to be determined by the cost of materials, labor, overhead and profit, insurance, bonds, etc. All General Contractor, Subcontractor and Material Supplier levels of the Contract are to be included in the total value of credits back.
 3. An amount equal to the percentage of work already completed on the deleted item may be withheld from credits back for overhead and profit, insurance, bonds, construction schedule adjustments and administrative expenses, as indicated in the General Conditions.

1.08 PREPARATION OF CHANGE ORDERS

- A. The Architect will prepare each Change Order.
- B. Change Order will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change.
- C. Change Order will provide an accounting of the adjustment in the Contract Sum/ Contract Price and in the Contract Time.

1.09 LUMP-SUM/FIXED PRICE CHANGE ORDER

- A. Content of Change Orders will be based on either:
 1. The School District's Proposal Request and Contractor's responsive Proposal as mutually agreed with the School District.
 2. Contractor's Proposal for a change, as recommended by the School District or their authorized agent.
- B. The School District, Division of the State Architect and Architect or Engineer in responsible charge will sign and date the Change Order as an authorization for the Contractor to proceed with the changes.
- C. The Contractor will sign and date the Change Order to indicate agreement with the terms therein.

1.10 UNIT PRICE CHANGE ORDER

- A. Content of Change Orders will be based on either:
 - 1. The School District's definition of the scope of the required changes.
 - 2. Contractor's Proposal for a change, as recommended by the School District or Authorized Agent.
 - 3. Survey of completed work.
- B. The amounts of the unit prices to be:
 - 1. Those stated in the Agreement.
 - 2. Those mutually agreed upon between School District and Contractor.
- C. When quantities of each of the items affected by the Change Order can be determined prior to start of the work:
 - 1. The School District and Architect or Engineer in responsible charge will sign and date the Change Order as authorization for Contractor to proceed with the changes.
 - 2. Contractor is to sign and date the Change Order to indicate agreement with the terms therein.
- D. When quantities of the items cannot be determined prior to start of the work:
 - 1. The School District through the Architect will issue a Construction Change Directive directing the Contractor to proceed with the change on the basis of unit prices, and will cite the applicable unit prices.
 - 2. At completion of the change, the School District or its authorized agent will determine the cost of such work based on the unit prices and quantities used.
 - 3. The Contractor shall submit documentation to establish the number of units of each item and any claims for a change in Contract Time.
 - 4. The School District, Division of the State Architect and Architect or Engineer in responsible charge will sign and date the Change Order as authorization for the Contractor to proceed with the Changes.
 - 5. The Contractor will sign and date the Change Order to indicate agreement with the terms therein.

1.11 TIME AND MATERIALS CHANGE ORDER/CONSTRUCTION CHANGE DIRECTIVE:

- A. The School District through the Architect will issue a Construction Change Directive directing Contractor to proceed with the changes

- B. At completion of the change, Contractor shall submit itemized accounting and supporting data as provided in the Article 1.6, "Documentation of Proposals and Claims," of this Section.
- C. The School District or its authorized representative will determine the allowable cost of such work, as provided in General Conditions and Supplementary Conditions.
- D. The School District, Division of the State Architect and Architect or Engineer in general responsible charge will sign and date the Change Order to authorize the change in Contract Sum/ Contract Price and in Contract Time.
- E. The Contractor will sign and date the Change Order to indicate agreement with the terms therewith.

1.12 INSTRUCTIONS

- A. Architect's Supplemental Instructions:
 - 1. Minor changes in the work shall be carried out in accordance with supplemental instructions issued in accordance with the Contract Documents without change in Contract Sum/ Contract Price or Contract Time.
 - 2. The Architect will issue, sign, and date Supplemental Instructions.
 - 3. The Contractor will sign and date Supplemental Instructions to indicate acceptance of minor changes consistent with the Contract Documents and return signed copy to Architect.

1.13 CORRELATION WITH CONTRACTOR'S SUBMITTALS

- A. Periodically revise Schedule of Values and Request for Payment forms to record each change as a separate item of Work and to record the adjusted contract amounts.
- B. Periodically revise the Construction Schedule to reflect each change in Contract Time.
- C. Revise sub-schedules to show changes for other items of work affected by the changes.
- D. Upon completion of work under a Change Order, enter pertinent changes in Record Documents.

1.14 FORMS

- A. Submit Proposal Request typed on AIA Document G709. A Copy of this form may be obtained from the local American Institute of Architects, Chapter Office
- B. Submit Change Orders typed on the Change Order Form included in this Project Manual. Form is included in General Conditions and at the end of this Section.
- C. Submit Supplemental Instructions typed on the form provided by Architect, Requests for Interpretation (RFI's).

- D. Immediate Change Directive Form is included in the Supplementary General Conditions.

END OF SECTION

SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preconstruction meeting.
- B. Site mobilization meeting.
- C. Progress meetings.
- D. Construction progress schedule.
- E. Progress photographs.
- F. Coordination drawings.
- G. Requests for Interpretation.
- H. Submittals for review, information, and project closeout.
- I. Number of copies of submittals.
- J. Submittal procedures.
- K. Labor Compliance Program

1.02 RELATED REQUIREMENTS

- A. Section 01 20 00 - Price and Payment Procedures:
 - 1. Proposal Requests, Construction Change Directives and Change Orders.
 - 2. Applications for Payment and the Schedule of Values.
- B. Section 01 32 16 - Construction Progress Schedule: Form, content, and administration of schedules.
- C. Section 01 40 00 - Quality Requirements: Test and inspection reports.
- D. Section 01 60 00 - Product Requirements: Requests for substitutions of materials, products, equipment and systems.
- E. Section 01 70 00 - Execution and Closeout Requirements: Additional coordination requirements.
 - 1. Requirements for preparation and submission of operation and maintenance data.
 - 2. Lien and bonding company releases, keys, inspection records from authorities having jurisdiction and insurance documents.
 - 3. Submittals for occupancy, Acceptance and Final Payment.
- F. Section 01 78 00 - Closeout Submittals: Project record documents.
 - 1. Procedures for submitting warranty and guarantee documentation.
- I. Divisions 2 through 33 Sections (as applicable): Procedures for specific submittals specified in those Sections to be made at Contract closeout.

1.03 REFERENCE STANDARDS

- A. AIA G810 - Transmittal Letter; 2001.

1.04 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires responsive action by Construction Manager and Architect or other responsible design professional.
- B. Informational Submittals: Written information that does not require responsive action by Construction Manager and Architect or other responsible design professional.
- C. Unsolicited Submittals: Action or informational submittals not required by the Contract Documents or not requested by the reviewer. Unsolicited submittals may be returned with notation "not reviewed."
- D. Product Data: Standard published information ("catalog cuts") and specially prepared data for the Work of the Contract, including standard illustrations, schedules, brochures, diagrams, performance charts, instructions and other information to illustrate a portion of the Work.
- E. Request for Interpretation (RFI): A document submitted by the Contractor requesting clarification of a portion of the Contract Documents, hereinafter referred to as an RFI.
- F. Samples: Physical examples that demonstrate the materials, finishes, features, workmanship and other characteristics of a portion of the Work. Accepted samples shall serve as quality basis for evaluating the Work.
- G. Shop Drawings, Product Data and Samples: Instruments prepared and submitted by Contractor, for Contractor's benefit, to communicate to Architect the Contractor's understanding of the design intent, for review and comment by Architect on the conformance of the submitted information to the general intent of the design. Shop drawings, product data and samples are not Contract Documents.
- H. Shop Drawings: Drawings, diagrams, schedules and illustrations, with related notes, specially prepared for the Work of the Contract, to illustrate a portion of the Work.
- I. Other Submittals: Technical data, test reports, calculations, surveys, certifications, special warranties and guarantees, operation and maintenance data, extra stock and other submitted information and products shall not be considered as Contract Documents but shall be information from Contractor to Architect to illustrate a portion of the Work for confirmation of understanding of design intent.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROGRESS PHOTOGRAPHS

- A. Submit photographs with each application for payment, taken not more than 3 days prior to submission of application for payment.
- B. Maintain one set of all photographs at project site for reference; same copies as submitted, identified as such.
- C. Photography Type: Digital; electronic files.
- D. Provide photographs of site and construction throughout progress of Work produced by an experienced photographer, acceptable to Architect.
- E. In addition to periodic, recurring views, take photographs of each of the following events:
 - 1. Completion of site clearing.
 - 2. Excavations in progress.

3. Foundation removals in progress and upon completion.
 4. Final completion, minimum of ten (10) photos.
- F. Views:
1. Provide non-aerial photographs from four cardinal views at each specified time, until Date of Substantial Completion.
 2. Consult with Architect for instructions on views required.
 3. Provide factual presentation.
 4. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.
 5. Point of View Sketch: Provide sketch identifying point of view of each photograph.
- G. Digital Photographs: 24 bit color, minimum resolution of 2584 x 1936 ("5 megapixel"), in JPG format; provide files unaltered by photo editing software.
1. Delivery Medium: Via email (for individual photos) and with project record photos on DVD.
 2. File Naming: Include project identification, date and time of view, and view identification.
 3. Point of View Sketch: Include digital copy of point of view sketch with each electronic submittal; include point of view identification in each photo file name.
 4. PDF File: Assemble all photos into printable pages in PDF format, with 2 to 3 photos per page, each photo labeled with file name; one PDF file per submittal.
 5. Photo CD(s): Provide 1 copy including all photos cumulative to date and PDF file(s), with files organized in separate folders by submittal date.
 6. Hard Copy: Printed hardcopy (grayscale) of PDF file and point of view sketch.

3.02 CONTRACTOR'S REQUESTS FOR INTERPRETATION (RFI)

- A. Contractor shall comply with procedures specified herein to make a Request for Interpretation (RFI).
1. Prior to submitting a written RFI, when possible, the Contractor shall have a verbal conversation with the Architect to discuss the item in question.
- B. The Contractor shall request that the Architect make an interpretation of the requirements of the Contract Documents for resolution of the following:
1. Inability to determine from the Contract Documents the exact material, process, or system to be installed;
 2. Or when the elements of construction are required to occupy the same space (interference);
 3. Or when an item of Work is described differently at more than one place in the Contract Documents; .
- C. Submission of RFIs: RFIs shall be prepared and submitted on form acceptable to Architect.
1. Forms shall be completely filled in, and if prepared by hand, shall be fully legible after copying by xerographic process.
 2. Each RFI shall be limited to a single discrete subject.
 3. Each RFI shall be given a discrete, consecutive number.

4. Each page of the RFI and each attachment to the RFI shall bear the Project name, Architect's Project number, date, RFI number and a descriptive title.
 5. Contractor shall sign all RFIs attesting to good faith effort to determine from the Contract Documents the information requested for interpretation.
 6. Make submission of RFIs to Architect.
 7. RFI may be submitted by email as a PDF attachment or through an electronic service if agreed to in advance by all parties.
- D. Subcontractor-Initiated and Supplier-Initiated RFIs:
1. RFIs from subcontractors and material suppliers shall be submitted through, be reviewed by and be attached to an RFI prepared, signed and submitted by Contractor.
 - a. RFIs submitted directly by subcontractors or material suppliers will be returned unanswered to the Contractor.
 2. Contractor shall review all subcontractor- and supplier-initiated RFIs and take actions to resolve issues of coordination, sequencing and layout of the Work.
 - a. RFIs submitted to request clarification of issues related to means, methods, techniques and sequences of construction or for establishing trade jurisdictions and scopes of subcontracts will be returned without interpretation.
 - 1) Such issues are solely the Contractor's responsibility.
 - b. Contractor shall be responsible for delays resulting from the necessity to resubmit an RFI due to insufficient or incorrect information presented in the RFI.
- E. Requested Information:
1. Contractor shall carefully study the Contract Documents to ensure that information sufficient for interpretation of requirements of the Contract Documents is not already included. RFIs that request interpretation of requirements clearly indicated in the Contract Documents will be returned without interpretation.
 2. In all cases in which RFIs are issued to request clarification of issues related to
 3. In all cases, the Contractor shall furnish all information required for the Architect to analyze and/or understand the circumstances causing the RFI and prepare a clarification or direction as to how the Contractor shall proceed for RFIs issued to request clarification of issues related to:
 - a. Means, methods, techniques and sequences of construction, for example
 - b. Pipe and duct routing, clearances;
 - c. Specific locations of Work shown diagrammatically;
 - d. Apparent interferences and similar items.
 4. If information included with this type RFI by the Contractor is insufficient, the RFI will be returned unanswered.
- F. Unacceptable Uses for RFIs: RFIs shall not be used for the following purposes:
1. To request approval of submittals.
 2. To request approval of substitutions. See Section 01 60 00 - Product Requirements.
 3. To request changes that entail change in Contract Time and Contract Sum. (Comply with provisions of the Conditions of the Contract), as discussed in detail during pre-construction conference).

4. To request different methods of performing Work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
- G. Disputed Requirements: In the event the Contractor believes that a clarification by the Architect results in additional cost or time, Contractor shall not proceed with the Work indicated by the RFI until authorized to proceed by the District and claims, if any, are resolved in accordance with provisions in the Conditions of the Contract.
- H. RFI Log: Contractor shall prepare and maintain a log of RFIs, and at any time requested by the Architect or District, the Contractor shall furnish copies of the log showing all outstanding RFIs.
- I. Review Time: Architect will return RFIs to Contractor and District within ten calendar days of receipt.
 1. RFIs received after 12:00 noon shall be considered received on the next regular working day for the purpose of establishing the start of the response period.
 2. Architect will endeavor to respond in a timely fashion to RFIs, in less than the allotted time. Some RFI's could take longer depending on third party responses.

SECTION 01 31 00

PROJECT COORDINATION AND MEETINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Coordination and Coordination Drawings.
- B. Pre-construction meeting.
- C. Progress meetings.
- D. Pre-installation meetings.

1.02 RELATED SECTIONS

- A. Construction Progress Schedule.
- B. Work Sequence and Phasing.
- C. Labor Compliance Program (LCP Coordination).
- D. Submittal Procedures.
- E. Closeout Procedures.
- F. Field Engineering.

1.02 COORDINATION

- A. Coordinate scheduling, submittals and work of the various portions of the Contract Documents to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. When separate or multiple-prime contracts exist, work cooperatively with the DISTRICT and all other CONTRACTORS, subcontractors, suppliers and other entities working on any portion of the Project.
- C. Work closely with the DISTRICT to coordinate work and to maintain the Construction Progress Schedule.
- D. Verify that utility-requirements of equipment to be installed are compatible with building utilities. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment, as well as work of utility companies.
- E. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on drawings. Follow routing shown for pipes, ducts and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance and for repairs.

- F. In finished areas, except as otherwise indicated, conceal pipes, ducts and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- G. In locations where several elements of mechanical and electrical work must be sequenced and positioned with precision in order to fit into available space, prepare Coordination Drawings showing the actual conditions required for the installation prior to purchasing, fabricating or installing the elements required to be coordinated. Submit Coordination Drawings to DISTRICT.
- H. Closing up of walls, partitions or furred spaces, backfilling and other covering up operations shall not proceed until all enclosed or covered work and inspections have been completed. Verify before proceeding.
- I. Coordinate completion and cleanup of work of separate sections in preparation for substantial completion, including portions of work designated for DISTRICT's full and/or partial occupancy).
- J. After DISTRICT occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, in a manner to minimize disruption of DISTRICT's activities.

1.03 PRE-CONSTRUCTION MEETING

- A. The DISTRICT will schedule a pre-construction meeting immediately after receipt of the Notice of Award.
- B. Mandatory attendance includes DISTRICT Representative, INSPECTOR OF RECORD (IOR), Testing Laboratory Representative, ARCHITECT, CONTRACTOR and CONTRACTORS Job Superintendents, and major sub-contractors.
- C. Optional Attendance includes Architect's consultants, subcontractors and utility company representatives.
- D. The DISTRICT Representative will preside at the conference, and will record meeting minutes and distribute copies in a timely manner.
- E. Agenda:
 - 1. Execution of Agreement between DISTRICT and CONTRACTOR.
 - 2. Issue Notice to Proceed.
 - 3. Submission of executed bonds and insurance certificates.
 - 4. Distribution of Contract Documents, Notice of Award, Forms, sample Schedule of Values.
 - 5. Submission of list of subcontractors, list of products.
 - 6. Designation of responsible personnel representing the parties.
 - 7. Procedures for processing of field decisions, submittals, substitutions, applications for payments, proposal requests, change orders, construction directives, and contract closeout procedures.
 - 8. Preliminary Construction Progress Schedule.
 - 9. Critical work sequencing.

10. Submittals, substitutions.
11. Procedures and forms for preparation and maintenance of project record/as-built documents
12. Use of the Project site and parking availability
13. Temporary facilities
14. Equipment deliveries and priorities
15. Safety procedures
16. Security
17. Housekeeping
18. Working hours
19. Labor Compliance Officer presentation
20. Insurance Services including OCIP
21. Environmental Health & Safety
22. Review of Logistics Plan
23. Progress payments
24. Communications procedures
25. Fingerprinting requirements
26. Construction permits
27. Inspections and tests
28. SWPPP
29. Project meetings

1.04 PROGRESS MEETINGS

- A. CONTRACTOR shall schedule and administer progress meetings throughout progress of the work at regular intervals, typically weekly, or more frequently if needed.
- B. CONTRACTOR shall make arrangements for meetings, prepare agenda and preside at meetings, record minutes and distribute copies.
- C. Attendance required: DISTRICT, Architect, IOR, CONTRACTOR.
- D. Agenda:
 1. Review minutes of previous meetings.
 2. Review work progress.
 3. Field observations, problems and decisions.
 4. Identification of problems which impede planned progress.
 5. Review of submittals' status and schedule of submittals.
 6. Review of off-site fabrication progress and delivery schedules.
 7. Maintenance of Progress Schedule.
 8. Corrective measures to regain projected schedules.
 9. Planned progress during succeeding work period.
 10. Coordination of projected progress.
 11. Maintenance of quality and workmanship standards.
 12. Proposed changes and effect on progress schedule and coordination.
 13. Other business appropriate to the status of the Project.

1.05 PRE-INSTALLATION MEETING

- A. When required in individual Specification Sections, convene a pre-installation meeting prior to commencing work of the Section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section, including but not limited to the ARCHITECT, IOR, CONTRACTOR, and affected sub-contractors, manufacturers and fabricators.
- C. Notify DISTRICT and ARCHITECT at least five (5) days in advance of meeting date.
- D. Prepare agenda, preside at conference, record minutes and distribute copies within three (3) days after conference to participants
- E. Review and discuss pre-installation conditions, preparation, installation procedures, coordination with related work, and orientation of Maintenance and Operations personnel.

END OF SECTION

SECTION 01 32 16

CONSTRUCTION PROGRESS SCHEDULE

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide a Construction Progress Schedule ("schedule") for the entire Work, including all necessary and related sub-schedules.
- B. Provide updates of the Schedule and periodic reports as required.

1.02 RELATED SECTIONS

- A. Summary of the Work
- B. Work Sequence and Phasing
- C. Price and Payment Procedures
- D. Project Coordination and Meetings
- E. Submittals
- F. Testing and Inspection
- G. Contract Closeout

1.03 FORM AND CONTENT OF SCHEDULES

- A. Schedule shall be in the form of a computer-generated Critical Path Method (CPM) network in Precedence Diagram Mode (PDM) showing all construction activities required to complete the Work of the Project within the Contract Time and any DISTRICT-defined Milestones.
- B. Schedule shall include but not be limited to the following:
 - 1. Complete sequence, with start and completion dates, of each and every activity of construction or element of the construction process.
 - 2. Phases of construction, with start and completion Milestones, as well as any other Milestones defined by the DISTRICT.
 - 3. Critical submittals, including DISTRICT and ARCHITECT review and approval periods, including 15 workdays for the first submittal (10 days for resubmittal), 21 days when the ARCHITECT's Consultants must review, and 30 days for review of submittals of Structural Steel, Door Hardware, and Steel Doors and Frames.
 - 4. Procurement, manufacture and/or fabrication; testing and delivery to the Project site of special long-lead-time material and equipment.
 - 5. Operational start-up, test and balance, performance testing, and training of operators for systems and equipment; for Substantial Completion and for Final Completion.

6. Temporary facilities; construction of mock-ups, prototypes and/or samples; punch list; interfaces with Separate Work Contracts; and regulatory agency approvals and permits required for performance of the Work.
 7. Deferred Approvals by the Department of the State Architect (DSA), allowing a minimum of ninety (90) days for all Deferred Approval items.
 8. DISTRICT interfaces and owner-furnished equipment, either installed by CONTRACTOR (OFCI) or by OWNER (OFOI).
 9. Decision dates for products specified by allowances, selection of finishes, and other ARCHITECT- or DISTRICT-furnished schedules or decisions.
- C. Schedule shall be updated periodically as specified to show progress of each activity and all changes since the previous submission, including:
1. Major changes in scope.
 2. Activities modified since previous updating.
 3. Revised projections due to changes.
 4. Other identifiable changes.

1.04 QUALITY ASSURANCE

- A. Scheduler: Contractor's personnel or consultant specializing in CPM scheduling shall have five (5) years minimum experience in scheduling construction work of the size and complexity comparable to this Project, including use of Primavera P6 or other as approved by DISTRICT, and shall have use of computer facilities with high-speed Internet access. DISTRICT must approve the Scheduler's resume, experience, and demonstrated skills.
- B. Contractor's Administrative Personnel: Two years minimum experience in using and monitoring CPM schedules on comparable projects.

1.05 SCHEDULE SUBMITTALS

- A. CONTRACTOR shall submit Construction Progress Schedules as follows:
 1. Preliminary Schedule: Submit a preliminary Baseline Schedule within fourteen days after Notice of Award. DISTRICT will review the Preliminary Schedule and return comments within ten workdays.
 2. Initial Schedule: Revise the preliminary Schedule and resubmit within ten days, to provide the Project's Baseline Schedule.
 3. Monthly Schedule Update: While retaining the Baseline Schedule, revise copies to show actual construction progress to date, and submit at scheduled monthly dates, or as otherwise required by the DISTRICT.
 4. In the event that the progress of the Work or the sequencing of the activities of the Work differs significantly from that indicated in the Baseline Schedule, the Contractor shall submit a Recovery Schedule to the DISTRICT, demonstrating the Contractor's plan to recover lost time,

achieve all contractual milestones, and complete the work within the Contract Time. Appropriate recovery actions include, but are not limited to, assignments of additional labor or equipment, shift or overtime work, expediting of submittals or deliveries, overlapping of activities, or sequencing changes to increase activity concurrence. An accompanying narrative shall describe the cause of the problems and the actions planned by the Contractor to recover the schedule. The DISTRICT will review the Recovery Schedule and provide comments, leading to approval of the schedule.

- B. CONTRACTOR shall include with schedule submittals a written narrative report sufficiently comprehensive to explain the basis and determination of CONTRACTOR's approach to the Work, including but not limited to: activity durations; manpower flow; average crew sizes; equipment requirements; production rates; potential problem areas; permits; all necessary coordination with authorities, utilities suppliers, Separate Work Contracts, and other parties; and long lead delivery items requiring more than thirty (30) days from the date of order to delivery on the Project site. Report shall define problem areas, anticipated delays, or other factors having an impact on the Schedule.

1.06 SCHEDULE REQUIREMENTS

- A. Schedule shall represent CONTRACTOR's plan to complete the Work within the Milestones and/or Contract Time. However:
 - 1. A schedule extending beyond the Milestones and/or Contract Time will not be acceptable.
 - 2. A schedule indicating Work completed in less than the Milestones and/or Contract Time will not be acceptable. CONTRACTOR shall indicate any available float.
 - 3. A schedule found unacceptable by the DISTRICT shall be revised by CONTRACTOR and resubmitted within five (5) days.
- B. Schedule shall be in sufficient detail to assure adequate planning and execution of Work, including but not limited to:
 - 1. Start and completion of all items of Work and their major components, and all designated dates identified as Milestones by DISTRICT.
 - 2. Construction activity durations shall be limited to no more than two reporting periods, with exception of fabrication and procurement activities, unless approved otherwise by DISTRICT. Activity durations shall be total of actual workdays to perform and complete that activity and shall not include consideration of weather impact on the activity.
 - 3. Activities for procurement, delivery, and installation of equipment, materials and other supplies, including time for submittals, reviews and re-submittals. Include decision dates for selection of finishes.

4. Time for fabrication and delivery of manufactured products for the Work, showing interdependence of procurement and construction activities.
5. Identify each activity with applicable CSI Specification Division number, and coordinate with the CONTRACTOR's approved "Schedule of Values." Include adequate breakdown of activities for the Mechanical and Electrical elements of the work, to enable accurate monitoring and to assure full coordination with DISTRICT operating personnel.
6. Each activity shall be capable of being cost and resource-loaded with the resulting cost total equal to the Contract Amount
7. Activities shall include all associated interface activities contained within the Contract Documents including, but not limited to, DISTRICT maintenance-and-operations activities
8. Each activity shall be defined to permit reasonable monitoring and evaluation of progress in performance of the Work.
9. Activities shall include:
 - a. A description of what is to be accomplished and where.
 - b. Workday duration.
 - c. Responsibility code identifying the performing party for each individual activity.
 - d. Area of Work coded on each Work activity.
 - e. Phase of Work coded on each Work activity.
10. Network shall show continuous flow from left to right.
11. Network shall be capable of multiple sorts as required for DISTRICT review.
12. Program shall be capable of compiling monetary value of completed and partially completed activities, of accepting revised completion dates and re-computation of all dates and float.
13. Contractor shall not sequester float through strategies such as extending activity durations estimates to consume available float, using preferential logic, using extensive or insufficient crew or resource loading, or by using float-suppression techniques, special lead or lag logic restraints, or imposed dates.
14. Identify days per week and shifts per day worked; also, non-work days and holidays.
15. Identify activities that constitute controlling operations, i.e., Milestones or Critical Path.

16. DISTRICT may require additional coding of activities.

- C. Notwithstanding acceptance of the Schedule, failure to identify and/or include any element of the Contract into the Schedule shall not release CONTRACTOR from obligation of completing all required Work in accordance with the Contract Completion Date or any Milestones.
- D. Submittal of the Schedule shall constitute CONTRACTOR's confirmation that the Schedule meets the requirements of the Contract Documents, and the Work will be executed in the sequence indicated in the Schedule.

1.07 COST LOADING OF SCHEDULE

- A. The Contract Schedule shall contain sufficient detail and information so that the CONTRACTOR can cost load the schedule in accordance with the District's coding structure.
- B. Power, security, telephone, PA/intercom, data, clock, video, fire alarm, and HVAC controls cabling shall not be scheduled together in an activity.
- C. The CONTRACTOR shall assign a cost value to each activity consisting of the sum of labor, material, equipment, overhead, profit, and general conditions costs allocable to that activity. The sum of all such values assigned shall equal the Contract total.
- D. Unless authorized by the DISTRICT, no site-related activity shall have a value exceeding \$100,000. The CONTRACTOR shall not cost load procurement and submittal related activities, unless authorized by the DISTRICT.
- E. For site-stored materials that are eligible for payment as provided by the Contract Documents, the Contractor may load the value of the materials on a one-day delivery activity. Payment for uninstalled materials is limited to major pieces of equipment with a cost value in excess of \$10,000. If the Work includes items covered by allowances, the Contractor shall include one activity in the schedule for each allowance that is loaded with the cost of that allowance. The scheduling of the allowance activities shall reflect the Contractor's best estimate of the duration and sequence of the Work.
- F. Upon District approval of a Change Order, the Contractor shall add separate cost-loaded activities to the Contract Schedule for each Change Order individually. If the DISTRICT so determines, the Contractor must further divide each Change Order as necessary to comply with the District's cost coding system.

1.08 REQUIREMENTS FOR UPDATING AND REVIEW

- A. Prepare updated Schedule by one of following methods:
 - 1. When updating current Schedule with actual Work progress only (non logic changes), status current Schedule with actual start and finish dates, remaining durations, and percent completion of cost and resource loaded activities and submit to DISTRICT and ARCHITECT for review.

2. When updating current Schedule with logic changes, Construction Directives, Change Orders, delay / disruption activities, or recovery plans, prepare an explanatory description or computer-generated fragnet for DISTRICT and ARCHITECT review.
 3. When Work is associated with a Change Order, the adjustments shall be resource-loaded with material unit quantities, corresponding cost account, resources account codes, activity description, accepted costs and time adjustments. The activity ID number shall identify the number of the Change Order.
- B. CONTRACTOR shall attend weekly and monthly Schedule review meetings in order to accomplish the following:
1. Discuss actual activity start and/or completion dates and any applicable variances, forecast activity start and/or completion dates and any applicable variances, progress of all activities underway at the time of the review, and to plan remedial action to mitigate schedule variances.
 2. Identify activities modified by CONTRACTOR since last update.
 3. Indicate changes that may be required to maintain the Milestones and Date of Completion.
- C. Submit updated schedules:
1. With each Application for Payment.
 2. After Milestones, changes in scope, major delays, or other significant points in the construction process.
- 1.09 FAILURE TO COMPLY WITH REQUIREMENTS
- A. If CONTRACTOR fails to comply with the specified requirements, DISTRICT reserves the right to engage an independent scheduling consultant and/or provide its own expertise to fulfill these requirements, and shall be entitled to recover by assessment all incurred costs for the services from the CONTRACTOR.
- B. Submittal of any Schedule is subject to review and acceptance by ARCHITECT and/or DISTRICT. DISTRICT retains the right to withhold progress payments in whole or part until CONTRACTOR submits a Schedule acceptable to DISTRICT.
- 1.10 RECORD DOCUMENTS
- A. Prior to Final Completion of the Work, CONTRACTOR shall submit as-built report and time-scaled network diagram reflecting as-built Project critical paths.

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Submittal Procedures
- B. Shop Drawing Submittals
- C. Product Data Submittals
- D. Samples Submittals
- E. Manufacturers' Instruction Submittals
- F. Manufacturers' Certificate Submittals
- G. Coordination Drawing Submittals
- H. DSA Deferred Approvals

1.02 SUBMITTAL PROCEDURES

- A. Provide submittals wherever required by other sections of this Specification. Transmit ONE (1) electronic copy, and hard copy as requested, of each submittal directly to the ARCHITECT/IOR/DISTRICT/CM on forms prescribed by the ARCHITECT, with a copy of the transmittal form to the DISTRICT. Clearly identify each item submitted. Sequentially number the transmittal forms. For re-submittals use original submittal number with an alphabetic suffix.
 - 1. Include ARCHITECT's job number as it appears on Contract Documents, and all information required by the prescribed form.
 - 2. Include state agency application or approval number.
 - 3. Bind drawing and data submittals sturdily, clearly label covers.
- B. Identify Project, CONTRACTOR, subcontractor or supplier; pertinent Drawing sheet and detail number(s) and specification Section number, as well as name and telephone number of individual who may be contacted for further information.
- C. Determine and verify all field dimensions and conditions, materials, catalog numbers and similar data.
- D. Provide space for CONTRACTOR and ARCHITECT review stamps.
- E. Apply CONTRACTOR's dated stamp with CONTRACTOR's original signature or initials, certifying that review, verification of Products, field dimensions, adjacent construction Work and coordination of information is in accordance with the requirements of the Work and Contract Documents. Stamped signatures or initials are not acceptable.
- F. Identify clearly, on the submittal and the transmittal form, any changes or variations from the Contract Documents. State effect of changes on Construction Progress Schedule and changes required in other Work or products (including "no effect"). Any change not so noted, even though stamped reviewed, will not

be considered approved. Specific written approval by the ARCHITECT must be provided for any deviation from the Contract Documents.

- G. Revise and resubmit submittals as required; identify all changes made since previous submittal.
- H. Coordinate as required with all trades and all public agencies involved.
- I. Unless otherwise specifically authorized by ARCHITECT, make all submittals in groups containing all associated items. ARCHITECT may reject partial submittals as not complying with the provisions of this section.

1.03 SCHEDULES FOR SUBMITTALS

- A. Schedule submittals in accordance with the Construction Progress Schedule, far enough in advance of scheduled dates of installation to provide required time for the review and approval process, including possible revision and resubmittal and for placing orders and securing delivery.
- B. Within thirty (30) days from the Notice of Award, or in accordance with the Project Schedule, whichever is sooner, submit to the ARCHITECT and the DISTRICT for review and acceptance a "Schedule for Submission of Shop Drawings, Product Data, and Samples" ("Submittal Schedule") listing all submittals with planned dates of submission and return approved.
- C. Submittal Schedule will be incorporated into the Construction Progress Schedule. Update and submit revised schedule not less often than monthly.
- D. Allow in the Submittal Schedule sixteen (16) days after receipt for the ARCHITECT's review, both for initial submittals and for resubmittals; more for complex changes.

1.04 SHOP DRAWINGS

- A. Shop Drawings shall include fabrications and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:
 - 1. Dimensions.
 - 2. Identification of products and materials included.
 - 3. Compliance with specified standards.
 - 4. Notation of coordination requirements.
 - 5. Notation of dimensions established by field measurement.
- B. Sheet Size: Except for templates, patterns and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2-inch x 11 inch, but not larger than 30-inch x 42 inch.
- C. Stamp: Each page of shop drawings shall bear the CONTRACTOR's stamp, which shall signify the CONTRACTOR's representation that he has determined and verified materials, field measurements and field construction criteria related

thereto, or will do so, and has checked and coordinated the information contained in the shop drawings. Each stamp shall be accompanied by a wet signature or initial of an employee of the CONTRACTOR who may be contacted for information. Stamped signatures or initials are not acceptable.

- D. Review Process: Make initial submittal of one (1) electronic copy and hard copy as required by AOR of each shop drawing. Comments or corrections will be noted on the reproducible and returned to the CONTRACTOR. If resubmittal is required, CONTRACTOR shall identify all changes made since the previous submittal and resubmit in the same manner. ARCHITECT will stamp or note drawings as follows:

1. "NO EXCEPTION TAKEN" indicating that construction or fabrication may proceed.
2. "MAKE CORRECTIONS NOTED" indicating that no resubmittal is required contingent upon corrections being made.
3. "REJECTED" or "REVISE & RESUBMIT" indicating that corrections shall be made and drawings resubmitted for review.

After the final review, the CONTRACTOR shall copy and distribute the stamped drawings to the ARCHITECT.

- E. The ARCHITECT will review shop drawings for conformance with the requirements of the Contract Documents. The ARCHITECT's favorable review of a separate item shall not indicate acceptance of an assembly in which the item functions.
- F. The ARCHITECT's review of shop drawings shall not relieve the CONTRACTOR of responsibility for any deviation from the requirements of the Contract Documents unless the CONTRACTOR has informed the ARCHITECT in writing of such deviation at the time of submission and the ARCHITECT has given written acceptance to the specific deviation. The ARCHITECT's favorable review shall not relieve the CONTRACTOR from responsibility for errors or omissions in the shop drawings.
- G. No portion of work requiring shop drawings shall be commenced until the shop drawings have been returned with a favorable review by the ARCHITECT.
- H. ARCHITECT's CAD Drawings: The CONTRACTOR may request the use of the ARCHITECT's computer-generated drawings for use in preparing shop drawings. If the ARCHITECT approves this request, any costs incurred must be paid by the CONTRACTOR to the ARCHITECT. The CONTRACTOR must assume all liability for the accuracy and completeness of the shop drawings so prepared, and must hold the ARCHITECT harmless. The request must be in writing to the ARCHITECT, specifying the format and media requested.

1.05 PRODUCT DATA

- A. Product Data includes manufacturers' standard drawings, catalogs, certificates of conformance, substantiating calculations, and similar relevant data as specified in individual Specification sections.
- B. Submit six (6) copies loose-leaf in binders, to facilitate copying of individual sheets. Provide the CONTRACTOR's stamp on the cover sheet of each submittal.
- C. Mark each copy to identify applicable products, models, options and other data. Supplement manufacturers' standard data to provide information unique to this Project.
- D. Review process, corrections, final distribution, and other conditions shall be similar to that for Shop Drawings.

1.06 MANUFACTURER'S CERTIFICATES

- A. When specified in individual specification sections, submit manufacturers' certificates to ARCHITECT for review in quantities specified for Product Data.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or product, but must be acceptable to ARCHITECT.
- D. Review process, corrections, final distribution, and other conditions shall be similar to that for Shop Drawings.

1.07 COORDINATION DRAWINGS

- A. The CONTRACTOR shall prepare and submit for review Coordination Drawings of all major spaces. Coordination Drawings indicate routing, locations, sizes, types and numbers of components for each class of work in concealed spaces where potential conflict may occur between structures, mechanical, electrical, fire sprinklers, communications and ceiling suspension systems. They include both plans and section drawings. (See also the General Requirements Section "PROJECT COORDINATION & MEETINGS.")
- B. Show all systems components, including plan locations of all ceiling penetrations and surface-mounted items. Provide cross sections wherever necessary to indicate proper support of ceilings and non-interference with work of other sections of the specifications. Cross sections shall indicate coordination required and proposed solutions for routing of elements where potential conflict exists.
- C. Drawings shall be based on field measurements, shop drawings and product data. They shall be prepared early enough to allow time to identify and resolve conflicts without delaying the progress of the Work. Conflicts shall be brought to ARCHITECT's attention immediately, together with CONTRACTOR's recommendations for resolution.

- D. Submit the Coordination Drawings in a scale of not less than 1/8" = 1' - 0," with necessary sections and profiles at an appropriate, clearly readable enlarged scale. Submit the coordinated drawings as one reproducible and two prints.
- E. The ARCHITECT will review the submittals, make appropriate notations and comments to ensure the solutions meet the intent of the Contract Documents, and then return to CONTRACTOR for implementation.
- F. It shall be the responsibility of the CONTRACTOR to assure that all fabricators and installers of work involved in the Coordination Drawings be informed, consulted and advised in sufficient advance time to arrive at solutions where no extension of contract time or extra cost to the DISTRICT will be involved.

1.08 DSA DEFERRED APPROVALS

- A. Installation of deferred approval items shall not be started until detailed plans, specifications and engineering calculations have been accepted and signed by the ARCHITECT or Engineer in responsible charge of design and signed by a California registered ARCHITECT or Professional Engineer who has been delegated responsibility covering the work shown on a particular plan or specification, and the design has been approved by the Division of the State Architect (DSA). Deferred approval items for this project are the following:
 - 1. n/a
- B. Deferred approval drawings and specifications become part of the approved documents for the project when they have been approved by the Division of the State ARCHITECT.
- C. Submit electronic files and hard copies of each drawing as required by AOR and DISTRICT.
- D. Submit color electronic copies of calculations, product data and test reports and hardcopies as required by AOR.
- E. Identify and specify all supports, fasteners, spacing, penetrations, etc. for each of the deferred approval items, including calculations for each and all fasteners.
- F. Submit documents to the ARCHITECT for review prior to submitting to the Division of the State Architect. Submission shall be made within 30 days of the award of contract.
- G. Documents shall bear the stamp and signature of the Structural, Mechanical, or Electrical Engineer licensed in the State of California who is responsible for the Work shown on the documents.
- H. ARCHITECT will submit the documents as appropriate to the Project Structural, Mechanical and Electrical Engineers for review. Their review shall only be for conformance with the design intent shown in the Contract Documents.

- J. After review by ARCHITECT, forward submittal to the Division of the State Architect for approval, with copy of the transmittal to the DISTRICT.
- K. Respond to review comments made by the Division of the State Architect and revise and resubmit submittal to DSA for final approval. Provide copies of the DSA-approved documents to the ARCHITECT and the DISTRICT.

END OF SECTION

SECTION 01 33 00 – 1
SUPPLEMENTAL SUBMITTAL PROCEDURES
(For Projects involving demolition and/or hazardous materials abatement)

PART 1 – GENERAL

1.01 SECTION INCLUDES:

- A.** Supplemental Submittal Procedures
- B.** Requests for Information
- C.** Startup Submittals
- D.** Outline of Contractor's Technical Execution Plan

1.02 SUPPLEMENTAL SUBMITTAL PROCEDURES:

- A.** Contractor shall prepare and transmit two copies of each of the following Submittals to the CM:
 - 1.** Contractor shall submit the initial Project Schedule as discussed in this Section.
 - 2.** Contractor shall submit the Contractor's Health & Safety Plan (HASP) as discussed in this Section.
 - 3.** Contractor shall submit a Technical Execution Plan (Work Plan) as discussed in this Section.
 - 4.** Contractor shall submit Contractor's Daily Construction Report electronically by 10:00 A.M. the next Working day. Daily report shall include:
 - a.** Summary of day's activities.
 - b.** Summary of corrective actions that were taken to improve site safety, security, and erosion and sediment control BMPs.
 - c.** Summary of materials imported and exported
 - d.** Listing of equipment that was mobilized or demobilized
 - e.** Summary of any safety issues.
 - f.** Any "Near Miss" observations for the day.
 - g.** Summary of Daily Safety Meeting
 - h.** Summary of day's weather conditions
 - i.** Total number of personnel onsite for the day
 - j.** Listing of personnel onsite
 - k.** Listing of subcontractors onsite
 - l.** Listing of visitors onsite

5. Contractor shall submit weight tickets, Bill of Lading documents, generators initial waste manifest copies and any other form of shipping documents on a daily basis as specified in other Sections of the Specifications.
 6. Contractor shall submit a two week look-ahead schedule at each weekly construction meeting.
 7. Contractor shall submit biweekly revisions and updates of Progress Schedule and Technical Execution Plan as required by the CM.
 8. Contractor shall submit monthly Health and Safety reports, as specified in Specifications Section 01-45-15 – Health and Safety Requirements.
 9. Contractor shall submit weekly safety reports.
 10. Contractor shall submit equipment inspection logs on a daily basis. To be included in the Daily Construction Report.
 11. Additional submittals as described in the Specifications.
- B.** Contractor shall transmit each Submittal to the CM at the Project Site. Each submittal will be reviewed and returned with one of the following Classifications:
1. *No exceptions taken*; Contractor may proceed with the work.
 2. *Conformed as Noted*: Contractor may proceed with the work subject to the comments and/or notes on the Submittal. Re-submittal is not required.
 3. *Revise and Resubmit*: Contractor may not proceed with the work. Re-submittal is required for certain items.
 4. *Rejected*
- C.** Contractor shall develop a submittal register for review at weekly progress meetings. Register shall be based on submittals listed in the Submittal Summary following this section, requirements throughout the Specifications and additional items as deemed necessary by the Construction Manager or Engineer. In the event a submittal is not listed in the Submittal Summary it does not relieve the Contractor from the responsibility to provide such submittal.
- D.** Contractor shall submit copies (with all signatures affixed) of all waste manifests, weigh tickets, Certificates of Destruction, and other shipping documentation.
- E.** Contractor shall transmit each Submittal with a cover letter signed by Contractor's Project Superintendent. Contractor shall, by signing each Submittal, certify that Contractor has reviewed the Submittal, and that the submitted information conforms to the requirements of the Work and these Specifications.
- F.** Contractor shall sequentially number the transmittals (e.g., Submittal No. 001). Contractor shall number revised Submittals with original number and a sequential alphabetic suffix (e.g., Submittal No. 001a).
- G.** Each Submittal shall include Project title, Contractor, Subcontractor or Supplier, title of Submittal, Specifications Section number and, if applicable, Drawing number.

- H. Submittals that do not conform to the requirements of the Specifications shall be returned with a notation of deficiencies. Contractor shall revise to correct noted deficiencies and resubmit. When revised for resubmission, Contractor shall identify all changes made since previous submission.
- I. Submittals must be submitted to the Engineer prior to the execution of work that requires approval of submittal(s) associated with that work.
- J. The Engineer shall be allowed an ample amount of time to review, supply comment, and provide additional review and approval of all submittals.
- K. Submittals not required by the Specifications shall not be recognized or processed.

1.03 REQUESTS FOR INFORMATION:

- A. Contractor shall submit all Requests for Information (RFI) to the Engineer in writing. Requests for information shall be numbered sequentially and shall include the related Specifications Section number or Drawing number.
- B. RFIs shall be used for the purposes of providing clarification, proposing an alternative procedure or method, and providing a platform for discussion with regards to any changes in the work or proposed changes in the work.
- C. The Engineer will provide any revisions to the Specifications or Drawings in writing.
- D. Contractor shall request written confirmation of any interpretations or clarifications provided verbally by the Engineer.

1.04 STARTUP SUBMITTALS:

- A. This paragraph specifies Submittals that Contractor shall prepare and transmit prior to commencing the Work at the Project Site. Additional Submittals are specified in other Sections of these Specifications.
 - 1. Contractor shall submit the initial Project Schedule. The Project Schedule shall identify milestones and shall be consist with the Contractors TEP with regards to Abatement and Demolition sequence. The Project Schedule shall be prepared using Microsoft Project software.
 - 2. Contractor shall submit the Contractor's HASP as specified in Specifications Section 01415 – Health and Safety Requirements, including documentation of worker's OSHA training and medical monitoring and the name and qualifications of the full-time Site Safety and Health Officer.
 - 3. Technical Execution Plan: Certain elements of the Work require the Contractor to provide detailed written information for review, comment, and approval by the Engineer prior to the execution of the work. Prior to commencing any work on the site, Contractor shall submit a draft Technical Execution Plan (TEP), conforming to the outline specified in Paragraph 1.05, for the Engineer's review and comment. Contractor shall revise the draft TEP as requested by the Engineer and submit a final TEP, subject to the Engineer's review, approval, and acceptance, prior to commencing Work. Any material changes in the Work, process, staffing, major equipment or materials will require a TEP amendment and review and approval by the Engineer.

4. Contractor shall file required notifications of abatement and/or demolition activities with appropriate regulatory agencies prior to initiation of regulated site activities. Copies of all such notifications shall be submitted to Engineer concurrent with Contractor's submittal to said regulatory agencies.
5. Contractor shall provide for Engineer's approval the name and qualifications of Subcontractors providing any sampling, laboratory analyses, geotechnical, material testing or surveying services as required in the Specifications and/or contract documents.

1.05 OUTLINE OF CONTRACTOR'S TECHNICAL EXECUTION PLAN

- A. Contractor shall prepare and submit a Proposed Technical Execution Plan to the Engineer at least 10 days prior to the planned start of site work. The Technical Execution Plan shall, at a minimum, include the following sections:

1. Project Coordination.

- a. Detailed Project staffing plan showing staffing levels for each task and phase of Work. Note: No undocumented workers are allowed to work on site.
- b. Resume of key project staff including proposed Project Superintendent(s).
- c. List of all proposed subcontractors, including hazardous material abatement companies, transportation companies, and disposal facilities.
- d. List of major equipment and materials.
- e. List of Permits and Approvals to be obtained by Contractor, including contact names, titles, and phone numbers.

2. Progress Schedule.

- a. Include Contractor's initial Baseline Project Schedule, including line items for all major project work elements.

3. Construction Facilities and Temporary Controls.

- a. Locations, sizes, and requirements for utility services.
- b. Layout of Work Zones
- c. Proposed design of Abatement Enclosures and Decontamination Stations.
- d. Decontamination Methods and Equipment.

Procedures to prevent contamination of clean areas.

Vehicle decontamination and inspection procedures.

Procedures for collection, treatment, and disposal or discharge of decontamination residuals and used PPE.

4. Erosion and Sediment Control

- a. Proposed detail description and design of Erosion and Sediment controls to be used during demolition activities.
 - b. The Contractor shall implement storm water best management practices in general conformance with the requirements of the California Storm Water Quality Association (CASQA) Storm water Best Management Practice Handbook, Revised August 2011.
- 5. Site Security Requirements.
 - a. Detailed plan describing site security measures to be used during working and non-working hours to prevent unauthorized access to the property.
- 6. Notifications and Permits.
 - a. List of all required Permits and Notifications.
 - b. Proof of submittal of required notifications to appropriate regulatory agencies (Demolition and abatement notifications, etc.)
 - c. Description of information and assistance required for Contractor to obtain above-referenced notifications and permits.
- 7. Asbestos and Lead Paint Abatement and Regulated Waste Work Plan. (If applicable)
 - a. Identify proposed asbestos and lead paint abatement subcontractor to be used, if work will not be performed by Contractor. Include detailed work procedures to be used in the removal and demolition of the asbestos containing material, lead paint material, and universal waste. Contractor shall review the Asbestos Specifications and Hazardous Materials Survey Report provided in the Appendices. The work plan will identify proposed asbestos, lead paint, and regulated waste disposal and recycling facilities. Included within the plan written certification as specified herein that employees have received appropriate training regarding hazards of asbestos and lead paint exposure, respirator use, personnel decontamination, procedures and OSHA regulations. The Contractor shall provide proof of appropriate licenses to perform the Work. Additional information to be submitted from Asbestos abatement contractor are:
 - b. Equipment List;
 - c. Proof of Worker Training and required Medical Examinations;
 - d. Proof of employee respirator fit testing, and
 - e. Contractor and subcontractor's Respiratory Protection Plans.
- 8. Building Demolition Plan.
 - a. Proposed sequence of demolition work.
 - b. Planned methods and equipment to be used for demolition activities.

- c. Procedures and measures to ensure that workers as well as unauthorized personnel, both during and outside of working hours are safely away from the buildings especially during active demolition.
 - d. Description of utility termination process.
 - e. Proposed methods of protecting in place specified utilities.
 - f. Proposed debris and salvage stockpile locations.
 - g. Equipment and procedures to be employed to control dust and noise.
 - h. Dust and noise monitoring procedures.
- 9. Stockpile Management and Loading.
 - a. Show on-site truck routes and loading areas for off-site transportation.
 - b. Truck loading areas, staging areas for incoming empty trucks.
 - c. Coordination of demolition, stockpiling, and loading.
- 10. Off-site Transportation and Traffic Control Plan.
 - a. Provide an estimate, by day, of the expected quantities of material to be shipped from the site. Describe the number of trucks to be used, the expected turn-around-times, and the expected number of trips per day.
 - b. If onsite truck scales are employed, describe locations and equipment to be used to weigh haul trucks. Include frequency for obtaining true weight of trucks.
 - c. Provide a Traffic Control Plan showing how trucks will enter and exit the site, the location of flaggers and signs, designated haul route to and from the off-site disposal facilities with posted speed limits, warnings, etc., and incident reporting procedures for trucking related incidents. The Traffic Control Plan shall establish truck staging area located in area approved by District representative and/or as detailed in contract documents.
 - d. Provide a plan for verifying the accuracy of weight scales if employed.
 - e. Describe procedures to inspect trucks and loads before leaving the site to ensure nothing falls off the truck on roads and highways.
- 11. Site Cleanup
 - a. Describe the method for site clean-up activities and disposal of materials (fine debris, trash, etc.). This includes, but will not be limited to, preventing cross contamination of waste streams and quality control procedures to ensure hazardous materials are not mixed with nonhazardous materials; Describe dust mitigation during site clean-up activities.
- 12. Site Specific Health and Safety Plan (HASP).

- a.** Provide a HASP, including measures to be taken for operational and worker safety, protection of the general public, and measures to control exposure to airborne dusts, asbestos, lead-based paint, as well as hazards related to demolition activities.
 - b.** Contractor's HASP shall designate a qualified, dedicated Site Safety and Health Officer (SSHO) to be present on the Project site during the Work.

13. Disposal and Recycling Facilities.

- a.** List of proposed disposal and recycling facilities to be used and their daily capacities for this project.

END OF SECTION

SECTION 01 35 16

ALTERATION PROJECT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Products and installation for patching and extending Work.
- B. Transitions and adjustments.
- C. Repair of damaged surfaces, finishes and cleaning.

PART 2 PRODUCTS

2.01 PRODUCTS FOR PATCHING AND EXTENDING WORK

- A. New Materials: As specified in product Sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspection, and testing products where necessary, referring to existing work as a standard.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that demolition is complete and areas are ready for installation of new Work.
- B. Beginning of renovation work means acceptance of existing conditions.

3.02 PREPARATION

- A. Move, cut, or remove items as necessary for access to alterations and renovation work. Replace and restore at completion.
- B. Remove unsuitable material not marked for salvage, such as rotted wood, corroded metals and deteriorated masonry and concrete. Replace materials as specified for finished work.
- C. Remove debris and abandoned items from area and from concealed spaces.
- D. Prepare surface and remove surface finishes to provide for proper installation of new work and finishes.
- E. Close openings in exterior surfaces to protect existing work and salvage items from weather and extremes of temperature and humidity. Insulate ductwork and piping to prevent condensation in exposed areas.

3.03 INSTALLATION

- A. Coordinate work of alterations and renovations to expedite completion sequentially and to accommodate District occupancy.
- B. Remove, cut and patch work in a manner to minimize damage and to provide a means of restoring products and finishes to original or specified condition.
- C. Refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material with a neat transition to adjacent finishes.
- D. Restore existing and remaining plumbing, heating, ventilating and air conditioning, electrical and fire alarm systems to full operating condition and advise ARCHITECT of any deficiencies discovered during the course of the work.
- E. Install products as specified in individual Sections.

3.04 TRANSITIONS

- A. Where new work abuts or aligns with existing, perform a smooth and even transition. Patched work shall match existing adjacent work in texture and appearance.
- B. When finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to ARCHITECT for a satisfactory resolution.

3.05 ADJUSTMENTS

- A. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls and ceilings to a smooth plane without breaks, steps or bulkheads.
- B. Where a change of plane of 1/4 inch or more occurs, request instructions from ARCHITECT.
- C. Trim existing doors as necessary to clear new floor finish. Refinish trim as required.
- D. Fit work at penetrations in fire-rated assemblies as specified in "Cutting and Patching" section.

3.06 REPAIR OF DAMAGED SURFACES

- A. Patch or replace portions of existing surfaces which are damaged, lifted, discolored or showing other imperfections.
- B. Repair substrate prior to patching finish.

3.07 FINISHES

- A. Finish surfaces as specified in individual product Sections.
- B. Finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, refinish entire surface to nearest intersections.

3.08 CLEANING

- A. Conform to "Contract Closeout" requirements.

END OF SECTION

SECTION 01 42 19

REFERENCE STANDARDS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Definitions.
- B. Specification format and content.
- C. Industry standards.
- D. Codes and standards.
- E. Governing regulations/authorities.

1.2 DEFINITIONS

- A. General: Basic contract definitions are included in the General Conditions.
- B. Regulations: Includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the work.

1.3 SPECIFICATION FORMAT AND CONTENT

- A. Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 50-Division Master Format 2016 numbering system.
- B. The sections are placed in the Project Manual in numeric sequence; however, this sequence is not complete and the Table of Contents of the specifications must be consulted to determine the total listing of sections.
- C. The section title is not intended to limit the meaning or content of the section, nor to be fully descriptive of the requirements specified therein.
- D. The organization of the specifications shall not control the division of the work among subcontractors or establish the extent of work to be performed by any trade.
- E. Specifications use certain conventions regarding style of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are:
 - 1. Language used in Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words that are implied,

but not stated, shall be interpolated as the sense requires. Singular words shall be interpreted as plural and plural words interpreted as singular where applicable to maintain the context of the Contract Document indicated.

2. Imperative and streamlined language is generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. Subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor, or by others when so noted.
3. The words "shall be" are implied wherever a colon (:) is used within a sentence or phrase.

1.4 INDUSTRY STANDARDS

- A. Except where Contract Documents include more stringent requirements, applicable construction industry standards shall apply as if bound into the Contract Documents to the extent referenced. Such standards are made part of Contract Documents by reference.
- B. Conform to reference standard by date of issue current on date for receiving bids except when a specific date is indicated.
- C. Where compliance with 2 or more standards is specified and where standards may establish different or conflicting requirements for quantities or quality levels, the more stringent, higher quality and greater quantity of work shall apply.
- D. The quantity or quality level shown or specified shall be the minimum provided or performed. Indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements.
- E. Each entity engaged in construction of the work is required to be familiar with industry standards applicable to its construction activity.
- F. Copies of applicable standards are not bound with the Contract Documents. Where copies of standards are needed to perform a required activity, Contractor shall obtain copies directly from publication source.
- G. Trade associations names and titles of general standards are frequently abbreviated. Where such abbreviations are used in the Specifications or other Contract Documents, they shall mean the recognized trade association, standards-generating organization, authority having jurisdiction, or other entity applicable to the content of the text provision. Refer to the "Encyclopedia of Associations", published by Gale Research Co., available in most libraries.
- H. Refer to individual specification sections and related drawings for names and abbreviations of trade associations and standards applicable to specific portions of the work. In particular, refer to Division 23 for names and abbreviations applicable to

mechanical work, and refer to Division 26 for names and abbreviations applicable to electrical work.

- I. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.5 CODES AND STANDARDS

- A. Latest edition of pertaining ordinances, laws, rules, codes, regulations, standards, and others of public agencies having jurisdiction of the work are intended wherever reference is made in either the singular or plural to Code or Building Code except as otherwise specified, including but not limited to latest edition of those in the following listing.

- | | | |
|----|---|--|
| 1. | 2019 California Building Standards
Administrative Code (CBSAC),
California Code of Regulations (CCR),
Title 24, Part 1 | |
| 2. | 2019 California Building Code (CBC)
California Code of Regulations (CCR)
Title 24, Part 2 | (2015 International Building Code
(IBC) with California amendments) |
| 3. | 2019 California Electrical Code (CEC)
California Code of Regulations (CCR)
Title 24, Part 3 | (2014 National Electric Code (NEC)
with California amendments) |
| 4. | 2019 California Mechanical Code (CMC)
California Code of Regulations (CCR)
Title 24, Part 4 | (2015 Uniform Mechanical Code
(UMC) with California
amendments) |
| 5. | 2019 California Plumbing Code (CPC)
California Code of Regulations (CCR)
Title 24, Part 5 | (2015 Uniform Plumbing Code
(UPC) with California amendments) |

6. 2019 California Energy Code,
California Code of Regulations (CCR)
Title 24, Part 6
7. 2019 California Fire Code (CFC)
California Code of Regulations (CCR)
Title 24, Part 9 (2015 International Fire Code (IFC)
with California Amendments)
8. 1990 State Fire Marshal Regulations
California Code of Regulations (CCR)
Title 19 (As amended to date)
9. 2019 California Existing Building Code
(CEBC) California Code of Regulations
(CCR) Title 24, Part 10 (2015) International Existing
Building Code (IEBC) with
California Amendment

10. 2019 California Green Building Standards Code (CALGreen) California Code of Regulations (CCR) Title 24, Part 11.
11. 2019 State Referenced Standards Code (CRSC) California Code of Regulations (CCR) Title 24, Part 12
12. California Elevator Safety Code, California Code of Regulations (CCR) Title 8. (As amended to date)
13. 2010 Americans with Disabilities Act (ADA) Standards for Accessible Design. (ADAS)

1.6 GOVERNING REGULATIONS/AUTHORITIES

- A. Authorities having jurisdiction have been contacted where necessary to obtain information for preparation of Contract Documents. Contact authorities having jurisdiction directly for information having a bearing on the work.
- B. Comply with all federal, state and local laws, ordinances, rules and regulations indicated and which bear on the conduct of the work.

2. PART 2 PRODUCTS

Not Used

3. PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 43 00
QUALITY ASSURANCE

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Interpretation of requirements.
- B. Quality assurance and control of installation.
- C. Tolerances.
- D. Field samples.
- E. Mock-up.
- F. Manufacturers' field services and reports.

1.2 INTERPRETATION OF REQUIREMENTS

- A. If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement.
- B. The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation shall comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits.
- C. Where codes or specified standards indicate higher standards, more stringent tolerances or more precise workmanship than levels shown or specified, comply with most stringent requirements.
- D. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.

1.3 QUALITY ASSURANCE/CONTROL OF INSTALLATION

- A. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this project, whose work has resulted in construction with a record of successful in-service performance.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and - control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
- E. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- F. Comply fully with manufacturers' instructions, including each step in sequence.
- G. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- H. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.4 TOLERANCES

- A. Monitor tolerance control of installed products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturer's tolerances. Should manufacturer's tolerance conflict with Contract Documents, request clarification from Architect before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

1.5 FIELD SAMPLES

- A. Install field samples at the site as required by individual specifications sections for review.
- B. Acceptable samples represent a quality level for the Work.
- C. Where field sample is specified in individual sections to be removed, clear area after field sample has been reviewed by Architect.

1.6 MANUFACTURERS' FIELD SERVICES AND REPORTS

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance of equipment and other field services as applicable, and to initiate instructions when necessary.

- B. Individuals to report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- C. Submit report in duplicate within 15 days of observation to Architect for review.

2. PART 2 PRODUCTS

Not Used

3. PART 3 EXECUTION

3.1 GENERAL INSTALLATION

- A. Comply with requirements specified in Section 01 73 00.

3.2 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Verify that utility services are available, of the correct characteristics, and in the correct locations.

3.3 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

END OF SECTION

SECTION 01 45 00

QUALITY CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Quality assurance and control of installation
- B. Reference Standards
- C. Field Samples
- D. Mock-up
- E. Project Inspector
- F. Permits and Fees
- G. Verified Reports
- H. Manufacturers' field services and reports

1.02 QUALITY ASSURANCE/CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions and workmanship to produce work of specified quality.
- B. Comply fully with manufacturers' instructions including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- D. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes or specified requirements indicate higher standards or more precise workmanship.
- E. Perform work by persons qualified to produce workmanship of specified quality.
- F. Where experience minimums for workmen, applicators, companies or manufacturers are required in individual sections, written certification and documentation substantiating such minimums shall be submitted and approved by the Architect, when requested.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.03 REFERENCE STANDARDS

- A. Conform to reference standard by date of issue current on date of Contract Documents.
- B. Obtain copies of standards when required by Contract Documents.
- C. Should specified reference standards conflict with Contract Documents, request clarification from the Architect before proceeding.

- D. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.04 FIELD SAMPLES

- A. Install field samples at the site as required by individual specifications Sections for review by Architect.
- B. Accepted samples represent a quality level for the Work.
- C. Where field sample is specified in individual Sections to be removed, clear area after field sample has been accepted by Architect and is no longer required for reference.

1.05 MOCK-UP

- A. Tests will be performed under provisions identified in this section.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals and finishes.
- C. Where mock-up is specified in individual Sections to be removed, clear area after mock-up has been accepted by Architect and is no longer required for reference.

1.06 PROJECT INSPECTOR

- A. An Inspector, herein referred to as the "Project Inspector" or "Inspector of Record", will be employed by the District and approved by Office of Regulation Services, Division of State Architect (ORS/DSA) in accordance with Part 1, Title 24, Section 4-333, California Code of Regulations. His duties are described in Part 1, Title 24, Section 4-342, CCR. His duties are also required and defined in Sections 17309, 17311, 81141 and 81143 of the California Education Code as they relate to schools.
- B. The work of construction in all stages of progress shall be subject to the personal continuous observation of the Inspector of Record (IOR). He shall have free access to any or all part of the work at any time. The Contractor shall furnish the Inspector reasonable facilities for obtaining such information as may be necessary to keep him fully informed respecting the progress and manner of the work and the character of the materials. Inspection of the work shall not relieve the Contractor from any obligation to fulfill the requirements of this Contract.

1.07 VERIFIED REPORTS

- A. Contractor shall comply with Part 1, Title 24, Sections 4-336 and 4-343, California Code of Regulations and issue verified reports through the Architect as required.

1.08 MANUFACTURERS' FIELD SERVICES AND REPORTS

- A. When specified in individual specification Sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment and as applicable and to initiate instructions when necessary.
- B. Manufacturers' Representatives shall report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- C. Submit report of observation to Architect for review.

END OF SECTION

SECTION 01 45 15

HEALTH AND SAFETY REQUIREMENTS

PART 1 – GENERAL

1.01 SECTION INCLUDES:

- A.** Summary
- B.** References
- C.** Contractor's Responsibility for Health and Safety
- D.** Submittals
- E.** Notifications
- F.** Equipment and Facilities
- G.** Personal Protective Equipment
- H.** Other Health and Safety Equipment
- I.** Training
- J.** Work Planning and Meetings
- K.** Engineering Controls
- L.** Monitoring
- M.** Evaluation of Performance
- N.** Site Security - Other Safety Considerations
- O.** Work by Others
- P.** EHS Incident Report Form
- Q.** Hot Work Permit Form
- R.** Job Safety and Hazard Analysis Form

1.02 SUMMARY:

- A.** This Section includes requirements for Health and Safety during performance of Work, including identification of applicable Laws and Regulations, Submittals, notification requirements, and Health and Safety Specifications.

1.03 REFERENCES:

- A.** Applicable regulations and publications include, but are not limited to, the following:
 - 1. ANSI, Emergency Eyewash and Shower Equipment, Z358.1, 1981.
 - 2. ANSI, Practice for Occupational and Educational Eye and Face Protection, Z87.1, 1979.
 - 3. ANSI, Protective Footwear, Z41.1, 1983.
 - 4. DOT Standards and Regulations, 49 CFR 171, 49 CFR 172 and 49 CFR 214.
 - 5. NFPA, Flammable and Combustible Liquids Code, NFPA 30, most recent revision.
 - 6. OSHA, Title 29 CFR Part 1910, Occupational Safety and Health Standards, and Title 29 CFR Part 1926, Safety and Health Regulations for Construction Sites.
 - 7. USEPA, Health and Safety Requirements for Personnel Engaged in Field Activities, USEPA Order No. 14402.
 - 8. USEPA, Standard Operating Safety Guidelines, November 1984.
 - 9. Title 8, California Code of Regulations, Section 1532.1, Lead. Cal/OSHA
 - 10. Title 8, California Code of Regulations, Section 1529. Asbestos. Cal/OSHA
 - 11. Title 8, California Code of Regulations, Section 1529(I)(2), Asbestos Waste Disposal, Cal/OSHA

12. South Coast Air Quality Management District (SCAQMD) regulations including but not limited to Rule 402, 403, and 1403)

Where two or more regulations/documents conflict, the one(s) offering the greatest degree of protection shall apply.

1.04 CONTRACTOR'S RESPONSIBILITY FOR HEALTH AND SAFETY:

- A.** Contractor shall comply with any and all state, federal, and local Ordinances, Laws and Regulations.
1. Contractor shall be responsible for the Health and Safety of Contractor's employees, its Subcontractors, Suppliers, agents, inspectors, visitors, the general public, and any others associated with or interacting with Contractor who provides labor, goods, or other services on the Project site.
 2. Contractor shall be responsible for emergency response planning and notification, and for actual response to any and all emergencies that may occur during the course of the Work, including emergencies that may occur when Contractor is not present at the Project site.
 3. Contractor is responsible for communicating daily with the District Representative regarding Health and Safety issues for the District Representative's safe conduct of the District Representative's duties, but such communication shall not imply any duty or responsibility on the part of the District Representative with regard to Health and Safety of Contractor's employees, its Subcontractors, Suppliers, the general public, or others. The District Representative's responsibility and duty with regard to Health and Safety shall be limited to the District Representative's employees. Contractor shall have responsibility and duty to the District Representative to communicate Health and Safety issues accurately and in a timely manner to allow the District Representative to take appropriate actions to protect the District Representative's employees and the Owner's employees.
 4. Contractor shall designate a dedicated Site Safety and Health Officer (SSHO) on the Project site during the Work.
 - A.** The SSHO duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs associated with the Contractor's activities at the Project site. The designated SSHO shall be certified in applicable OSHA Construction Safety training. At a minimum, the designated SSHO shall have at least 1 year of experience as a SSHO on demolition and construction sites. Contractor's SSHO shall be solely dedicated to Health and Safety issues from the start of the site activities through completion.
 - B.** The SSHO shall enforce the requirements of safety for all Contractor personnel onsite at all times. The SSHO shall ensure that all Contractor personnel, Subcontractor personnel, and Contractor visitors follow the Contractor's site Health and Safety Plan (HASP), including wearing the designated level of PPE. If the SSHO elects to require a higher level of protection than that specified in the District Representative's HASP, the extra costs associated with such higher level shall be borne by Contractor, unless such extra costs are approved in advance in writing by the District Representative.
 - C.** Prior to mobilization and continually through the duration of the Work, the SSHO shall inspect the Project site and document area-specific and worker-specific protection requirements.

- D. After mobilization, the SSHO shall monitor activities and shall document the need for additional worker protection as required, based on activities performed and Action Levels specified in the HASP.
- E. The SSHO shall verify that all activities are performed in accordance with the HASP and all federal, state, local, and Health and Safety standards, Laws and Regulations, and guidelines.
- F. In the event of a health or safety risk, as determined by the SSHO or by other Contractor personnel or by the District Representative, Contractor shall not proceed with the Work until a method for handling the risk has been determined in consultation with the District Representative and implemented. Any health or safety risk resulting in a stoppage of Work shall be reported immediately to the District Representative.

Contractor shall be responsible for implementing a behavior-based safety process and providing site training, observation, and feedback for Contractor personnel employed at the Site.

District Representative shall provide the Contractor with a copy of the District Representative's HASP as a reference. Contractor shall be responsible for preparing their own HASP under which their employees shall work.

1.05 SUBMITTALS:

- A. Contractor shall prepare and submit a HASP to the District Representative as a part of the TEP. The Contractor shall follow all applicable local, state, and federal Health and Safety standards, Laws and Regulations, and guidelines implemented through, but not limited to, CalOSHA, SCAQMD, OSHA and USEPA. Where these are in conflict, the most stringent requirement shall be followed. The following points shall be addressed in the Contractor's HASP:
 - i. Names of key personnel and alternates responsible for Health and Safety, including a Contractor Health and Safety Representative and SSHO. The District Representative must approve the SSHO.
- 2. A Health and Safety risk or Task Hazard Analysis (THA) associated with each portion of the Work (i.e., list potential hazards), including THAs for abatement, demolition, construction of retaining structures, loading and transportation of demolition debris and materials, decontamination, truck traffic, and restoration.
- 3. A requirement that Contractor locate Underground Facilities by using Southern California "Dig Alert" procedures prior to the start of the Work.
- 4. PPE to be used for each of the site tasks and operations being conducted, as required by Cal/OSHA and 29 CFR Subpart I, and 29 CFR 1926.
- 5. Frequency and types of dust monitoring and instrumentation to be used by the Contractor, including methods of maintenance and calibration of monitoring and sampling equipment. Dust monitoring requirements will be determined by the South Coast Air Quality Management District (SCAQMD Rule 403).
- 6. Corrective actions and upgrading of PPE based on monitoring of dust, with specific Action Levels identified.
- 7. Site control measures in accordance with the control program required Cal/OSHA and OSHA.
- 8. Decontamination procedures in accordance with Specifications.
- 9. An emergency response plan meeting federal, state, and local requirements for safe and effective responses to emergencies, including the necessary PPE and other equipment. Explanation of potential emergencies and contingency plan of

action, including description of the route to the nearest appropriate hospital, hospital route map, and posting of emergency telephone numbers at the Project site.

10. If confined space entry is required, include confined space entry procedures in accordance with Cal/OSHA Title 8, Subchapter 7 § 5157 Permit Required Confined Spaces and a list of all anticipated confined space entries required by Contractor in the course of the Work.
11. A spill containment program meeting the requirements of all applicable local, state, and federal Health and Safety standards.
12. A list of Health and Safety and emergency equipment available on the Site.
13. A description of engineering controls used to reduce the hazards of equipment operation.
14. Training for emergency response procedures as outlined in the District Representative's HASP.
15. Heat stress program consistent with the references provided in the District Representative's HASP.
16. Cold stress program consistent with the references provided in the District Representative's HASP.
17. Lockout/Tagout where the operation of machinery and/or equipment in which the unexpected energization on start up or the release of stored energy could cause injury to personnel.
18. Measures in place to ensure accountability of the location of all workers onsite at all times specifically to prevent workers from entering into unsafe areas such as buildings being demolished;
19. Measures in place to verify that unauthorized personnel such as passersby and homeless personnel have not entered the site prior to beginning of demolition in the morning, after lunch or other times when the site is momentarily left unattended;
20. Securing the site each night to ensure there are no large pieces of metal, brick, concrete, etc. that might fall on workers during the next shift or unauthorized people that might enter the site after hours;
21. Ensuring that all holes and pits where personnel might fall or trip are covered, backfilled fenced or barricaded as needed to prevent injuries;

- 1.06 Contractor's Daily Construction Report, submitted in accordance with Specifications Section 01330, shall include a summary of daily safety issues and a summary of Contractor's Daily Safety Meeting.

A. Contractor shall submit weekly safety reports that include:

1. The names of all Contractor and Subcontractor personnel employed at the Site at any time during the week, and the names and duties of key personnel including Contractor's Project Manager, Project Superintendent, SSHO, and all competent personnel.
2. A summary of all Health and Safety incidents describing any medical treatment that was provided during the week, the current Work status of any individuals affected the names of individuals who may have observed the incident, and actions taken by Contractor to address the unsafe act or unsafe condition.
3. A summary of all Health and Safety near-misses or observations providing an opportunity for shared learning and future hazard avoidance. For any Health or Safety incident or near-miss, list the date, the nature of the incident or near-miss, and the names of individuals involved.
4. The total number of labor hours worked at the Site during that week.

- 5. Internal Health and Safety audits performed by the Contractor as part of the Contractor's HASP.
- 6. Results of Contractor behavioral observation and feedback evaluations as described in the District Representative's HASP.
- B. Contractor shall submit documentation of training and experience for the designated competent persons.
- C. Contractor shall maintain all required and applicable training records on-site including, but not limited to those specified in Part 3.01 (A) of this Section.
- D. Contractor shall submit a Hot Work Permit for any torch cutting, or activities that generate sparks. If the Contractor does not have a permit format readily available, they may request a permit from the District Representative.
- E. Contractor shall conduct a THA for significant activities and submit the documentation to the District Representative for review prior to the start of the activities. Contractor's THA shall be submitted on the THA forms attached to this Section, or other form acceptable to the District Representative.
- F. Contractor shall submit copies of all daily equipment inspections completed.

1.07 NOTIFICATIONS:

- A. Contractor shall immediately (within 30 minutes) verbally report to the District Representative the occurrence of any and all Health and Safety incidents. A Supervisor's Accident/ Incident Report (SAIR), which may be requested from the District Representative, shall be submitted within 24 hours of occurrence of the incident or issue.
- B. Contractor shall immediately and fully investigate any such incident or near-miss and conduct a root cause analysis, and shall submit to the District Representative, the Contractor's written corrective action plan for such incident within one day after the incident occurs in accordance with Specifications Section 01330 – Submittal Procedures.
- C. Contractor shall notify the District Representative in writing at least 5 days prior to bringing any hazardous material, equipment, or process to the site, or using the same on the Site. Contractor shall provide the District Representative with a MSDS for all chemicals brought on to the Site.
- D. Contractor shall immediately notify the District Representative in writing of any hazard that Contractor discovers or observes on the site and corrective measures planned or taken to eliminate or minimize such hazard. Hazard reporting will be completed as a Near Miss Report as described in 1.05(C)(3) of this Section.

PART 2 – PRODUCTS

2.01 EQUIPMENT AND FACILITIES:

- A. Contractor shall provide all equipment, temporary facilities, and personnel required to perform activities onsite safely in accordance with all Laws and Regulations and standards, and with the Contractor's HASP.

2.02 PERSONAL PROTECTIVE EQUIPMENT:

- A. The appropriate level of PPE shall be determined by the Contractor for specific tasks as described in the Contractor's HASP. If hazards are identified that require a level of protection greater than Level D (defined in paragraph C below), Work shall be suspended and the District Representative notified. The Contractor's SSO, in consultation with the District Representative, shall determine what actions are required prior to restarting Work. Contractor shall determine and document the appropriateness of suggested minimum PPE requirements for Contractor's employees and others at the Project site.
- B. Contractor shall furnish and maintain materials and equipment for the Health and Safety of Contractor employees, its Subcontractors, Suppliers, and visitor personnel. Contractor shall

provide all required Health and Safety equipment, first aid equipment, tools, monitoring equipment, PPE, and ancillary equipment and methods required to ensure workers' Health and Safety and to comply with the Contractor's HASP. District Representative will furnish PPE and monitoring for District Representative's employees.

- C. Level D protection will be required at all times while onsite by all personnel and visitors. Level D PPE consists of:
 - 1. Hard hat
 - 2. Steel-toed boots
 - 3. Safety glasses with permanent side shields
 - 4. Work clothes (long pants, shirts with sleeves)
 - 5. High visibility reflective safety vests
 - 6. Hearing protection (as needed to prevent exposure exceeding 85 dB level) if noise level warrants.
- D. In most cases, Level D will be the maximum allowed level of PPE. Level C may be required as certain hazards are faced provided that personnel are properly trained and certified. Contractor shall notify District Representative immediately when upgrades to Level C are employed by the Contractor.
- E. In cases where the Owner requires additional PPE, the District Representative will notify the Contractor of these additional requirements in advance of mobilization so that Contractor may obtain the necessary equipment.

2.03 OTHER HEALTH AND SAFETY EQUIPMENT:

- A. Contractor is required to have the following equipment available on the Site for the Health and Safety of Contractor, Subcontractors, Suppliers, and visitors:
 - 1. First aid kits
 - 2. Fire suppression equipment (appropriate to location and type of flammable materials present). Equipment will be certified ready for use within the previous twelve months and will also have been inspected each month; documentation supporting certification and inspections will be available for review.
 - 3. Emergency eyewash facilities meeting OSHA specifications
 - 4. Other equipment or supplies as determined to be necessary or prudent by Contractor or the District Representative
 - 5. Flammable liquids storage cabinet(s), if necessary
 - 6. Fall protection equipment appropriate for the hazards on the project
 - 7. Heavy blankets

PART 3 – EXECUTION

3.01 WORKER QUALIFICATION:

- A. Contractor shall provide the following training to each worker, unless otherwise specified:
 - 1. Cal OSHA, OSHA, AHERA, and or California Department of Public Health (CDPH) compliant worker training as required by regulations including but not limited to CCR Title 8, 29 CFR, and 40 CFR.
 - 2. Current cardiopulmonary resuscitation (CPR) and first aid certification for at least two workers assigned to Work on the site.
 - 3. Confined Space Entry Training for workers entering confined spaces.
 - 4. Contractor shall designate one "competent person" for Demolition as defined by 29 CFR Part 1926.850.
- A. For one who is assigned the role of a "competent person," documentation of sufficient and relevant training and experience to perform the assigned duties and responsibilities of that role. As defined in 29 CFR 1926.32(f), the competent

person shall be “one who is capable of identifying existing and predictable hazards, and who has authority to take prompt corrective measures to eliminate them.”

- B. Relevant training and experience shall be in the same type of Project activities included in the Work under this contract.
- C. Training as required for Asbestos and Lead abatement workers

3.02 WORK PLANNING AND MEETINGS

- a. Contractor and the District Representative shall conduct a daily Health and Safety meeting, prior to beginning Work for that day, to address Health and Safety issues, changing site conditions, activities and personnel. All Contractor and Subcontractor employees working on the Site on that day shall attend the meeting. All meetings shall be documented and attendees shall sign acknowledgement of their presence at the meeting. Daily meetings shall include an evaluation of the Work to be conducted, the hazards associated with the work, and control measures being used to reduce exposure.
- b. Contractor personnel who are not in attendance for the daily Health and Safety meeting shall be briefed on the meeting notes upon arrival at the Site and prior to commencing their Work activities. Employees shall sign acknowledgement of briefings prior to commencing Work.
- c. Contractor shall hold and document additional safety meetings at the start of each major task and whenever site conditions affecting personnel safety change. Any major task undertaken shall require the completion, or modification, of a THA as described in this Section.

3.03 ENGINEERING CONTROLS

- A. Contractor shall, at a minimum, provide the following Engineering controls to reduce the hazards of equipment operation and exposure during demolition and lead and asbestos abatement activities:
 - 1. Roll-over cages for bulldozers, back hoes, loaders, and tractors
 - 2. Back-up alarms for all trucks and moving equipment
 - 3. Wetting of media or other means to control dust during the Work
 - 4. Decontamination of equipment in accordance with Specifications.
 - 5. Enclosures for abatement activities.
 - 6. Barricades around restricted areas.
 - 7. Others as determined to be necessary or prudent by Contractor or as directed by the District Representative
 - 8. Contractor shall post ground-level warning signs every 50 feet below all overhead utilities onsite.

3.04 MONITORING:

- A. Contractor shall perform heat exposure and cold exposure monitoring activities as required by weather conditions.
 - 1. Contractor shall perform all atmospheric monitoring of tanks, pits, sumps, vaults, and enclosures to ensure that toxic or explosive gases are not present prior to performing demolition activities or personnel entry. At a minimum, atmospheric monitoring shall include the Lower Explosive Limit (LEL), % Oxygen, and Hydrogen Sulfide gas.

2. Contractor should monitor workers for dust exposure using a personal dust monitor. Workers with the greatest likelihood of being exposed to dust, as evaluated by the SSHO, should don a personal dust monitor.

3.05 EVALUATION OF PERFORMANCE:

- a. Contractor shall routinely conduct internal safety audits on Subcontract and Sub-subcontract Work sites in accordance with the Contractor's HASP. The focus of these routine audits will be on compliance with OSHA and local occupational safety regulations.
- b. Contractor shall conduct routine behavioral observations and provide immediate feedback during Work activities to promote safe behavior of Contractor employees and Subcontractor employees.

3.06 SITE SECURITY - OTHER SAFETY CONSIDERATIONS

- A. The Site is located in a heavily developed community, with frequent traffic on adjacent streets, and truck traffic delivering to the neighboring retail locations. Site workers, visitors, and truck drivers need to become familiar with the local traffic pattern to prevent traffic accidents and impeding traffic when entering and exiting the site.
- B. There is evidence of some transients and/or trespassers attempting to enter the portions of the campus.
- C. Site Security measures in the form of fencing, barricades and signage are critically important to maintain a safe work environment and to protect the public. The Contractor shall be responsible for maintaining adequate security measures for the duration of the project.

3.07 WORK BY OTHERS

- A. District representative or consultant may perform site perimeter dust monitoring activities and monitor for emissions of nuisance dust and/or hazardous materials to areas outside the Work limits.

END OF SECTION

HEALTH AND SAFETY FORMS FOLLOW

– Hot Work Permit

Permit Valid

For 1 Work Day

Site Name: _____

Project Number: _____

EHS Officer: _____

Client: _____

Hot Work Description: _____

Workers/Welders Conducting Hot Work: _____

Permits MUST be completed in its Entirety Before Hot Work Begins

	Yes	No
Has Project supervisor been notified of intended Hot Work?		
Does client representative need to be notified of the intended Hot Work?		
Will Hot Work impact the general public, clients, or operation employees?		
Will the intended Hot Work need to be coordinated with other contractors who may be working on the site to make them aware of any hazards and the scope of work to be performed?		
Have hazardous energy sources been identified, isolated, and locked out/tagged out before the start of the Project?		
Will Hot Work be conducted within a confined space?		
All testing equipment (i.e., CGI, oxygen meter, etc.) and firefighting equipment (i.e., extinguisher, etc.) have been checked to ensure proper operation and calibration before the start of this Project?		
Has a fire watch been designated and on station?		
Have coatings on metal surfaces been tested for ignitability and flame spread?		
Has the area been cleared of all flammable materials?		
Have all fuel sources been identified and protected?		
Has the area been restricted with proper barriers and signs?		
Has the area been tested to be certain that atmosphere is 0% LEL before starting Hot Work?		
Have flame sensitive areas and equipment (including cylinders and gas delivery lines) exposed to slag and sparks been protected by flame resistant blankets or removed from the area?		
Have all equipment and hoses been protected from falling metal structures and debris?		
Have escape routes been identified before starting work?		
Is ventilation equipment needed? Type needed:		

The Following Protective Equipment Will be Required:

	Yes	No		Yes	No
Welding Goggles/Shield Tint			Supplied Air Respirator		
Safety Boots			Head Protection		
Leather gloves			Safety Harness		
Hearing Protection			Welding Leathers – Top		
APR Cartridge			Welding Leathers - Bottom		

Permit Valid for 1 Work Day

The following procedures will be applicable prior to Hot Work on tanks or other types of enclosed structures. (Check all that apply and fill in appropriate information.)

- ☐ Ventilate to 0% LEL
- ☐ Confined Space Entry Permit
- ☐ Mechanical Ventilation Required
- ☐ Cold Cut Only Method Allowed: _____
- ☐ Hot Cutting Permitted Method Allowed: _____

Inert to < _____ % Oxygen

Approvals:

Date

District Representative

Contractor's Site Safety Officer

Fire Watch

Performed Hot Work Employee

File Permit in Project Work File and Health and Safety Department

SECTION 01 45 23

TESTING AND INSPECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

This Section includes CONTRACTOR's responsibilities with regard to mandatory testing and inspection services:

- A. Testing and inspection services to meet requirements of the California Code of Regulations (CCR), Title 24, California Building Code (CBC).
- B. Tests of materials required by the DISTRICT's DSA certified testing agency as set forth in Section 4-335 of the California Building Standards Administrative Code.
- C. Inspection by DSA certified inspectors, employed by the DISTRICT in accordance with the requirements of California Building Standards Administrative Code, assigned to the Work with duties specifically defined in Section 4-333(b).

1.02 TESTING AGENCY

- A. DISTRICT will select an independent testing agency approved by the California Division of the State Architect to conduct tests, sampling, and testing of materials.
- B. Selection of material to be tested shall be by the agency or the INSPECTOR OF RECORD (IOR) and not by CONTRACTOR.
- C. Any material shipped from the source of supply prior to having satisfactorily passed such testing and inspection or prior to the receipt of notice from IOR that such testing and inspection is not required shall not be incorporated into the Work.
- D. DISTRICT will select and directly reimburse testing agency the costs for all DSA and/or DSA required tests and inspections, but may be reimbursed by CONTRACTOR for such costs as noted in related portions of the Contract Documents.
- E. The independent testing agency is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents or approve or accept any portion of the Work. The testing agency shall not perform any duties of CONTRACTOR. The agency does not have authority to stop the Work.

1.02 TEST REPORTING

- A. Test reports shall include all tests performed, regardless of whether such tests indicate the material is satisfactory or unsatisfactory. Samples taken but not tested shall also be reported. Records of special sampling operations as required shall also be reported. Reports shall indicate the material or materials were sampled and tested in accordance with requirements of CBC, Title 24, Parts 1 and 2. Test reports shall indicate specified design strength. They shall also definitely state whether or not material or materials tested comply with the

specified requirements. When requested by DISTRICT or Architect, provide interpretation of test results.

- B. After each inspection and test, testing agency will promptly submit one (1) copy of laboratory report to the following distribution list:
 - 1. Division of State Architect
 - 2. District. (or District Representative if applicable)
 - 3. Project Inspector.
 - 4. Architect.
 - 5. Structural Engineer.
 - 6. Mechanical and Electrical Engineers (Related Tests and Inspections).
 - 7. Contractor
- C. Each test report will include:
 - 1. Date issued.
 - 2. Project title, Architect's number, DSA application and file number.
 - 3. Name of agency's inspector.
 - 4. Date and time of sampling or inspection.
 - 5. Identification of product and Specifications Section.
 - 6. Location in the Project.
 - 7. Type of inspection or test.
 - 8. Date of test and ambient conditions at time of test.
 - 9. Results of tests.
 - 10. Statement of Conformance with Contract Documents.
 - 11. Signature by Registered Professional Engineer licensed in California.
 - 12. Statement that tests were conducted in accordance with Parts 1 and 2, Title 24, California Code of Regulations.
- D. Immediately upon testing agency determination of a test failure, the agency will telephone the results of the test to the ARCHITECT. On the same day, the agency will send written test results to those on the distribution list.

1.03 TEST AND INSPECTION VERIFICATION REPORT

- A. Testing agency shall submit to the Division of the State Architect a verified report in duplicate, with copy to the DISTRICT, covering each test which is required to be performed by that agency during progress of the Work. Such report shall be furnished each time construction on the Work is suspended, covering tests up to that time, and also prior to Final Completion of the Work, covering all tests.

1.04 INSPECTION BY DISTRICT

- A. DISTRICT and its representatives shall at all times have access, for purpose of inspection, to all parts of the Work and to shops wherein the Work is in preparation, and CONTRACTOR shall at all times maintain proper facilities and provide safe access for such inspection.
- B. DISTRICT shall have the right to reject materials and/or workmanship deemed defective Work, and to require correction. Defective workmanship shall be corrected in a satisfactory manner and defective materials shall be removed from

the premises and legally disposed of, all without charge to DISTRICT. If CONTRACTOR does not correct such defective Work within a reasonable time, fixed by written notice and in accordance with the terms and conditions of the Contract Documents, DISTRICT may correct such defective Work and proceed to recover costs in accordance with related Articles of the Contract Documents.

1.05 INSPECTOR OF RECORD

- A. INSPECTOR OF RECORD (IOR) is employed by DISTRICT in accordance with requirements of Title 24 of the California Code of Regulations with their duties specifically defined therein.
- B. Inspection of Work shall not relieve CONTRACTOR from any obligation to fulfill all of the terms and conditions of the Contract Documents.
- C. CONTRACTOR shall be responsible for scheduling times of inspection, tests, sample taking, and similar activities of the Work.

1.06 CONTRACTOR RESPONSIBILITIES

- A. Cooperate with testing agency personnel, DISTRICT's Representative, INSPECTOR OF RECORD (IOR), CONSTRUCTION MANAGER and the ARCHITECT, to provide access to the Work including weekends and after work hours and to manufacturer's facilities.
- B. Provide incidental labor, materials and facilities to provide, at all times, safe access to Work to be tested, to obtain and handle samples at the site or at source of products to be tested, to facilitate tests and inspections, storage and curing of test samples.
- C. Notify CONSTRUCTION MANAGER, IOR and testing agency 24 hours in advance of required inspections or sampling, and 48 hours in advance of special testing or inspections. Notify DISTRICT in advance of the manufacturer or fabrication of materials in time to plan and schedule required testing at the source of supply. Extra expenses resulting from a failure to notify the agency shall be borne by the CONTRACTOR. Whenever extra expenses are indicated to be borne by the CONTRACTOR, they will be charged to the CONTRACTOR by Change Order.
- D. The DISTRICT, IOR, CONSTRUCTION MANAGER or the ARCHITECT shall have the right to reject materials and workmanship which are defective or to require their correction. Rejected workmanship shall be satisfactorily corrected and rejected materials shall be removed from the premises without cost to the DISTRICT. Extra expenses for retesting and re-inspection shall be borne by the CONTRACTOR. If the CONTRACTOR fails to correct such rejected work within a reasonable time, fixed by written notice, the DISTRICT will correct same and charge the expense to the CONTRACTOR by Change Order.
- E. Should it be considered necessary or advisable by the DISTRICT at any time before date of substantial completion of the entire work to make an examination of work already completed by removing or tearing out the same, the CONTRACTOR shall on request promptly furnish all necessary facilities, labor and materials. If such work is found to be defective in any respect due to fault of the CONTRACTOR or his subcontractor, all extra expenses shall be borne by the CONTRACTOR. If, however, such work is found to meet the requirements of the

Contract, the additional cost of labor and material necessarily involved in the examination and replacement costs shall be allowed the CONTRACTOR by Change Order.

- F. When changes of construction progress schedule are necessary during construction, coordinate such changes with the testing agency as required.
- G. When the testing agency is ready to test according to the established schedule, but is prevented from testing or taking specimens due to incompleteness of the Work, extra charges for testing attributable to the delay shall be borne by the CONTRACTOR.
- H. CONTRACTOR is responsible for compliance to all applicable local, state, and federal regulations regarding codes, regulations, ordinances, restrictions, and requirements, regardless of the provisions of this Section.
- I. Inspecting and testing performed exclusively for the CONTRACTOR's convenience shall be the sole responsibility and expense of the CONTRACTOR.

1.07. TESTS AND INSPECTIONS

- A. Test and inspections for the following will be performed in conformance with the California Building Code, Title 24, Part 2, of the California Code of Regulations, and the DSA Interpretations of Regulations (IR) Manual.
- B. Soils (CBC Chapter 18A).
 - 1. General: CBC Table 1705A.6.
 - a. Verification of site preparation
 - 2. Compacted Fills: CBC Table 1705A.6.
 - a. Qualification of fill materials.
 - b. Inspect placement.
 - 3. Driven Deep Foundations (Piles): CBC Table 1705A.7.
 - a. Verify materials, sizes, lengths.
 - b. Load tests.
 - c. Inspect driving operations.
 - d. Verify locations, plumbness, penetrations.
 - 4. Cast-In-Place Deep Foundations (Piers): CBC Table 1705A.7.
 - a. Inspect drilling operations.
 - b. Verify locations.
 - c. Confirm diameters, plumbness, embedment.
 - d. Confirm bearing capacity.
 - 5. Retaining Walls:

- a. Backfill: CBC Table 1705A.6.1
- C. Concrete (CBC Chapter 19A).
 - 1. Cast-In-Place Concrete: CBC Table 1705A.3.
 - a. Material Verification and Testing:
 - 1) Design Mix: verification.
 - 2) Reinforcing Steel: CBC Section 1908A.3, 1910A.2; ASTM A370; DSA IR 17-10.
 - 3) Slump, Temperature, Air Content: ASTM C172; ASTM C31.
 - 4) Compression: ACI 318 Section 5.6; CBC Section 19010A; ASTM C39.
 - b. Inspection:
 - 1) Batch Plant Inspection: CBC Section 1705A.3.3.
 - 2) Placement of formwork, reinforcing steel, embedded items.
 - 3) Verify concrete strength prior to removal of forms.
 - 2. Prestressed Concrete:
 - a. Test prestressing tendons and anchorages: CBC Section 1910A.3.
 - b. Inspect placement of prestressing tendons.
 - c. Verify concrete strength prior to stressing of tendons.
 - d. Inspect application of prestressing forces and grouting of tendons.
 - 3. Precast Concrete:
 - a. Inspect fabrication of precast members.
 - b. Inspect erection of precast members.
 - 4. Shotcrete:
 - a. Inspect shotcrete placement: CBC Section 1908A.2.
 - b. Test shotcrete compression: CBC Section 1908A.10; ASTM C42; ASTM C1140.
 - 5. Post-Installed Anchors:
 - a. Inspect installation: CBC Table 1705A.3.
 - b. Test post-installed anchors: CBC Section 1910A.5.
- D. Lightweight Metal - CBC, Chapter 20:
 - 1. Materials:
 - a. Alloys 2003.1
 - b. Identification 2003.1

- 2. Inspection:
 - a. Welding 2003.1
- D. Masonry (CBC Chapter 21A and TMS 402-11/ACI 530-11/ASCE 5-11 Table 1.19.3).
 - 1. Structural Masonry:
 - a. Material Verification and Testing:
 - 1) Reinforcing Steel: CBC Section 2103A.14; ASTM A370; DSA IR 17- 10.
 - 2) Strength: CBC Sections 1708A.1.4 and 2105A.2.2.1; ASTM C140; ASTM C1586; ASTM C1019.
 - 3) Prism Test: CBC Section 2105A2.2.2; ASTM C1314.
 - 4) Verify mortar and grout proportions: ASTM C780.
 - 5) Test core-drilled holes: CBC Section 2105A.5.
 - b. Mandatory Tests Required by DSA IR 21-4:
 - 1) Measurements: Per Section 5, ASTM C 140.
 - 2) Compressive Strength: Per Section 6, ASTM C 140.
 - 3) Absorption: Per Section B, ASTM C 140.
 - 4) Shrinkage of CMU: Per ASTM C 90, Section 5.2 and 8.3.
 - c. Inspection:
 - 1) Inspect preparation of prisms: ASTM C1314.
 - 2) Verify size, location, and condition of dowels.
 - 3) Verify size, grade, and type of reinforcement.
 - 4) Inspect placement of reinforcement, connectors, masonry units, mortar joints.
 - 5) Verify protection of masonry during cold or hot weather.
 - 6) Inspect type, size, and location of embedded anchor.
 - 7) Inspect grout space prior to grouting.
- F. Steel (CBC Chapter 22A and CBC Table 1705A.2.1).
 - 1. Structural Steel and Cold-Formed Steel Used for Structural Purposes:
 - a. Material Verification:
 - 1) Verify markings, mill certificates, sizes, types, and grades.
 - 2) Test unidentified materials: CBC Section 2203A.1; ASTM A370.
 - 3) Examine seam welds of structural tubes and pipes: DSA IR 17-3.
 - b. Inspection:
 - 1) Verify member locations and details constructed in field.
 - 2) Verify stiffener locations and details fabricated in shop.

2. High-Strength Bolts:
 - a. Material Verification:
 - 1) Verify markings and certificates of compliance: DSA IR 17-9.
 - 2) Test bolts, nuts, washers: CBC Section 2213A.1; ASTM F606; ASTM A370; DSA IR 17-8.
 - b. Inspection
 - 1) Bearing-type connections: DSA IR 17-9.
 - 2) Slip-critical connections: DSA IR 17-9.
3. Welding: DSA IR 17-3; AWS D1.1; AWS D1.8.
 - a. Verification
 - 1) Verify weld filler identification markings.
 - 2) Verify weld filler material manufacturer's certificate of compliance.
 - 3) Verify WPS, welder qualifications, and equipment: DSA IR 17-3.
 - b. Shop Welding
 - 1) Inspect groove, multi-pass, and fillet welds $>5/16"$: AISC 360; DSA IR 17-3.
 - 2) Inspect single pass fillet welds $\leq 5/16"$: AISC 360; DSA IR 17-3.
 - 3) Inspect welding of stairs and railings: CBC Section 1705A.2.2.1; AISC 360; DSA IR 17-3.
 - 4) Verification of reinforcing steel weldability: CBC Section 1705A.3.1; DSA IR 17-3.
 - 5) Inspect welding of reinforcing steel: CBC Sections 1705A.2.2.1.2 and 1705A.2.2.5; CBC Table 1705A.2.1 Item 5b; AWS D1.4; DSA IR 17-3.
 - c. Field Welding:
 - 1) Inspect groove, multi-pass, and fillet welds $>5/16"$: AISC 360; DSA IR 17-3.
 - 2) Inspect single pass fillet welds $\leq 5/16"$: AISC 360; DSA IR 17-3.
 - 3) Inspect floor and roof deck welds: AISC 360; DSA IR 17-3.
 - 4) Inspect welding of structural cold-formed steel: CBC Sections 1705A.2.2.1.1 and 1705A.2.2.5; DSA IR 17-3.
 - 5) Inspect welding of stairs and railings: CBC Sections 1705A.2.2.1.1 and 1705A.2.2.5; DSA IR 17-3.
 - 6) Verification of reinforcing steel weldability: CBC Section 1705A.3.1.
 - 7) Inspect welding of reinforcing steel: CBC Sections 1705A.2.2.1.2 and 1705A.2.2.5; CBC Table 1705A.2.1 Item 5b; AWS D1.4.
4. Non-Destructive Testing:
 - a. Ultrasonic: AISC 341, App. Q 5.2. AWS D1.1, D1.8.- ANSI/ASNT CP-189, SNT-TC-1A. - ASTM E543, E1444, E164 - DSA IR 17-2.

- b. Magnetic Particle: AISC 341, App. Q 5.2. AWS D1.1, D1.8.- ANSI/ASNT CP-189, SNT-TC-1A. - ASTM E543, E1444, E164 - DSA IR 17-2.
 - 5. Steel Joists and Trusses:
 - a. Verify size, type, and grade of all members, connectors, weld filler materials: CBC Section 1705A.2.2.3 and DSA IR 22-3 for steel joists only; CBC Section 1705A.2.2.4 for steel trusses.
 - 6. Spray-Applied Fireproofing:
 - a. Examine surfaces, inspect application, take samples, measure thickness; CBC Section 1705A.13; ASTM E605.
 - b. Test bond strength: CBC Section 1705A.13.6; ASTM E736.
 - c. Test density: CBC Section 1705A.13.5; ASTM E605.
 - 7. Other Steel:
 - a. High-Strength Threaded Rods: CBC Section 2212A.1.
- G. Wood (CBC Chapter 23)
 - a. Prefabricated Wood Structural Elements: CBC Section 1705A.5.
 - 1. Inspect fabrication of structural glued-laminated timber.
 - 2. Inspect fabrication of manufactured open-web trusses: CBC Section 1705A.5.5; DSA IR 23-4.
 - 3. Inspect fabrication of manufactured metal plate connected trusses: CBC Section 1705A.5; DS AIR 23-8.
- H. Exterior Wall Coverings - CBC, Chapter 14A, 25A:
 - 1. Materials:
 - a. Portland Cement Plaster 2508A, 2509A, 2510A
 - 2. Inspection:
 - a. Veneer Inspection 1405A
 - 2. Inspection: District Requirement

1.08 EARTHWORK

- A. The DISTRICT's testing agency, under the direction of the Geotechnical Engineer of Record, will provide continuous inspection of fill and will field test fill and earth backfill as placed and compacted, and inspect excavations and subgrade before concrete is placed and provide periodic inspection of open excavations, embankments, and other cuts or vertical surfaces of earth. Geotechnical Engineer will sign all reports of observation and testing.
- B. Unsatisfactory materials shall be removed from the site. Materials installed improperly shall be removed, replaced, moisture adjusted, re-compacted and otherwise re-worked to achieve a satisfactory installation.

- C. Imported fill materials from offsite or onsite shall be inspected and tested at the source before importing and placing, and a report issue attesting to the satisfactory nature of the material.
- D. The agency will perform all sampling and testing of materials and testing of work in place as required by the DSA Testing and Inspection Listing, or otherwise required. Testing will be performed in accordance with ASTM or California-required test methods.

1.09 CONCRETE

- A. The DISTRICT's testing agency will conduct one-time sampling of aggregate and preparation and testing of concrete mix design for each strength and/or aggregate size specified. Testing costs for additional mix designs shall be borne by the CONTRACTOR.
- B. Continuous plant inspection and other concrete installation tests will be conducted by the DISTRICT's testing agency. However, costs for retesting of materials that do not meet specification requirements shall be borne by the CONTRACTOR.

1.10 ROOFING

- A. Testing agency will conduct inspection and testing of built-up bituminous roofing in accordance with manufacturer's instructions, including:
 - 1. Attend pre-roofing conference.
 - 2. Check deck surfaces prior to roofing application to verify that substrate is in satisfactory condition to receive roofing.
 - 3. Check kettle temperature control system and monitor kettle control temperatures.
 - 4. Inspect and test materials including softening point of asphalt to ensure conformance with specifications.
 - 5. Check for excessive moisture.
 - 6. Observe roofing application to ensure conformance with specifications.
 - 7. Supervise cutting and repair of cut-out tests and test and inspect cut-out samples for conformance with specifications.

END OF SECTION

SECTION 01 52 00

CONSTRUCTION FACILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Furnishing and installing temporary facilities as indicated, specified or required for proper performance of the Work.

1.02 RELATED SECTIONS

- A. Temporary. Storm Water Pollution Control
- B. Temporary Controls
- C. Construction Waste Management and Disposal

1.03 GENERAL

- A. CONTRACTOR shall provide, maintain, relocate, and remove temporary facilities, including buildings, field office, toilets, utilities, storage units, fencing, barricades, chutes, elevators, hoists, scaffolds, railings and other facilities or services as required. CONTRACTOR shall be responsible for all use charges for the items provided as specified herein.
- B. CONTRACTOR shall furnish, install, maintain and pay for all necessary permits, inspections, temporary lines and connections and metering devices, use charges, move-ins/outs, connection fees, service, extension and distribution, deliveries/pickups, rentals, storage, transportation, taxes, labor, insurance, bonds, materials, equipment and all other required miscellaneous items for the temporary utilities systems required for completion of the work, and, upon substantial completion of the Work, remove all such temporary utilities systems and appurtenances.

1.04 REGULATORY REQUIREMENTS

- A. Comply with governing ordinances, regulations and utility company requirements and recommendations.
- B. Comply with pollution and environmental protection codes and regulations for use of water and energy, for discharge of waste and storm drainage from the project site, and for control of dust, air pollution and noise.
- C. Temporary construction shall conform to requirements of State, County and local authorities and insurance requirements which pertain to operation, health, safety and fire hazard. Provide items necessary to comply with such requirements, whether or not specifically indicated or specified in the Contract Documents.

1.05 TEMPORARY WATER

- A. CONTRACTOR shall provide and maintain temporary potable water service, including water distribution piping and outlet devices of the size and required flow rates in order to provide service to all areas of the Project site at all times.

1.06 TEMPORARY SANITARY FACILITIES

- A. CONTRACTOR shall provide portable chemical toilet facilities, in quantities based on total number of workers and shall be in accordance with CAL/OSHA standards.
- B. Portable chemical toilet facilities shall be maintained with adequate supplies and in a clean and sanitary condition and shall be removed from the Project site upon Substantial Completion of the Work.
- C. CONTRACTOR employees shall not use school toilet facilities.
- D. CONTRACTOR will define appropriate areas for break and lunch periods and will provide suitable containers for placement of trash in those areas. Areas shall be maintained clean and orderly.

1.07 TEMPORARY TELEPHONE SERVICE

- A. CONTRACTOR shall provide temporary telephone and data service for temporary facilities.

1.08 TEMPORARY ELECTRICAL POWER

- A. CONTRACTOR shall provide temporary electrical service for construction, temporary facilities, and connections for construction equipment requiring power or lighting, at all points required for the Work, for inspection and safety.
- B. CONTRACTOR shall ensure that welding equipment is supplied by electrical generators, not by the utility-furnished electrical power.

1.09 TEMPORARY LIGHTING

- A. CONTRACTOR shall provide and maintain all temporary lighting as necessary to provide safe access, performance and inspection of the work.
- B. Light levels provided shall be a minimum of 20 foot candles inside buildings and 5 foot candles outside for inspection, safety and security.

1.10 TEMPORARY HEATING, VENTILATION AND AIR CONDITIONING (HVAC)

- A. CONTRACTOR shall provide temporary heating, ventilating, cooling and filtration required for satisfactory completion of the Work.
- B. CONTRACTOR shall ventilate enclosed areas to assist cure of materials, dissipate humidity, and to prevent accumulation of dust, fumes, vapors, gases, or other irritants.

- C. CONTRACTOR shall maintain manufacturer-required levels of room and/or space temperature, humidity and ventilation necessary to install products, materials and/or systems of the Work.
- D. Utilization of the HVAC system for temporary construction use does not constitute DISTRICT acceptance of the system.

1.11 TEMPORARY GAS

- A. CONTRACTOR shall provide temporary gas service for construction and temporary facilities, at all points required for the Work.

1.12 CONSTRUCTION EQUIPMENT AND FACILITIES

- A. CONTRACTOR shall erect, equip, and maintain construction equipment in strict accordance with applicable statutes, laws, ordinances and regulations of authority having jurisdiction.
- B. CONTRACTOR shall provide, maintain and remove upon completion of the Work all temporary rigging, scaffolding, hoisting equipment, rubbish chutes, ramps, stairs, runways, platforms, ladders, railings and other temporary construction as required for all work hereunder.

1.13 FIELD OFFICES

- A. CONTRACTOR shall provide a temporary field office for his own use. It shall be weather-tight with lighting, electrical outlets, electronic communications capabilities, HVAC, and otherwise equipped to adequately conduct construction operations. Provide a conference room adequate for project meetings.
- B. In addition to the CONTRACTOR's field office, CONTRACTOR shall provide and maintain a minimum of one similarly equipped 800 sf temporary field office building on the Project site for use by the DISTRICT for the duration of the Work. The office shall be accessible by the DISTRICT, ARCHITECT and/or the IOR on a 7 day a week 24-hour basis. Office shall be provided with code-required ADA accessibility:
 - 1. Office building shall include a conference room with a conference table and adequate seating for twelve.
 - 2. Office building shall have two separate private offices; together with an open office space.
 - 3. Office shall be furnished with two (2) exterior entrance doors with one located in a separate office. Each door shall be furnished with both a dead bolt and cylinder lock with 6 keys.
 - 4. Exterior doors and windows shall be provided with exterior mounted burglar bars. Windows shall be provided with operable window shades. Security of office and contents is a continuous obligation of CONTRACTOR.
 - 5. Office shall have ample headroom and shall be properly lighted, heated, ventilated, and air-conditioned, and shall have an electric drinking

fountain or potable refrigerated bottled water service.

6. The conference room shall be approximately 300 sq. ft. in size and shall be furnished with a minimum of four single phase convenience outlets. It shall be furnished with a conference table capable of seating twelve, and twelve comfortable conference chairs, and shall have a 4' x 8' whiteboard on one of the long walls.
7. Provide phone, data transmission lines, related appurtenances, services, and equipment for use by DISTRICT as specified below:
 - a. Provide, install, & maintain any related equipment necessary to provide continuous internet access from each location.
- C. CONTRACTOR shall be responsible for maintaining all electrical distribution lines, equipment and related devices. If equipment and/or transmission equipment becomes inoperable and downtime exceeds two (2) days, CONTRACTOR shall replace and/or provide equivalent interim equipment.
- D. Office, furniture, equipment, and related ancillary devices shall remain property of CONTRACTOR. CONTRACTOR shall remove such property upon Final Completion of Work or as otherwise determined by the DISTRICT.
- E. At CONTRACTOR expense and without limitation, remove and/or relocate temporary office(s) and related facilities as rapidly as required in order to provide for progress of the Work.
- F. FIELD OFFICE SUPPLIES
 1. CONTRACTOR shall provide the initial supply of field office supplies as need for IOR.

1.14 STORAGE AND STAGING

- A. Operations of the CONTRACTOR, including storage of materials, shall be confined to areas approved by DISTRICT. CONTRACTOR shall be liable for damage caused by him during such use of property of the DISTRICT or other parties.
- B. Storage facilities shall provide protection of products from excessive cold, heat, moisture, humidity or physical abuse as specified in the respective sections for the products stored.
- C. CONTRACTOR shall save the DISTRICT, along with its respective officers, employees and agents, and the ARCHITECT and his employees, free and harmless from liability of any nature or kind arising from any use, trespass or damage occasioned by his operations on assigned premises of third parties.

1.15 FENCES AND BARRICADES

- A. CONTRACTOR shall install temporary Project site security fence(s) and/or barricade(s), as specified herein or indicated on Drawings, or as required for safety and security. New or used material may be furnished. Security of Project site and contents is a continuous obligation of CONTRACTOR.

B. Unless otherwise indicated or specified, a site security fence shall be constructed of 8'-0" high chain link fencing with an 8'-0" high windscreen. Space posts not to exceed 10'-0" on centers. Posts shall be of following nominal pipe dimensions: terminal, corner, and gatepost 2-1/2", line posts 2". Chain link fence shall be not less than #13 gage, 2" mesh, and in one width. Posts, fence and accessories shall be galvanized and as follows:

1. Posts shall be set in the earth a depth of 30" with soil firmly compacted around post, unless required otherwise in writing by DISTRICT.
2. Fence fabric shall be attached to posts with #14 gage tie wire at 16" on centers. A #6 gage steel tension wire with turnbuckles shall be installed at top and bottom of barricade fencing. Wire tie fabric to tension wires at 18" centers.
3. Windscreen shall be attached to fence fabric and steel tension wires at 18" centers with a minimum of #14 gage tie wire. Windscreen shall be maintained and all rips, tears, missing sections shall be corrected as soon as detected.
4. Chain link fencing shall be free from barbs, icicles or other projections resulting from galvanizing process. Fence having such defects will be replaced even if it has been installed.
5. Gates shall be fabricated of steel pipe with welded corners, and bracing as required. Fence and fabric to be attached to frame at 12" centers. Provide all gate hardware of a strength and quality to perform satisfactorily until barricade is removed upon Substantial Completion of the Work. Each gate shall have a chain and padlock. Provide two (2) gate keys to DISTRICT. At Substantial Completion of the Work, remove barricade from Project site, backfill and compact fence footing holes. Existing surface paving that is cut into or removed shall be patched and sealed to match surrounding areas.
6. When directed by DISTRICT, CONTRACTOR shall at CONTRACTOR expense and without limitation, remove and/or relocate fencing, fabric and barricades or other security and protection facilities as rapidly as required in order to provide for progress of the Work. (Note: DISTRICT retains option to leave fencing, barricades and SWPPP protections in place for an unspecified period of time after completion of demolition and final grading operations, to be compensated on a monthly rate basis.)

C. Other Temporary Enclosures & Barricades

1. Provide fences and barricades to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.
2. Provide lockable, temporary weather-tight enclosures at openings in exterior walls to create acceptable working conditions, to allow for temporary heating and for security.

3. Provide protective barriers around trees, plants and other improvements designated to remain. Replace any damaged materials as directed by the ARCHITECT
4. Temporary partitions shall be installed at all openings where additions connect to existing buildings, and where necessary to protect areas, spaces, property, personnel, students and faculty and to separate and control dust, debris, noise, access, sight, fire areas, safety and security. Temporary partitions shall be as designated on the Drawings or as specified by ARCHITECT. At CONTRACTOR expense and without limitation, remove and/or relocate enclosures, barriers and temporary partitions as rapidly as required in order to provide for progress of the Work.
5. Since the Work of this Project may be immediately adjacent to existing occupied structures and vehicular and pedestrian right of ways, CONTRACTOR shall, in his sole judgment and in accordance with applicable safety standards, provide all temporary facilities, additional barricades, protection and care to protect existing structures, occupants, property, pedestrians and vehicular traffic. CONTRACTOR is responsible for any damage, which may occur to the property and occupants of the property of DISTRICT or adjacent private or public properties which in any way results from the acts or neglect of CONTRACTOR.
6. Fences and barricades must completely separate construction activities and personnel from school operations, staff, students and the public. Construction workers shall not interact or communicate with students or staff except in emergency or safety related situations.
7. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing buildings.
8. Protect vehicles, stored materials, site and structures from damage.

1.16 TEMPORARY DE-WATERING FACILITIES & DRAINAGE:

- A. For temporary drainage and de-watering facilities and operations not directly associated with construction activities included under individual sections, comply with de-watering requirements of applicable Division 01 sections or of sound practice. CONTRACTOR shall maintain the Work, Project site and related areas free of water.
- B. For temporary drainage and de-watering facilities and operations directly associated with new buildings, additions or other construction activities, comply with Division 01 & 02 Sections. CONTRACTOR shall be responsible for de-watering of excavations, trenches & below grade areas of buildings, structures, the Project site and related areas.

1.17 TEMPORARY PROTECTION FACILITIES:

- A. CONTRACTOR shall not change over from using temporary facilities and controls to permanent facilities until Substantial Completion, except as permitted by DISTRICT.
- B. CONTRACTOR shall provide fire protection during construction in accordance with CFC, Article 87
- C. Until permanent fire protection needs are supplied and approved by authorities having jurisdiction, CONTRACTOR shall provide, install and maintain temporary fire protection facilities of the types needed in order to adequately protect against fire loss. CONTRACTOR shall adequately supervise welding operations, combustion type temporary heating and similar sources of fire ignition.
- D. CONTRACTOR shall provide, install and maintain substantial temporary enclosures of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft and similar violations of security. Where materials, tools and equipment are stored within the Work area, CONTRACTOR shall provide secure lock up to protect against vandalism, theft and similar violations of security. DISTRICT accepts no financial responsibility for loss, damage, vandalism or theft.
- E. CONTRACTOR operations shall not block, hinder, impede or otherwise inhibit the use of required exits and/or emergency exits to the public way, except as approved by the DISTRICT. CONTRACTOR shall maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for firefighting equipment and/or personnel.
- F. With approval of DISTRICT and at the earliest feasible date in each area of the Work, complete installation of the permanent fire protection facilities including connected services and place into operation and use. Instruct DISTRICT personnel in use of permanent fire protection facilities.
- G. In the event of an emergency drill or an actual emergency, designated by the sounding of the fire alarm and/or other sounding device, all construction activities must cease. CONTRACTOR shall evacuate the Work area and remain outside the Work area until permitted to return. No Work shall be conducted during the evacuation of a building or during an emergency.

1.18 TEMPORARY SECURITY AND SAFETY MEASURES:

- A. During performance of the Work in existing facilities CONTRACTOR shall provide, install and maintain substantial temporary barriers and/or partitions separating all Work areas from areas occupied by students, faculty and/or administrative staff.
- B. During performance of the Work in existing facilities and/or on a Project site occupied by students and where temporary barriers and/or partitions are not physically feasible, CONTRACTOR shall provide an employee meeting the requirements of Education Code Section 45125.2. (2) to continually supervise and monitor all employees of the CONTRACTOR and Subcontractor. For the purposes of this Section, CONTRACTOR employee shall be someone whom the Department of Justice has ascertained has not been convicted of a violent or serious felony as listed in Penal Code Section 667.5(c) and/or Penal Code Section 1192.7(c). To comply with this Section, CONTRACTOR shall have his

employee submit his or her fingerprints to the Department of Justice pursuant to Education Code Section 45125.1(a).

- C. Penal Code Sections 290 and 290.4, commonly known as “Megan’s Law,” require, among other things, individuals convicted of sexually oriented crimes, to register with the chief of police where the convicted individual resides or with a county sheriff or other law enforcement officials. The CONTRACTOR shall check its own employees and require each Subcontractor to check its employees and report to the CONTRACTOR if any such employees are registered sex offenders. The CONTRACTOR shall check monthly during the life of the Contract to ascertain this information and report same to DISTRICT. Before starting the Work, and monthly thereafter during the life of Contract, CONTRACTOR shall notify the DISTRICT in writing if any of its employees and/or if any Subcontractor’s employees is a registered sex offender. If so, CONTRACTOR shall proceed in accordance with the previous paragraph.

1.19 TEMPORARY ACCESS ROADS AND PARKING:

- A. Due to the limited amount of on and off Project site space for the parking of staff, students and school visitors’ vehicles, there will be no parking of CONTRACTOR vehicles in areas designated for school use only. CONTRACTOR shall provide legal access to and maintain CONTRACTOR designated areas for the legal parking, loading, off-loading & delivery of all vehicles associated with the Work. CONTRACTOR shall be solely responsible for providing and maintaining these requirements whether on or off the Project site.
- B. Contractor’s onsite parking shall be in areas shown on the Logistics Site Plan or as otherwise designated by the DISTRICT.
- C. Temporary access roads are to be installed and maintained by CONTRACTOR to all areas of the Project site.
- D. CONTRACTOR will be permitted to utilize existing on-site roads as designated by DISTRICT. CONTRACTOR shall only utilize those entrances and exits as designated by DISTRICT, and CONTRACTOR shall observe all traffic regulations of DISTRICT.
- E. Provide and maintain access to fire hydrants, free of obstructions.
- F. Do not park or drive on concrete walks or in the new buildings at any time.
- G. CONTRACTOR shall maintain roads and walkways in a clean condition including removal of debris and/or other deleterious material on a daily basis.

1.20 TRENCHES

- A. CONTRACTOR shall comply with all applicable statutes, codes & regulations regarding trenching and trenching operations. Open trenches for installation of utility lines (water, gas, electrical and similar utilities) and open pits outside barricaded working areas shall be barricaded at all times in a legal manner determined by CONTRACTOR.
- B. Open trenches deeper than 3'-6", and not located within a public street access, shall be enclosed within an 8'-0" high chain-link fence.

- C. Trenches shall be backfilled and patch-paved within twenty-four (24) hours after approval of installation by authorities having jurisdiction or shall have "trench plates" installed.
- D. Required access to buildings shall be provided and maintained.

1.21 PROJECT SIGNAGE

- A. CONTRACTOR shall furnish and install a Project sign on the Project site at a location established by ARCHITECT. A graphical layout of the proposed sign shall be submitted to ARCHITECT and DISTRICT for review before fabrication.
- B. Sign construction shall be 10'-0" wide by 6'-0" high with 6" x 6" posts and 1" exterior grade plywood, bolted to posts.
- C. Sign lettering shall be painted white with exhibit lettering by a professional sign painter, in accordance with details reviewed by ARCHITECT. The following shall be listed on sign:
 - 1. DISTRICT – San Bernardino City Unified School District.
 - 2. Name of School.
 - 3. Names of the Architect/Engineer and Consultants.
 - 4. Name of Prime Contractor.
 - 5. Other principal Contractors.
 - 6. Name of School Board member from District in which project is located.
- D. Except as otherwise specified herein, no other signs shall be displayed without approval of DISTRICT. At CONTRACTOR expense and without limitation remove and/or relocate Project signage and related facilities as rapidly as required in order to provide for progress of the Work.
- E. CONTRACTOR shall remove any Project signage at Substantial Completion of the Work.
- F. CONTRACTOR shall provide and install signage to provide directional, identification, and contact information to construction personnel and visitors as follows and as approved by DISTRICT.
 - 1. For construction traffic control/flow at entrances/exits, and as designated by DISTRICT.
 - 2. To direct visitors.
 - 3. For construction parking.
 - 4. To direct deliveries.
 - 5. For Warning Signs as required.
 - 6. Per CAL/OSHA standards as necessary.
 - 7. For office identification and Project site address.
 - 8. For "No Smoking" safe work site at designated locations.
 - 9. Emergency contact information and phone number of CONTRACTOR.
 - 10. Emergency contact information and phone number of local police, fire,

and emergency personnel.

1.22. CLOSE OUT

- A. Remove all temporary facilities at the completion of construction, and restore the site and facilities to conditions acceptable to the DISTRICT, ARCHITECT and to local authorities.

END OF SECTION

SECTION 01 57 00

TEMPORARY CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water Control.
- B. Dust Control.
- C. Erosion and Sediment Control.
- D. Noise Control.
- E. Pollution Control.

1.02 RELATED SECTIONS

- A. Work Sequence and Phasing.
- B. Temporary Storm Water Pollution Control
- C. Construction Facilities

1.04 GENERAL

- A. Include planned temporary control measures in the Project Logistics Plan of Section 01 32 16, Work Sequence and Phasing. Include hours of operation permitted by the Contract Documents or by local authorities.
- B. Update this Plan and provide status reports to the DISTRICT on temporary controls on a monthly basis

1.04 WATER CONTROL

- A. Do not permit surface or subsurface water or other liquids to accumulate on the site or in the immediate vicinity.
- B. Should such conditions be encountered or develop, control the accumulation of water or other liquid and suitably dispose of it by means of temporary pumps, piping, drainage lines, troughs, ditches, dams or other methods as approved by the ARCHITECT and/or the authority having jurisdiction.

1.05 DUST CONTROL

- A. Conduct earthwork operations in a manner to prevent windblown dust and dirt from interfering with the progress of the Work, the District's activities, the existing occupied structures in the areas of the site immediately adjacent, and offsite adjacent properties.
- B. Water construction areas as necessary to minimize windblown dust and on-site accumulation of dust and dirt.
- C. Water spray or cover with tarpaulins truckloads of soil to minimize generation of dust and dirt from construction transportation operations.

- D. Prevent dust and dirt from accumulating on walks, roadways, parking areas and from washing into sewer and storm drain lines.

1.06 EROSION AND SEDIMENT CONTROL

- A. Plan and execute construction by methods that will control surface drainage from cuts and fills and from borrow and waste disposal areas, and to prevent erosion and sedimentation.
- B. Minimize amount of bare soil exposed at one time.
- C. Provide temporary measures such as berms, dikes and drains to prevent water flow over adjacent properties or City rights-of-way.
- D. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays. Avoid any eroded materials flowing off the property.
- E. Periodically inspect earthwork to detect evidence of erosion and sedimentation; and promptly apply corrective measures.

1.07 NOISE CONTROL

- A. Avoid excessive noise that would affect detrimentally adjacent activities and adjoining property.
- B. Confine operations to permissible hours of day, to eliminate neighborhood noise pollution.

1.08 POLLUTION CONTROL

- A. Provide methods, means and facilities to prevent contamination of soil, water and atmosphere from discharge of noxious, toxic substances and pollutants produced by construction operations.
- B. Do not burn refuse, debris or other materials on the site.
- C. Comply with all State and local ordinances and regulatory requirements controlling environmental pollution during the course of construction and disposal operations.

1.09 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris and rubbish. Maintain site in a clean and orderly condition.
- B. CONTRACTOR shall assure the removal of debris and rubbish from pipe chases, plenums, attics, crawl spaces and other closed or remote spaces prior to the space being enclosed.
- C. CONTRACTOR shall assure the brooming and vacuum cleaning of interior areas prior to start of surface finishing, as well as continuing cleaning to eliminate dust.

- D. Until Substantial Completion of the Work, CONTRACTOR shall remove, as required, all graffiti from buildings, equipment, fences and other improvements on the Project site.
- E. CONTRACTOR shall remove waste materials, debris and rubbish from site periodically and dispose off-site.

1.10 CLOSE OUT

- A. Remove all temporary control measures at the completion of construction, and restore the site and facilities to conditions acceptable to the ARCHITECT and local authorities.

END OF SECTION

SECTION 01 57 13

TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.01 SUMMARY

- A. The District will be filing with the State of California, State Water Resources Control Board a Notice of Intent (N.O.I.) to comply with the terms of the General Permit to Discharge Storm Water Associated with Construction Activity, prior to the beginning of construction on this site.
- B. A copy of the SWPPP will be made available to Contractors during the bidding period. The Contractor will need to implement and monitor the storm water pollution prevention plan prepared for this site. The Contractor will be required to review the storm water pollution prevention plan and to identify possible pollution sources and mitigation measures with all subcontractors at their starting of work on site.
- C. The Contractor will be obligated to comply with the requirements of the State's General Permit. Any fines or penalties due to failure to comply with the general permit shall be borne by the Contractor.
- D. Prior to construction and after commencement of construction activities, revisions to the SWPPP shall be submitted, by the Contractor, to the Architect for amendment to the general permit by the Civil Engineer.
- E. Storm water pollution prevention plan testing and reporting will be performed by the Contractor until such responsibility is reassigned by the District.

1.02 REFERENCE STANDARDS

- A. EPA (NPDES) - National Pollutant Discharge Elimination System (NPDES), Construction General Permit; Current Edition.

1.03 QUALITY ASSURANCE

- A. Codes and Standards
 - 1. California Codes and Regulations; Title 24, California Building Code, Parts 1 & 2.
 - 2. State of California State Water Resources Control Board Regulations.
 - 3. US EPA's National Pollutant Discharge Elimination System EPA (NPDES).

1.04 SUBMITTAL

- A. Comply with pertinent provisions of the general permit.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION

- A. Installation of the work shall be as indicated on the drawings as specified herein and regulatory requirements.
- B. Maintain the protection up to the project completion.

3.03 CLEANING

- A. During and upon completion of the work comply with the general provisions of the general permit.

END OF SECTION

SECTION 01 60 00

MATERIALS AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

This Section includes administrative and procedural requirements governing products for incorporation into the Work.

1.02 RELATED SECTIONS

- A. Section 01300: Submittals
- B. Section 01420: Testing and Inspection
- C. Section 01640: Substitutions
- D. Section 01740: Warranties

1.03 DEFINITIONS

Definitions used in this Section are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and other similar terms. Such terms are self-explanatory and have well-recognized meanings in the construction industry.

- A. "Products" are items purchased for incorporation into the Work, whether purchased for the Work or taken from previously purchased stock. The term "product" includes the terms "material" and "equipment" and terms of similar intent.
 - 1. "Named Products," are items identified by the manufacturer's product name, including make, model number or other designation, shown or listed in the manufacturer's published product literature, current as of the date of the Contract.
 - 2. "Foreign Products," as distinguished from "domestic products," are items substantially manufactured (50 percent or more of value) outside the United States and its possessions.
- B. "Materials" are products substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
- C. "Equipment" is a product with operational parts, whether motorized or manually operated, that may require service connections, such as wiring or piping. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work.

1.04 QUALITY ASSURANCE

- A. Source Limitations: To the fullest extent possible, provide products of the same kind from a single source.
- B. Compatibility of Options: When the CONTRACTOR is given the option of selecting between two or more products for use in the Work, the product selected shall be compatible with products previously selected, even if previously selected products were also options.
- C. Nameplates: Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on exposed

surfaces of products that will be exposed in view in occupied spaces or on the exterior.

1. Labels: Locate required product labels and stamps on concealed surfaces or, where required for observation after installation, on accessible surfaces that are not conspicuous.
2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface that is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data:
 - a. Name of product and manufacturer
 - b. Model and serial number
 - c. Capacity
 - d. Speed
 - e. Ratings

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.
 1. Schedule delivery to minimize long-term storage at the Project site and to prevent overcrowding of Work spaces.
 2. Coordinate delivery with installation time to assure minimum holding time for all items, but especially those that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 3. Deliver products to the Project site in an undamaged condition in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 4. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement or damage.
 5. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
 6. Store products at the Project site in a manner that will facilitate inspection and measurement of quantity or counting of units.
 7. Store heavy materials away from structures in a manner that will not endanger the structure's supporting construction.
 8. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter. Cover products subject to deterioration with impervious sheet covering.
 9. When approved by the District, provide off-site storage and protection in a bonded warehouse approved by District when site does not permit on-site storage or protection at no cost to the District.

10. Store products subject to damage by the elements above ground, under cover in a weather-tight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

1.06 MATERIAL SELECTION

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, new at the time of installation.
 1. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and the intended use and effect.
 2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other Projects.
- B. Product Selection Procedures: The Contract Documents and governing regulations govern product selection. Procedures governing product selection include the following:
 1. Proprietary Specification Requirements: Where Specifications name only a single material or manufacturer, provide the product indicated. No substitutions will be permitted.
 2. Semi-proprietary Specification Requirements: Where Specifications name two or more products or manufacturers, provide one of the products indicated throughout the Project. No substitutions will be permitted.
 - a. Where Specifications specify products or manufacturers by name, accompanied by the term "or equal," comply with General Conditions article on Substitutions to obtain approval for use of an unnamed product.
 3. Descriptive Specification Requirements: Where Specifications describe a product or assembly and list exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that has the characteristics and otherwise complies with the Contract Documents.
 4. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply with these requirements and are recommended by the manufacturer for the application indicated.
 - a. Manufacturer's recommendations may be contained in published material literature or by the manufacturer's certification of performance.
 5. Compliance with Standards, Codes, and Regulations: Where Specifications only require compliance with an imposed code, standard or regulation, select a product that complies with the standards, codes, or regulations specified.
 6. Visual Matching: Where Specifications require matching an established Sample, decision of the ARCHITECT will be final on whether a proposed product matches satisfactorily.

7. Visual Selection: Where specified product requirements include the phrase "... as selected from manufacturer's standard or premium colors, patterns, textures..." or a similar phrase, select a product and manufacturer that complies with other specified requirements. The ARCHITECT will select the color, pattern, and texture from the product line selected.

1.07 INSTALLATION OF PRODUCTS

- A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located, and aligned with other Work.
- B. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration until Substantial Completion.

END OF SECTION

SECTION 01 60 00.01
REQUEST FOR SUBSTITUTION

SUBSTITUTION REQUEST NO. _____

DATE: _____

PROJECT NAME: _____

PROJECT NUMBER: _____

TO: _____

FROM: _____

We hereby submit for your consideration the following product comparisons of the specified product and the proposed substitution. The undersigned fully understands that failure to answer any item below may be cause for rejection of request for substitution.

Request for substitution shall only be made during bidding (not later than 7 days prior to bid opening for inclusion by Addendum) except under conditions beyond control of Contractor.

Specified Product: _____

Project Manual Section Title _____ Number _____ Page _____ Paragraph _____

Drawing No. _____ Detail No. _____

Proposed Substitution: _____

Manufacturer: _____ Tel: _____

A. Reason request for substitution is being submitted:

B. Does proposed substitution affect in any way the Structural Safety, Access Compliance, or Fire & Life Safety portions of the project? No _____ Yes _____

Explain _____

- B. Does proposed substitution affect dimensions, gages, weights, etc. on Drawing?

No _____ Yes _____

Explain _____

- D. Does proposed substitution require changes in Drawings or design and installation changes? No _____ Yes _____

(If yes, cost of these changes is the responsibility of the Contractor.)

- E. Does proposed substitution affect product cost, delivery time, or construction schedule?

No ___ Yes ___ Explain

- F. Does proposed substitution comply with specified ICC Number, UL Rating, ASTM Numbers? No ___ Yes ___ Explain

- G. Does proposed substitution affect other trades and systems such as wiring, piping, ductwork, structure, etc.? No ___ Yes ___ (Explain which and how)

If yes, has impact on their work been included in price of proposed substitution?

No ___ Yes ___.

- H. Does proposed substitution product guarantee differ from that of the specified product?

No ___ Yes ___ Explain

If the substitution request is accepted, it will result in: No cost impact ___ credit of \$ _____

Attach a listing of 3 projects (one in service for at least 3 years) using the proposed substitution.

Substantiating Data: Attach product data/brochures and Vendor qualifications for both specified and substitute product. Provide samples for both specified and substitute products, if applicable.

Certification: Undersigned has examined Construction Documents, is familiar with specified product, understands indicated application of product, and understands design intent of the Architect caused by the requested substitution.

Submitted by:

(Type Name)

Signature

Date

Signature must be made by person having legal authority to bind his firm to the above terms.

Architect's Comments:

_____ Accepted, _____ accepted as noted, _____ not accepted, _____ received too late.

Reviewed by:

Architect

Date

Construction Manager

Date

District

Date

END OF SECTION

SECTION 01 61 00
PRODUCT REQUIREMENTS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Products.
- B. Transportation and handling.
- C. Storage and protection.
- D. Damage and restoration.

1.2 PRODUCTS

- A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work.
- B. Products may also include existing materials or components required for reuse that were obtained from this project.
- C. Products specified or recycled from other projects are not considered new products.
- D. Provide interchangeable components of the same manufacturer, for similar components.
- E. Provide products that comply with the Contract Documents, that are undamaged and are unused at the time of installation.
- F. Provide products complete with all accessories, trim, finish, safety guards and other devices and detail needed for a complete installation and for the intended use and effect.
- G. Where a specific manufacturer's product is specified as the basis of design, the designation shall establish the qualities relating to type, function, dimension, in-service performance, physical properties, appearance and other characteristics for comparable products of other named manufacturers.
- H. Where products are specified by name or by manufacturer provide the product or manufacturer specified. No substitutions will be permitted unless made under the provisions of Section 01 25 13.
- I. Where specifications only describe a product or assembly by listing exact characteristics required, provide a product or assembly that provides the characteristics.

- J. Where specifications only require compliance with performance requirements, provide products that comply with those requirements.
- K. Where the specifications only require compliance with an imposed code, standard or regulation, provide a product that complies with the standards, codes or regulations specified.
- L. Where specifications require review and acceptance of a sample, the Architect's decision will be final on whether a proposed product sample is acceptable or not.
- M. Provide materials and products specified in the full range of color, texture and pattern for selection by Architect. Range shall include standard stocked color/texture/pattern, as advertised in product data and brochures. Unless otherwise indicated in individual specification sections, Architect may select from any color range at no additional cost to Owner.
- N. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
- O. Where product is designated to match an existing product, provide product that matches in size, profile, finish, dimension and other characteristics the existing product identified.

1.3 TRANSPORTATION AND HANDLING

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

1.4 STORAGE

- A. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible.
- B. Store sensitive products in weather-tight, climate controlled enclosures.
- C. Store products in a manner that will not damage or overload project structure.
- D. For exterior storage of fabricated products, place on sloped supports, above ground.
- E. Provide off-site storage when site does not permit on-site storage.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.
- G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.
- J. Prevent the discharge of pollutants to storm water from storage of materials on-site using best management practice techniques defined in Chapter 4 of the Construction Activity Handbook published by the Storm Water Quality Task Force.

1.5 PROTECTION

- A. Protect installed Work and provide special protection where specified in individual specification Sections.
- B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.
- C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects.

- E. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- F. Provide humidity and temperature control for installed products as recommended by materials manufacturer.
- G. Prohibit traffic from landscaped areas.

1.6 DAMAGE AND RESTORATIONS

- A. Damage to existing or new work whether accidental or not shall be restored or replaced as specified or directed by Architect.
- B. Restoration shall be equal to structural performance of original work.
- C. Finish shall match appearance of existing adjacent work.
- D. Work not properly restored or where not capable of being restored shall be removed and replaced.

2. PART 2 PRODUCTS

Not Used

3. PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 71 23

FIELD ENGINEERING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Construction surveying requirements for the Work

1.02 RELATED SECTIONS

- A. Summary of the Work
- B. Project Coordination and Meetings
- C. Submittals
- D. Contract Closeout

1.03 SUBMITTALS

- A. CONTRACTOR shall submit the name and address of the State of California licensed surveyor to ARCHITECT and DISTRICT, including any changes as they may occur.
- B. At request of ARCHITECT and/or DISTRICT, CONTRACTOR shall submit copies of cut sheets, coordinate plots, data collector printouts, and other documentation as available to verify completeness and/or accuracy of field surveying Work

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION

3.01 SURVEY REQUIREMENTS

- A. Establish a minimum of two permanent horizontal and vertical control points on the Project site, remote from the building area, referenced to data established by the survey control points.
- B. Indicate the reference points on the project record drawings with the basis of elevation being the established benchmarks.
- C. Establish lines, grades, locations and dimensions by instrumentation. Periodically, verify the layout of all Work by the same methods.
- D. Provide grade stakes and elevations for over-excavation and re-compaction, rough and final grades, paved areas, curbs, gutters, sidewalks, building pads, landscaped areas, and other areas as required.
- E. Calculate and layout proposed finished elevations and intermediate control as required to provide smooth transitions between the spot elevations indicated in the Contract Documents.

- F. Provide stakes and elevations for grading, fill, and topsoil placement.
- G. Provide adequate horizontal and vertical control to locate utility lines, including but not limited to, storm drains, sewers, water mains, gas, electric and signal, and provide vertical control in proportion to the slope of the line as required for accurate construction.
 - 1. Prior to trench closure, survey and record locations and invert and flow line elevations at manholes, POCs, and 50-foot intervals.
 - 2. Survey and record top of curb and flow line elevations on finished concrete or AC surfaces at key locations such as BC's, EC's, grade breaks, corners or angle points in sufficient number to demonstrate the Work complies with the intent of the Contract Documents.
- H. Provide horizontal and vertical control for batter boards for drainage, utility, and other on-site structures as required.
- I. Furnish building corner offsets as required to adequately locate building pads. Provide cut and fill stakes within the building pad perimeter adequate to control both over excavation and re-compaction and the final sub-grade elevation of the building pad.
- J. Submit a certification signed by the surveyor confirming that the elevations and locations of improvements are in conformance with the Contract Documents. The statement shall include survey notes for the finish floor and building pad, showing the actual measured elevations on the completed sub-grade, recorded to the nearest 0.01'. Building pad tolerance will be $\pm 0.10'$.

3.02 RECORD DRAWINGS

- A. The surveyor shall record all horizontal and vertical control information on "as-built" Record Drawings, as coordinates and elevations. Record drawings shall indicate locations of all utilities information, as described above.
- B. Upon Substantial Completion, CONTRACTOR shall deliver to the ARCHITECT Electronic CAD file as the final Record Drawings. CAD version to be determined by DISTRICT.
- C. Completed record drawing Electronic files shall be signed by the licensed surveyor, certifying that the information shown is correct and is in conformance with the Contract Documents within specified tolerances.
- D. Where other sections of the Contract Documents require verification or measurements of installed Work by survey, the surveyor shall perform and certify that all such surveys or verifications are completed in accordance with the Contract Documents.

END OF SECTION

SECTION 01 73 00

EXECUTION REQUIREMENTS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. General procedural requirements governing execution of the Work.
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. General installation of products.

1.2 SUBMITTALS

- A. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.
- B. Certified Surveys: Submit two copies signed by land surveyor.
- C. Final Property Survey: Submit 2 copies showing the Work performed and record survey data.

2. PART 2 PRODUCTS

Not Used

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: Existence and location of site improvements and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify existence and location of construction affecting the Work.
- B. Existing Utilities: Existence and location of underground and other utilities indicated as existing are not guaranteed. Before beginning work, investigate and verify existence and location of underground utilities affecting the Work.
 - 1. Before construction, verify location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and electrical services.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Written Report: Where conditions detrimental to performance of the Work are encountered, provide a written report listing the following:
 - (a) Description of the Work.
 - (b) List of detrimental conditions, including substrates.
 - (c) List of unacceptable installation tolerances.
 - (d) Recommended corrections.
2. Verify compatibility with and suitability of substrates, including compatibility of existing finishes or primers.
3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of need for clarification of Contract Documents, submit a Request For Information (RFI) to Architect. Include a detailed description of problem encountered, together with recommendations for resolution of the item discovered.

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a land surveyor, registered in the state of California to lay out the

Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 3. Inform installers of lines and levels to which they must comply.
 4. Check the location, level and plumb, of every major element as the Work progresses.
 5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Identification: Control datum for survey is that established by Owner provided survey.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field- engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
- E. Final Property Survey: Prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
 4. Maintain maximum headroom clearance in spaces without a suspended ceiling.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

END OF SECTION

SECTION 01 73 29

CUTTING AND PATCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

Requirements and limitations for cutting and patching of work.

1.02 SCOPE

- A. Where the work requires that a particular existing building element, such as a partition, wall, paving, window or similar element of existing building construction, be removed, it is the intention of this specification that such work be a part of the demolition section and not a part of cutting and patching. Refer to individual category scope of work sheets to determine the limits of demolition work for each CONTRACTOR.
- B. New work required to replace such removals is considered as a part of the separate sections of the specifications covering similar new construction.
- C. Where incidental cutting and patching is required for the installation of a specific item or piece of equipment (including piping, ductwork, conduit, etc.), all such cutting and patching is considered to be specified as a part of the section requiring the cutting and patching, but shall also comply with the requirements of this Section.
- D. CONTRACTOR shall verify and check all areas to be cut and patched and shall coordinate the work of the various trades involved.
- G. Unless specifically designated otherwise, existing work cut, altered or revised to accommodate new work shall be patched to duplicate undisturbed adjacent finishes, colors, textures and profiles. New work in existing portions shall also be finished to match adjacent existing work unless noted otherwise.

1.03 SUBMITTALS

- A. Submit written request in advance of cutting or alteration which affects:
 - 1. Structural integrity of any element of Project.
 - 2. Integrity of weather-exposed or moisture-resistant element.
 - 3. Efficiency, maintenance or safety of any operational element.
 - 4. Visual qualities of sight exposed elements.
 - 5. Work of DISTRICT or separate CONTRACTOR.
- B. Include in request:
 - 1. Identification of Project.
 - 2. Location and description of affected work.
 - 3. Necessity for cutting or alteration.

4. Alternatives to cutting and patching.
5. Description of proposed work and products to be used.
6. Effect on work of District or separate CONTRACTOR.
7. Written permission of affected separate CONTRACTOR.
8. Date and time work will be executed.

C. Obtain approval of ARCHITECT before proceeding with any cutting and patching:

PART 2 PRODUCTS

2.01 MATERIALS

- A. Primary Products: Those required for original installation, unless specifically approved otherwise

PART 3 EXECUTION

3.01 EXAMINATION

- A. Inspect existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. Confirm status and current warranties and guarantees.
- B. After uncovering existing work, inspect conditions affecting performance of work.
1. Prior to cutting, boring or drilling through new or existing structural members or elements including reinforcing bars, CONTRACTOR shall prepare detailed drawings for review by the ARCHITECT and approval by the Division of the State Architect (DSA). Agency approvals shall be obtained by the ARCHITECT, not CONTRACTOR.
- C. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. Provide temporary support to ensure structural integrity of the work. Provide devices and methods to protect other portions of Project from damage.
- B. Provide protection from elements for areas which may be exposed by uncovering work.
- C. Maintain excavations free of water.
- 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 and/or fastening of new Work. Utilize wet sand blasting for interior surfaces and for exterior surfaces where necessary to prevent objectionable production of dust.

3.03 PERFORMANCE

- A. 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 in the Work. Verify compatibility and suitability of existing substrates before starting the Work.
- B. 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.
- C. **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. Comply with requirements of applicable Division 2 Sections where cutting and patching requires excavating, backfill, and/or recompaction.
 - 5. Woodwork: Cut and or remove to a panel or joint line.
 - 6. Sheet Metal: Remove back to joint, lap, or connection. Secure loose or unfastened ends or edges and seal watertight.
 - 7. Glass: Remove cracked, broken, or damaged glass and clean rebates and stops of setting materials.
 - 8. Plaster: Cut back to sound plaster on straight lines, and back bevel edges of remaining plaster. Trim existing lath and prepare for new lath.
 - 9. Gypsum Wallboard: Cut back on straight lines to undamaged surfaces with at least two opposite cut edges centered on supports.
 - 10. Acoustical ceilings: Remove hanger wires and related appurtenances where ceilings are not scheduled to be installed.
 - 11. Tile: Cut back to sound tile and backing on joint lines.

12. Flooring: Completely remove flooring and clean backing of prior adhesive. Carefully remove wood flooring for patching and repairing of existing wood 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 (24) 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/or 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 as required for new Work.
 6. Glass: Install matching glass and re-seal exterior window assemblies.
 7. Lath and Plaster: Install new lath materials to match existing and fasten to supports at 6" centers. Provide a 6" 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.
 8. Gypsum Wallboard: Fasten cut edges of wallboard. Install patches with at least two opposite edges centered on supports and secure at 6" centers. Tape and finish joints and fastener heads. Patching shall be non-apparent when painted or finished.
 9. Acoustical Ceilings: Comply with the requirements for new Work specified in related sections of the Contract Documents.
 10. Resilient Flooring: Completely remove flooring and prepare substrate for new material.
 11. Paint: Prepare areas to be painted as specified for painting specific surfaces in the painting and coatings Sections of the Specifications.
- D. Fit work air tight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.

- E. At penetrations of fire-rated walls, partitions, ceiling or floor construction, completely seal voids with fire-rated devices or material in accordance with Section 07270, to full thickness of the penetrated element.
- F. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

3.05 SLEEVES AND HANGERS

- A. Provide conduit, outlets, piping sleeves, boxes, inserts or other materials or equipment necessary to be built into work.
- B. In the event delays occur in delivery of sleeves or other materials, arrange to have boxes or other forms set at locations where piping or other material is to pass through or into slabs or other work.
- C. Upon subsequent installation of sleeves or other material, install fill materials to completely seal voids with fire-rated devices or moisture-resistant material, to full thickness of the penetrated element. Necessary expenditures incurred for boxing out or filling shall be without extra cost to the DISTRICT.

END OF SECTION

SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

- A. Comply with the requirements Section 5.408 of the California Green Building Standards Code.
 - 1. Recycle and/or salvage for reuse a minimum of 50 percent of the nonhazardous construction and demolition waste in accordance with Section 504.8.1.1, 5.408.1.2, or 5.408.1.3; or meet a local construction and demolition waste management ordinance, whichever is more stringent.
- B. District requires that this project generate the least amount of trash and waste possible.
- C. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.
- D. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.
- E. Required Recycling, Salvage, and Reuse: The following may not be disposed of in landfills or by incineration:
 - 1. Aluminum and plastic beverage containers.
 - 2. Corrugated cardboard.
 - 3. Wood pallets.
 - 4. Clean dimensional wood: May be used as blocking or furring.
 - 5. Land clearing debris, including brush, branches, logs, and stumps; see Section 31 10 00 - Site Clearing for use options.
 - a. Comply with California Green Code (CGC) 5.408.3; Excavated soil and land clearing debris: 100 percent of trees, stumps, rocks and associated vegetation and soils resulting primarily from land clearing shall be reused or recycled.
 - 1) Exception: Reuse, either on-or off-site, of vegetation or soil contaminated by disease or pest infestation.
 - 6. Concrete: May be crushed and used as riprap, aggregate, sub-base material, or fill.
 - 7. Bricks: May be used on project if whole, or crushed and used as landscape cover, sub-base material, or fill.
 - 8. Concrete masonry units: May be used on project if whole, or crushed and used as sub-base material or fill.
 - 9. Asphalt paving.
 - 10. Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
 - 11. Glass.
 - 12. Gypsum drywall and plaster.

13. Carpet, carpet cushion, carpet tile, and carpet remnants : DuPont (<http://flooring.dupont.com>) and Interface (www.interfaceinc.com) conduct reclamation programs.
14. Roofing.
15. Paint.
16. Plastic sheeting.
17. Rigid foam insulation.
18. Windows, doors, and door hardware.
19. Plumbing fixtures.
20. Mechanical and electrical equipment.
21. Fluorescent lamps (light bulbs).
22. Acoustical ceiling tile and panels.
23. Materials which could be hazardous and subject to special disposal regulations include but are not limited to the following:
 - a. Lead-Based Paint
 - b. Asbestos: Found in older pipe insulation, asphalt floor tiles, linoleum, insulation, etc.
 - c. Polychlorinated Biphenyls (PCBs):
 - 1) Found in electrical oil filled equipment manufactured prior to 1978 such as transformers, switches and fluorescent lamp ballasts.
 - 2) Also found in adhesive, sealant, caulk, glazing putty, roofing material, pesticide vehicle, ink, paper, fabric dye, gaskets, and hydraulic fluid.
 - d. HVAC Refrigerants: Containing Fluorinated and Chlorinated compounds.
 - e. Drinking Fountain Refrigerants: Containing Fluorinated and Chlorinated compounds.
 - f. Fluorescent Light Tubes: Contain mercury.
 - g. EXIT signs and Smoke Detectors: May contain unregulated, radioactive tritium. · Required to be returned to manufacturer.
 - h. Contaminated Soils.
 - i. Pressure Treated Lumber.
- F. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.
 1. Contractor's quantitative reports for construction waste materials as a condition of approval of progress payments.
- G. Contractor shall develop and follow a Waste Management Plan designed to implement these requirements. CalGreen Section 5.408.1.1.
- H. The following sources may be useful in developing the Waste Management Plan:
 1. California Recycling Department, at www.bsc.ca.gov/Home/CALGreen.aspx.
 2. General information contacts regarding construction and demolition waste:
 - a. EPA Construction and demolition (C&D) debris website: www.epa.gov/epawaste/conservation/imr/cdm/.
 - b. Directory of Wood-Framed Building Deconstruction and Reused Building Materials Companies: www.fpl.fs.fed.us/documnts/fplgtr/fpl_gtr150.pdf.
 - c. Additional resources to be developed by Contractor with assistance from District and Contractor, as requested.

3. Recycling Haulers and Markets: The source list below contains local haulers and markets for recyclable materials. This list is provided for information only and is not necessarily comprehensive; other haulers and markets are acceptable.
 - a. CAL-MAX: www.calrecycle.ca.gov/calmax/.
 - 1) A free service designed to help businesses find markets for non-hazardous materials they have traditionally discarded.
 - b. General Recycling/Reuse Centers: For information on qualified local solid waste haulers contact the California Department of Resources Recycling and Recovery - CalRecycle. The website lists wastes recycling facilities in counties throughout the State of California.
 - 1) <http://www.calrecycle.ca.gov/default.asp>
- I. Methods of trash/waste disposal that are not acceptable are:
 1. Burning on the project site.
 2. Burying on the project site.
 3. Dumping or burying on other property, public or private.
 4. Other illegal dumping or burying.
 5. Incineration, either on- or off-site.
- J. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 RELATED REQUIREMENTS

- A. Section 01 30 00 - Administrative Requirements: Additional requirements for project meetings, reports, submittal procedures, and project documentation.
- B. Section 01 52 00 - Construction Facilities: Additional requirements related to trash/waste collection and removal facilities and services.
- C. Section 01 60 00 - Product Requirements: Waste prevention requirements related to delivery, storage, and handling.
- D. Section 01 77 00 - Execution and Closeout Requirements: Trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.
- E. Section 31 10 00 - Site Clearing: Handling and disposal of land clearing debris.

1.03 DEFINITIONS

- A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
- B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.
 1. Debris that is not hazardous as defined in California Code of Regulations, Title 22, Section 66261.3 et seq.
 2. This term includes, but is not limited to, asphalt concrete, Portland cement concrete, brick, lumber, gypsum wallboard, cardboard and other associated packaging, roofing material, ceramic tile, carpeting, plastic pipe, and steel.

3. The debris may be commingled with rock, soil, tree stumps, and other vegetative matter resulting from land clearing and landscaping for construction or land development projects.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Diversion: Avoidance of demolition and construction waste sent to landfill or incineration. Diversion does not include using materials for landfill, alternate daily cover on landfills, or materials used as fuel in waste-to-energy processes.
- E. Enforcement Agency (EA). Enforcement agency as defined in CA Public Resources Code 40130.
- F. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.
- G. Landfill, Inert waste or Inert Disposal Facility:
 1. A disposal facility that accepts only inert waste such as soil and rock, fully cured asphalt paving, uncontaminated concrete (including fiberglass or steel reinforcing rods embedded in the concrete), brick, glass, and ceramics, for land disposal.
- H. Landfill, Class III:
 1. A landfill that accepts non-hazardous resources such as household, commercial, and industrial waste, resulting from construction, remodeling, repair, and demolition operations.
 2. A Class III landfill must have a solid waste facilities permit from the California Integrated Waste Management Board (CIWMB) and is regulated by the Enforcement Agency (EA).
- I. Mixed Debris: Loads that include commingled recyclable and non-recyclable materials generated at the construction site.
- J. Mixed Debris Recycling Facility: A processing facility that accepts loads of commingled construction and demolition debris for the purpose of recovering re-usable and recyclable materials and disposing the non-recyclable residual materials.
- K. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.
- L. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.
- M. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- N. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
- O. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- P. Recycling Center: A facility that receives only C&D material that has been separated for reuse prior to receipt, in which the residual (disposed) amount of waste in the material is less than 10% of the amount separated for reuse by weight.
- Q. Return: To give back reusable items or unused products to vendors for credit.
- R. Reuse: To reuse a construction waste material in some manner on the project site.
- S. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

- T. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.
- U. Separated for Reuse:
 - 1. Materials, including commingled recyclables.
 - 2. Separated or kept separate from the solid waste stream for the purpose of:
 - a. Additional sorting or processing those materials for reuse or recycling.
 - 1) In order to return them to the economic mainstream in the form of raw material for new, reused, or reconstituted products.
 - b. Products shall meet the quality standards necessary to be used in the marketplace.
 - c. Includes materials that have been "source separated".
- V. Solid Waste:
 - 1. All putrescible and nonputrescible solid, semisolid, and liquid wastes, including:
 - a. Garbage, trash, refuse, paper, rubbish, ashes, industrial wastes, demolition and construction wastes.
 - b. Abandoned vehicles and parts thereof.
 - c. Discarded home and industrial appliances.
 - d. Dewatered, treated, or chemically fixed sewage sludge which is not hazardous waste.
 - e. Manure, vegetable or animal solid and semisolid wastes.
 - f. Other discarded solid and semisolid wastes.
 - 2. "Solid waste" does not include hazardous waste, radioactive waste, or medical waste as defined or regulated by State law.
- W. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
 - 1. Materials, including commingled recyclables, that have been separated or kept separate from the solid waste stream at the point of generation, for the purpose of additional sorting or processing of those materials for reuse or recycling in order to return them to the economic mainstream in the form of raw materials for new, reused, or reconstituted products which meet the quality standards necessary to be used in the marketplace.
- X. Toxic: Poisonous to humans either immediately or after a long period of exposure.
- Y. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- Z. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.
- AA. Waste Hauler: A company that possesses a valid permit from the local waste management authority to collect and transport solid wastes from individuals or businesses for the purpose of recycling or disposal in the locality.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Submit Waste Management Plan within 30 calendar days after receipt of Notice to Proceed, or prior to any trash or waste removal, whichever occurs sooner; submit projection of all trash and waste that will require disposal and alternatives to landfilling.
 - 1. Submit four copies of CWMP for review.

- a. Contractor's Construction Waste and Recycling Plan must be approved by the Architect and Construction Manager prior to the start of Work.
 2. Approval of the Contractor's CWMP shall not relieve the Contractor of responsibility for adequate and continuing control of pollutants and other environmental protection measures.
- C. Waste Management Plan: Include the following information:
1. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.
 2. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all project trash/waste in the landfill(s).
 3. Landfill Alternatives: List all waste materials that will be diverted from landfills by reuse, salvage, or recycling.
 - a. List each material proposed to be salvaged, reused, or recycled.
 - b. List the local market for each material.
 4. Meetings: Describe regular meetings to be held to address waste prevention, reduction, recycling, salvage, reuse, and disposal.
 5. Materials Handling Procedures: Describe the means by which materials to be diverted from landfills will be protected from contamination and prepared for acceptance by designated facilities; include separation procedures for recyclables, storage, and packaging.
 6. Transportation: Identify the destination and means of transportation of materials to be recycled; i.e. whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler.
 7. Recycling Incentives: Describe procedures required to obtain credits, rebates, or similar incentives.
- D. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.
1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.
 - a. Inert materials shall achieve a construction waste diversion rate of at least 95 percent.
 - 1) These materials include, but are not limited to, concrete, asphalt and rock.
 - 2) Earthwork is not included.
 - 3) Excavated soil shall not be included in any of the calculations used to ensure compliance with this specification section.
 - b. The overall diversion rate must be based on weight.
 - c. The diversion rate of individual materials can be measured in either weight or volume, but the rate shall be converted into the units selected for calculating the overall diversion rate.
 - 1) All individual material diversions must be converted to a consistent set of units when calculating the overall diversion rate for the all reports and submittals required for the Work.
 - d. Conversion rate numbers shall be based on standard conversion rate data for construction projects provided by the California Integrated Waste

Management Board (CIWMB). This data is available at the following internet location, <http://www.calrecycle.ca.gov/LGCentral/Library/dsg/ICandD.htm>.

2. Submit Report on a form acceptable to District.
3. Landfill Disposal: Include the following information:
 - a. Identification of material.
 - b. Amount, in tons or cubic yards, of trash/waste material from the project disposed of in landfills.
 - c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.
 - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
4. Recycled and Salvaged Materials: Include the following information for each:
 - a. Identification of material, including those retrieved by installer for use on other projects.
 - b. Amount, in tons or cubic yards, date removed from the project site, and receiving party.
 - c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.
 - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
 - e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.
5. Material Reused on Project: Include the following information for each:
 - a. Identification of material and how it was used in the project.
 - b. Amount, in tons or cubic yards.
 - c. Include weight tickets as evidence of quantity.
6. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

PART 2 PRODUCTS

2.01 PRODUCT SUBSTITUTIONS

- A. See Section 01 60 00 - Product Requirements for substitution submission procedures.
- B. For each proposed product substitution, submit the following information in addition to requirements specified in Section 01 60 00:
 1. Relative amount of waste produced, compared to specified product.
 2. Cost savings on waste disposal, compared to specified product, to be deducted from the Contract Sum.
 3. Proposed disposal method for waste product.
 4. Markets for recycled waste product.

PART 3 EXECUTION

3.01 WASTE MANAGEMENT PROCEDURES

- A. See Section 01 30 00 for additional requirements for project meetings, reports, submittal procedures, and project documentation.

- B. See Section 01 52 00 for additional requirements related to trash/waste collection and removal facilities and services.
- C. See Section 01 60 00 for waste prevention requirements related to delivery, storage, and handling.
- D. See Section 01 70 00 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.
- B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, District, and Architect.
- C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.
- D. Meetings: Discuss trash/waste management goals and issues at project meetings.
 - 1. Pre-bid meeting.
 - 2. Pre-construction meeting.
 - 3. Regular job-site meetings.
- E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
 - 1. As a minimum, provide:
 - a. Separate area for storage of materials to be reused on-site, such as wood cut-offs for blocking.
 - b. Separate dumpsters for each category of recyclable.
 - c. Recycling bins at worker lunch area.
 - 2. Provide containers as required.
 - 3. Provide temporary enclosures around piles of separated materials to be recycled or salvaged.
 - 4. Provide materials for barriers and enclosures that are nonhazardous, recyclable, or reusable to the maximum extent possible; reuse project construction waste materials if possible.
 - 5. Locate enclosures out of the way of construction traffic.
 - 6. Provide adequate space for pick-up and delivery and convenience to subcontractors.
 - 7. If an enclosed area is not provided, clearly lay out and label a specific area on-site.
 - 8. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.
- F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.
- G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

- H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.
- I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

3.03 DISPOSAL OPERATIONS AND WASTE HAULING

- A. Remove waste materials from Project Site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 - 1. Except for items or materials to be salvaged, recycled, or otherwise reused.
 - 2. Except as otherwise specified, do not allow waste materials that are to be disposed of to accumulate on site.
 - 3. Use a permitted waste hauler or Contractor's trucking services and personnel. To confirm valid permitted status of waste haulers, contact the local solid waste authority.
 - 4. Become familiar with the conditions for acceptance of new construction, excavation and demolition materials at recycling facilities, prior to delivering materials.
 - 5. Deliver to facilities that can legally accept new construction, excavation and demolition materials for purpose of re-use, recycling, composting, or disposal.
 - 6. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 7. Do not burn or bury waste materials on or off site. Appropriate on-site topical application of ground gypsum or wood, or use of site paving as granulated fill is considered reuse, not waste.

3.04 PLAN AND REPORT FORMS

- A. See suggested forms on the following pages.

END OF SECTION

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This Section includes administrative and procedural requirements for Contract Closeout, including but not limited to, the following:
 - 1. Completion Procedures
 - 2. Project Record Documents
 - 3. Operation and Maintenance Manuals
 - 4. Orientation and Instruction of DISTRICT'S Personnel
 - 5. Warranties and Guarantees
 - 6. Spare Parts and Materials
 - 7. Final Cleaning
- B. Additional closeout requirements for specific Work activities are included in the appropriate Sections in Divisions 02 through 16.

1.02 RELATED SECTIONS

- A. Price and Payment Procedures
- B. Submittals
- C. Construction Progress Schedule
- D. Construction Facilities
- E. Temporary Controls
- F. Warranties
- G. Project Record Documents

1.03 COMPLETION PROCEDURES

- A. Substantial Completion and Partial Occupancy:
 - 1. Conform to Title 24, Part 1, Section 4-336 CCR, Requirements for Verified Reports and Closeout Procedures.
 - 2. In conjunction with the IOR, prepare a list of items to be completed or corrected. List may be developed by areas, when approved by the ARCHITECT.
 - 3. Within a reasonable time after receipt of the list, the ARCHITECT will inspect to determine status of completion.
 - 4. Should the ARCHITECT determine that Work is not substantially

complete:

- a. The ARCHITECT will promptly notify the CONTRACTOR in writing, giving the reasons for his determination.
- b. CONTRACTOR shall remedy the deficiencies and notify the ARCHITECT when Work is ready for re-inspection.
- c. The ARCHITECT will re-inspect the Work.

5. When the ARCHITECT concurs that work is substantially complete:

- a. The ARCHITECT will prepare a "Certificate of Substantial Completion" on AIA Form G704, accompanied by the CONTRACTOR's list of items to be completed or corrected as verified by the ARCHITECT.
- b. The ARCHITECT will submit the Certificate to the DISTRICT and to the CONTRACTOR for their written acceptance of the responsibilities assigned to them in the Certificate.

B. Final Completion:

- 1. Verify the Work is complete.
- 2. Prepare and submit a notice that Work is ready for final inspection and acceptance.
- 3. Certify that:
 - a. Work has been inspected by all governing agencies and is in compliance with all governing regulations.
 - b. Work has been inspected for compliance with the Contract Documents.
 - c. Work has been completed in accordance with the Contract Documents.
 - d. Equipment and systems have been tested as required and are operational.
 - e. Work is completed and ready for final inspection.
- 4. The ARCHITECT will make an inspection to verify status of completion.
- 5. Should the ARCHITECT determine the Work is incomplete or defective:
 - a. The ARCHITECT will promptly notify the CONTRACTOR in writing, listing incomplete or defective work.
 - b. CONTRACTOR shall remedy the deficiencies promptly and notify the ARCHITECT when ready for re-inspection.

6. When the ARCHITECT determines the Work is acceptable under the Contract Documents, he will request the CONTRACTOR to make closeout submittals.
- C. Submit all closeout documents, including but are not limited to:
1. Project Record Documents.
 2. Operation and Maintenance Manuals (for all items requiring special knowledge for operation or for maintenance, listed in pertinent Sections of these Specifications), and for other items when so approved by the ARCHITECT.
 3. Warranties and Guarantees.
 4. Keys and Keying Schedule.
 5. Spare parts, materials, extra stock to be turned over to the DISTRICT.
 6. Evidence of payment and release of liens, when requested by DISTRICT.
 7. List of subcontractors, service organizations and principal vendors, including names, addresses and telephone numbers, where they may be contacted for emergency service at all times, including nights, weekends and holidays.

D. Final Payment:

Submit a Final Payment Request, showing all adjustments to the Contract Sum.

1.04 VERIFIED REPORTS

- A. Construction progress of the Work shall be reported to DSA via a duly verified report in accordance with Sections 4-336 and 4-343 of the California Building Standards Administrative Code.

1.05 OPERATION AND MAINTENANCE MANUALS

- A. Prior to Substantial Completion, submit three (3) sets of Operation and Maintenance (O&M) Manuals and one (1) electronic copy to the ARCHITECT for DISTRICT's records. Organize O&M data into sets of manageable size. Bind properly indexed data in individual, heavy-duty, 2"-3", 3-ring, durably covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder.
1. Emergency instructions
 2. Manufacturer's operating and maintenance instructions, including any seasonal adjustments
 3. Spare parts list
 4. Copies of warranties
 5. Wiring diagrams

6. Recommended "turn-around" cycles
7. Inspection procedures
8. Shop Drawings and Product Data
9. Fixture lamping schedule

1.06 ORIENTATION AND INSTRUCTION OF DISTRICT'S PERSONNEL:

- A. Instruct the DISTRICT's personnel in proper operation and maintenance of all systems, equipment and similar items, which were provided as part of the work. Provide maintenance and inspection schedules that conform to manufacturer's recommendations. Provide instruction by manufacturers' representatives if installers are not experienced in operation and maintenance procedures. Include a detailed review of the following items:
 1. Maintenance manuals
 2. Record documents
 3. Spare parts and materials
 4. Tools
 5. Lubricants
 6. Fuels
 7. Identification systems
 8. Control sequences
 9. Hazards
 10. Cleaning
 11. Warranties and bonds
 12. Maintenance agreements and similar continuing commitments
- B. CONTRACTOR shall provide a schedule to the DISTRICT for approval for each of the instruction periods required.
 1. Organize the instruction sessions into group sizes and schedule the elapsed time for instruction in a manner to provide complete coverage of the subject matter. Video tape each session and provide DISTRICT with two (2) copies.
- C. Instruction sessions will be held in a DISTRICT designated area on the project site and at DISTRICT's convenience. Amount of time required for each session shall be as specified in individual sections, but in no case less than the time needed to fully convey the information needed by DISTRICT personnel for operating and maintaining the products.
- D. Instructors shall be qualified by the product manufacturer in the subject matter presented at each session.
 1. Submit names of instructors and qualifications to the Architect and DISTRICT for approval, 30 days prior to each scheduled session.
 2. Substitution of instructors will not be permitted without prior approval of Architect or DISTRICT.

- E. As part of instruction for operating equipment, demonstrate the following procedures:
 - 1. Start-up
 - 2. Shutdown
 - 3. Emergency operations
 - 4. Noise and vibration adjustments
 - 5. Safety procedures
 - 6. Seasonal adjustments
 - 7. Economy and efficiency adjustments
 - 8. Effective energy utilization measures
- F. Schedule and provide seasonal or periodic training sessions when specified in technical sections of the Specifications.

1.07 WARRANTIES AND GUARANTEES

- A. Manufacturer's warranties and guarantees notwithstanding, warrant entire Work against defects in materials and workmanship for twelve (12) months from date of Substantial Completion. Warranties and guarantees between CONTRACTOR and manufacturers and CONTRACTOR and suppliers shall not affect warranties or guarantees between CONTRACTOR and DISTRICT.
- B. Execute and assemble documents from subcontractors, suppliers and manufacturers.
- C. Submit prior to final Application for Payment.
- D. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within ten (10) days after acceptance, listing date of acceptance as start of warranty period.

1.08 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification Sections.
- B. Deliver to project site location as directed by DISTRICT.

1.09 FINAL CLEANING

- A. Final cleaning is provided by Contractor.
- B. Each CONTRACTOR shall leave his finished work in clean condition, including following as applicable:
 - 1. Remove labels that are not permanent labels.
 - 2. 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.

3. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.
4. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.

END OF SECTION

SECTION 01 78 36

WARRANTIES AND BONDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preparation and submittal of warranties and bonds.
- B. Time and schedule of submittals.

1.02 RELATED SECTIONS

- A. Contract Closeout Procedures.
- B. Product Requirements
- C. Materials and Equipment
- D. Technical Specifications Sections: Warranties required for specific products or Work.

1.03 WARRANTY REQUIREMENTS

- A. Warranties or bonds shall provide for replacement or reconstruction of failed or defective Work to an acceptable condition complying with the requirements of the Contract Documents. Work shall be restored at no cost to the District regardless of whether the District has benefited from use of the Work for a portion of its anticipated useful service life.
- B. Provide warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item or work.
- C. When a designated portion of the Work is partially used and/or occupied by the DISTRICT, submit properly executed warranties within ten (10) days of the Partial Use or Occupancy of the designated portion of the Work
- D. Verify that documents are in proper form, contain full information and are notarized.
- E. DISTRICT Recourse: Expressed warranties made to DISTRICT 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 DISTRICT can enforce such other duties, obligations, rights, or remedies.

1.04 FORM OF SUBMITTALS

- A. Prepare duplicate binders, commercial quality, 8-1/2 x 11 inch, three-ring side binders with hardback, cleanable, plastic covers.

- B. Label cover and spine of each binder with typed or printed title WARRANTIES AND BONDS, with title of Project. Number separate volumes in order.
- C. Table of Contents: Typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification Section in which specified and the name of the product or work item.
- D. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. Use paper of durable, long-lasting quality. List Subcontractor, supplier, and manufacturer, with name, address and telephone number of responsible principal.

1.05 TIME OF SUBMITTALS

- A. Except for specifically authorized exceptions, the date for beginning the period of warranty shall be the Date of Substantial Completion.
- B. For equipment or component parts of equipment put into service during construction with District's permission, submit documents within ten (10) days after acceptance.
- C. Make other submittals within ten (10) days after Date of Substantial Completion prior to final Application for Payment.
- D. For items of Work when acceptance is delayed beyond Date of Substantial Completion, submit within ten (10) days after acceptance, listing the date of acceptance as the beginning of the warranty period.

END OF SECTION

GUARANTEE

We hereby guarantee that the **Category No.** _____, which we have installed for **SAN BERNARDINO CITY UNIFIED SCHOOL DISTRICT** at **PROJECT NAME** has been performed in accordance with the requirements of the Contract Documents and that the work as installed will fulfill the requirements of the Contract Documents.

The undersigned agrees to repair or replace any or all of such work that may prove to be defective in workmanship or material together with any other adjacent work which may be displaced in connection with such replacement within a minimum period of **ONE (1) YEAR** (see individual trade specifications for more stringent requirements) from the date of acceptance of the above-mentioned project by **SAN BERNARDINO CITY UNIFIED SCHOOL DISTRICT**, ordinary wear and tear and unusual abuse or neglect excepted.

In the event of the undersigned's failure to comply with the above mentioned conditions within a reasonable period of time, as determined by the District, but not later than ten (10) working days after being notified in writing by the District, the undersigned authorizes the District to proceed to have said defects repaired and made good at the expense of the undersigned, who will pay the costs and charges therefore upon demand.

PRIME CONTRACTOR

SIGNED: _____

NAME

Representatives to be contacted for service subject to terms of contract:

NAME: _____

ADDRESS: _____

PHONE #: _____

**CONTRACTOR'S CERTIFICATE
REGARDING ASBESTOS MATERIAL**

This form is to be submitted at the time final billing is provided.

"I certify that all the materials and supplies installed under this

(Name of Contract)

contract are free of asbestos-containing materials."

Date

Official Name of Contractor

By

Title

Signature

END OF SECTION

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.07 SECTION INCLUDES

- A. This Section includes administrative and procedural requirements for preparing, maintaining, and submitting Project Record Documents.

1.08 RELATED SECTIONS

- A. Price and Payment Procedures
- B. Submittals
- C. Closeout Procedures
- D. Field Engineering

1.09 PROJECT RECORD DOCUMENTS

- A. CONTRACTOR shall prepare and maintain record documents throughout the course of construction, as specified herein.
- B. Provide access to record documents for ARCHITECT, IOR and CM reference during normal working hours.
- C. Do not use project record documents for construction purposes. Protect record documents from deterioration and loss.
- D. Record in concise and neat manner, concurrent with construction progress, and at least on a weekly basis, all actual revisions to the work:
 - 1. Changes made on the Drawings, including Clarification Drawings.
 - 2. Changes made to the Specifications.
 - 3. Changes made by Addenda.
 - 4. Changes made by Instruction Bulletins.
 - 5. Change Orders or other authorized Modifications to the Contract.
 - 6. Revisions made to shop drawings, product data and samples.
- E. Record Drawings shall be a clean, clear electronic files of Drawings and Shop Drawings. File type shall be determined by DISTRICT. Mark the set with red erasable pencil to show the actual installation where the installation varies substantially from the Work as originally shown. Indicate which Drawing is most capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on the Drawings. Provide detailed and accurate field dimensions for concealed elements that would be difficult to measure and record at a later date.

1. Mark new information, including details, that is important to DISTRICT but was not shown on Drawings or Shop Drawings.
 2. Show measured depths of foundations in relation to finish first floor datum.
 3. Show measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements. Identify drains and sewers by invert elevation.
 4. Verify surveyor's Record Drawings with CONTRACTOR'S utilities locations and depths markups.
 5. Show measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work. Identify ducts, dampers, valves, access doors and control equipment wiring.
 6. Show field changes of dimension and detail.
 7. Note related Change Order or Construction Directive numbers on each affected sheet.
 8. Organize Record Drawing sheets into manageable sets. Bind sets with durable-paper cover sheets; print suitable titles, dates, and other identification on the cover of each set.
- F. Record Specifications: Maintain a complete copy of the Specifications, including Addenda, Change Orders and Construction Directives issued during construction. Legibly mark at each Section description of actual products installed if different from that specified, including:
1. Manufacturer's name, trade name, product model and number and supplier.
 2. Authorized product substitutions or alternates utilized.
 3. Changes made by Addenda and Modifications.
- G. Record Product Data: Maintain a copy of each Product Data submittal. Note related Change Orders and Construction Directives and mark-up of record drawings and Specifications.
1. Mark these documents to illustrate significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the Project site and from the manufacturer's installation instructions and recommendations.
 2. Provide detailed and accurate information regarding concealed products and portions of Work that cannot otherwise be readily discerned later by direct observation.

- H. Record Samples: Immediately prior to Substantial Completion, CONTRACTOR shall meet with ARCHITECT and DISTRICT at the Project site to determine which Samples are to be transmitted to DISTRICT for record purposes. Comply with DISTRICT instructions regarding delivery to DISTRICT storage area.
- I. Miscellaneous Records: Refer to other Specification sections for requirements of miscellaneous record keeping and submittals in connection with actual performance of the Work. Immediately prior to the date of Final Completion, complete and compile miscellaneous records and place in good order. Identify miscellaneous records properly and bind or file, ready for continued use and reference. Submit to ARCHITECT for DISTRICT records.

END OF SECTION

SECTION 02 41 00

DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Selective demolition of building elements for alteration purposes.

1.02 RELATED REQUIREMENTS

- A. Division 01 - Summary: Limitations on Contractor's use of site and premises.
- B. Division 01 - Summary: Description of items to be salvaged or removed for re-use by Contractor.
- C. Division 01 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- D. Division 01 - Product Requirements: Handling and storage of items removed for salvage and relocation.
- E. Division 01 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 SCOPE

- A. Remove items indicated, for salvage, relocation, and recycling.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Do not begin removal until receipt of notification to proceed from Owner.
- B. Do not begin removal until built elements to be salvaged or relocated have been removed.
- C. Protect existing structures and other elements that are not to be removed.
- D. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

3.03 EXISTING UTILITIES

- A. Protect existing utilities to remain from damage.
- B. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

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- C. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.
- D. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 - 1. Verify that construction and utility arrangements are as shown.
 - 2. Report discrepancies to Architect before disturbing existing installation.
 - 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Remove existing work as indicated and as required to accomplish new work.
 - 1. Remove items indicated on drawings.
- C. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
 - 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
 - 2. Verify that abandoned services serve only abandoned facilities before removal.
 - 3. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.
- D. Protect existing work to remain.
 - 1. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 - 2. Repair adjacent construction and finishes damaged during removal work.
 - 3. Patch as specified for patching new work.

3.05 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SPECIFICATIONS

SECTION 02 41 19 SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Demolition and removal of selected portions of building or structure.
 - 2. Demolition and removal of selected site elements.
 - 3. Salvage of existing items to be reused or recycled.
- B. Related Requirements:
 - 1. Section 01 10 00 "Summary" for use of the premises, phasing requirements, interim housing considerations, coordination with occupants, etc.
 - 2. Section 01 32 33 "Photographic Documentation" for preconstruction photographs taken before building demolition.
 - 3. Section 31 10 00 "Site Clearing" for site clearing and removal of above- and below-grade improvements not part of selective demolition.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to the District ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.
- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

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1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to the District that may be uncovered during demolition remain the property of the District.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to the District.

1.5 PRE-INSTALLATION MEETINGS

- A. Pre-demolition Conference: Conduct conference at Project site.
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - 5. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Engineering Survey: Submit engineering survey of condition of building.
- C. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and for noise control. Indicate proposed locations and construction of barriers.
- D. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure District on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Use of elevator and stairs.
 - 5. Coordination of District continuing occupancy of portions of existing building and of District partial occupancy of completed Work.
 - 6. Locations of proposed dust and noise control temporary partitions and means of egress.

SPECIFICATIONS

- 7. Means of protection for items to remain and items in path of waste removal from building.
 - E. Pre-demolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces that might be misconstrued as damage caused by demolition operations. Comply with Section 01 32 33 "Photographic Documentation." Submit before Work begins.
 - F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
 - G. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.
- 1.7 CLOSEOUT SUBMITTALS
- A. Inventory: Submit a list of items that have been removed and salvaged.
 - B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.
- 1.8 QUALITY ASSURANCE
- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.
- 1.9 FIELD CONDITIONS
- A. The District will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so the District operations will not be disrupted.
 - B. Conditions existing at time of inspection for bidding purpose will be maintained by the District as far as practical.
 - C. Notify the District Construction Manager of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
 - D. Hazardous Materials: Present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
 - 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.

SELECTIVE DEMOLITION

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3. Hazardous materials and locations are shown in the Drawings. The mitigation of this material is included in the Base Bid.
 4. If hazardous materials are encountered that are not shown in the Drawings, do not disturb; immediately notify the District Construction Manager. Remove hazardous materials in accordance with Specification Sections 02 82 33, 02 83 33 and 02 84 33. The costs associated with such work shall be paid out of the appropriate Allowance, as approved by the District Construction Manager.
- E. Termite Infestation: It is not expected that active termite infestations will be encountered in the Work.
1. If active termite infestations are encountered, do not disturb; immediately notify the District Construction Manager who will have the infestations investigated. Allow three days when no work will be permitted on those portions of the Work suspected of having active termite infestations.
- F. Storage or sale of removed items or materials on-site is not permitted.
- G. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
1. Maintain fire-protection facilities in service during selective demolition operations.

1.10 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with the District operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI / ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by the District. The District does not

SPECIFICATIONS

guarantee that existing conditions are same as those indicated in Project Record Documents.

- C. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
 - 1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
- D. Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs or video.
 - 1. Comply with requirements specified in Section 01 32 33 "Photographic Documentation."
 - 2. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
- E. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to District Construction Manager.

3.2 PREPARATION

- A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Arrange to shut off utilities with utility companies.
 - 2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.

SELECTIVE DEMOLITION

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- c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to the District.
 - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.
4. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
- a. Where entire wall is to be removed, existing services/systems may be removed with removal of the wall.

3.4 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
- 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 - 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 01 50 00 "Temporary Facilities and Controls."
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
- 1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

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3.5 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
 5. Maintain fire watch and portable fire-suppression devices during and for at least 3 hours after flame-cutting operations.
 6. Maintain adequate ventilation when using cutting torches.
 7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 10. Dispose of demolished items and materials promptly. Comply with requirements in Section 01 74 19 "Construction Waste Management and Disposal."
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C. Removed and Salvaged Items:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to the District.
 4. Transport items to the District storage area designated by District.
 5. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

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- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by District Construction Manager, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.
- D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.
 - 1. Remove residual adhesive and prepare substrate for new floor coverings by one of the methods recommended by RFCI (Resilient Floor Covering Institute).
- E. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight.
 - 1. Remove existing roof membrane, flashings, copings, and roof accessories.
 - 2. Remove existing roofing system down to substrate.
- F. Air-Conditioning Equipment: Remove equipment without releasing refrigerants. Cap all ducts to remain, if new equipment is not immediately installed.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 - 4. Comply with requirements specified in Section 01 74 19 "Construction Waste Management and Disposal."

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- B. Burning: Do not burn demolished materials.

3.8 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 02 41 19

SPECIFICATIONS

SECTION 02 82 33

REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Hazardous Building Materials Survey Reports, prepared by the District's Consultant, are available from the District Construction Manager.

1.2 REFERENCE DOCUMENTS

- A. The current issue of the following documents are incorporated herein and shall govern the conduct of the Work. Where conflict among requirements or with this specification exists, the more stringent requirements shall apply.
- B. Code of Federal Regulations (CFR):
 - 1. 29 CFR 1910, Occupational Safety and Health Standards, General.
 - 2. 29 CFR 1910.134 Respiratory Protection.
 - 3. 29 CFR 1910.1001 Asbestos – General Industry.
 - 4. 29 CFR 1910.1200, Hazard Communication.
 - 5. 29 CFR 1926 Occupational Safety and Health Standards, Construction.
 - 6. 29 CFR 1926.55, Gases, Vapors, Fumes, Dusts, and Mists.
 - 7. 29 CFR 1926.59, Hazard Communication.
 - 8. 29 CFR 1926.1101 Asbestos – Construction Industry.
 - 9. 40 CFR 61 Subpart A and Subpart M, USEPA, National Emission Standards for Hazardous Air Pollutants (NESHAP).
 - 10. 40 CFR, Part 763, The Asbestos Hazard Emergency Response Act.
 - 11. 49 CFR Parts 106, 107, 171 to 179, The Transportation Safety Act, Hazardous Material Transportation Act.
- C. California Code of Regulations (CCR):
 - 1. Title 8, Section 1514, Personal Protective Equipment
 - 2. Title 8, Section 1529 Asbestos in the Construction Industry.
 - 3. Title 8, Section 1531 Construction Respiratory Protective Equipment.
 - 4. Title 8, Section 3203 Injury and Illness Prevention Program.
 - 5. Title 8, Section 5144 Respiratory Protective Equipment.
 - 6. Title 8, Section 5155 Airborne Contaminants.
 - 7. Title 8, Section 5194 Hazard Communication.
 - 8. Title 8, Section 5208 General Industry Safety Orders, Asbestos Regulations.

REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIALS

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- D. State and Local Regulations: Those regulations promulgated under the Clean Air Act or Occupational Safety and Health Act and incorporated in a State plan recognized by EPA or OSHA, respectively.
 - 1. San Diego Air Pollution Control District Subpart M, National Emission Standards for Asbestos, Rule 361.145 Standard for Demolition or Renovation.
- E. American National Standards Institute (ANSI):
 - 1. ANSI Standard Z9.2 Fundamentals Governing the Design and Operation of Local Exhaust Ventilation Systems.
- F. American Society for Testing and Materials (ASTM):
 - 1. ASTM Standard D1331 Standard Test Methods for Surface and Interfacial Tension of Solutions of Surface Active Agents.
 - 2. ASTM Standard E1368 Standard Practice for Visual Inspection of Asbestos Abatement Projects.
 - 3. ASTM Standard E1494 Standard Practice for Encapsulation Testing of Friable Asbestos-Containing Surfacing Materials.

1.3 SUMMARY

- A. Section includes the furnishing of all labor, materials, facilities, equipment, services, employee training, permits, agreements, waste transport and disposal necessary to perform the work required for asbestos removal in accordance with these specifications, EPA, APCD, OSHA, NIOSH, State of California regulations, and any other applicable federal, state and local government regulations. Whenever there is a conflict or overlap of the above references, the most stringent provisions are applicable.
- B. Perform the work and provide service as needed to accomplish abatement of asbestos containing materials at the Project Site. Specific locations and materials to be removed/disturbed are indicated on the Drawings. Sampling data for identification of asbestos containing materials and non-asbestos containing materials is available from the District Construction Manager. The requirements of all regulations and specifications must be observed for the removal or disturbance of any material containing any amount of "asbestos."
- C. Comply with all requirements of this specification. Alternate and innovative technologies and procedures are encouraged and must be submitted in detail for approval prior to any work being performed. Any alternative technologies submitted must have been written by a Certified Industrial Hygienist (CIH) or State of California Certified Asbestos Consultant (CAC).
- D. In the event ACMs or ACCMs in addition to those indicated in the Drawings are discovered, do not disturb. Immediately notify the District Construction Manager who will have the additional materials tested.

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E. Related Requirements:

1. Section 02 83 33 "Removal and Disposal of Materials Containing Lead" for lead abatement.
2. Section 02 84 33 "Removal and Disposal of Universal Waste and PCB" for Universal Waste and PCB abatement.

1.4 ALLOWANCES

- A. Allowances for removal and disposal of ACM and ACCM in addition to those indicated on the Drawings are specified in Section 01 21 00 "Allowances."

1.5 DEFINITIONS

- A. All terms not defined herein shall have the meaning given in the applicable publications and regulations.
- B. "Abatement Activities" shall mean all activities from the initiation of work area preparation through successful clearance air monitoring performed at the conclusion of an asbestos project.
- C. "Air Lock" shall mean an enclosed space designed to control air movement between two areas. It is composed of sealed spaces with curtained doorways at its portals. A Worker Decontamination Facility contains at least three air locks.
- D. "Ambient Air Monitoring" shall mean measurement or determination of airborne asbestos fiber concentrations outside but in the general vicinity of the work site.
- E. "Amended Water" or "Wetting Agent" shall mean water to which an approved surfactant has been added in proportion of at least one (1) ounce surfactant to five (5) gallons water.
- F. "Asbestos-Containing Materials (ACM)" shall mean any insulation, fireproofing, plaster, ceiling or floor tiles and any other building materials containing more than 1% asbestos (>1%).
- G. "Asbestos-Containing Construction Material (ACCM)" shall mean any material containing between one-tenth of one percent and one percent asbestos (0.1% - 1%).
- H. "Asbestos-Contaminated Objects" shall mean any objects, which may be contaminated by asbestos or asbestos-containing material as determined by the Consultant.
- I. "Asbestos Disposal" shall mean the removal of containerized asbestos, asbestos-containing material, asbestos-containing waste material and asbestos-contaminated objects from the regulated area to the final EPA approved disposal site.
- J. "Authorized Visitors" shall mean any visitor authorized by the Consultant or any representative of a regulatory agency or other agency having jurisdiction over the project.

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- K. "Barriers or Containment Barriers" shall mean walls, tunnels, or enclosures erected to separate any section of an abatement area from adjoining spaces. Where indicated on drawings, barriers shall be constructed of 2'x 4's, with minimum 1/2" plywood walls, and all seams in plywood and edges shall be sealed airtight with caulking. The inside (work) side of all such barriers shall be covered with two (2) layers of 6-mil polyethylene sheeting. Tunnels to maintain public access through a work area shall also be defined as part of the barriers. All lumber, plywood, and polyethylene shall be flame retardant and shall bear manufacturer's label.
- L. "Baseline or Background Air Monitoring" shall mean a measurement or determination of airborne asbestos fiber concentrations inside the workplace and outside a building prior to starting abatement activities.
- M. "Certified Clean" shall mean that a work area has no visible signs of fibrous materials or other contamination and does not have levels of airborne fiber above the defined air clearance criteria.
- N. "Class I asbestos work" means activities involving the removal of thermal systems insulation (TSI) and surfacing ACM and PACM.
- O. "Class II asbestos work" means activities involving the removal of ACM which is not thermal system insulation or surfacing material. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastics.
- P. "Class III asbestos work" means repair and maintenance operations, where "ACM", including TSI and surfacing ACM and PACM, is likely to be disturbed.
- Q. "Class IV asbestos work" means maintenance and custodial activities during which employees contact but do not disturb ACM or PACM and activities to clean up dust, waste and debris resulting from Class I, II, and III activities.
- R. "Clean or Decontaminate" shall mean to make a surface free of all visible and optically detectable fibers by thoroughly HEPA-vacuuming and wet washing with sponges and mops.
- S. "Clean room" shall mean an uncontaminated room having facilities for the storage of employees' street clothing and uncontaminated materials and equipment.
- T. "Competent Person" shall mean one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them. In addition, for Class I and Class II work, one who is specially trained in a training course that meets the criteria of EPA's Model Accreditation Plan (40 CFR part 763) for supervisor, or its equivalent.
- U. "Consultant" shall mean the consulting industrial hygienist. The Consultant is an independent party retained by the District to provide consultation services for asbestos abatement activities.

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- V. "Curtained Doorway or Entrance" shall mean a portal which limits air movement between two areas, constructed by placing two overlapping sheets of plastic over an existing or temporary doorway, by securing each along the top of the doorway, by securing the vertical edge of one sheet along one vertical side of the doorway, and by securing the vertical edge of the other sheet along the opposite vertical side of the doorway.
- W. "Decontamination Facility (DF) or Area (DA)" shall mean a series of connected rooms or spaces including clean room, shower room, and contaminated dirty (equipment) room, each separated by an air lock; and used for the decontamination of all workers, and their personal protective equipment leaving an asbestos removal work area, as well as for access to such work areas. All decontamination facilities shall be a "structural" (i.e. capable of supporting workers standing above).
- X. "Disposal Site" shall be an EPA approved landfill.
- Y. "District" shall mean the San Diego Unified School District.
- Z. "Disturb" shall mean contact that releases fibers from ACM, PACM, or ACCM. It includes any activity that disrupts the matrix of ACM, ACCM, or PACM, crumbles or pulverizes ACM, ACCM, or PACM, or generate visible debris from ACM, ACCM or PACM. Any activity which alters, changes, or stirs ACM or PACM, such as but not limited to the removal, encapsulation, enclosure or repair of ACM or asbestos contaminated material.
- AA. "Encapsulation" shall mean procedures necessary to coat or saturate material with an approved encapsulant liquid to control the possible release of fibers into the ambient air. "Encapsulant" (sealant) shall mean liquid material which can be applied to other solid material which reduces the possible release of fibers from the material either by creating a membrane over the surface (bridging encapsulant) or by penetrating into the material and binding its components together (penetrating encapsulant).
- BB. "Equipment room" means a contaminated room located within the decontamination area that is supplied with impermeable bags or containers for the disposal of contaminated protective clothing and equipment.
- CC. "Fiber" shall mean a particulate form of asbestos, 5 micrometers or longer, with a length-to-diameter ratio of at least 3 to 1.
- DD. "Final Cleaning" shall mean that no three-dimensional material is visible to the naked eye.
- EE. "Fixed Items" shall mean equipment, furniture, radiators, or other objects, which cannot be removed from the work area, plus walls and floors.
- FF. "HEPA-Filtered Exhaust Units or Fans" shall mean a fan equipped with a High Efficiency Particulate Air:(HEPA)filter greater than 99.97 percent efficient by 0.3 micron DOP test, and complying with ANSI Z9.2, Local Exhaust Ventilation. It shall be used to create a pressure in a work area (reduced with respect to surrounding areas) in order to prevent the escape of asbestos fibers. It shall also be used to reduce and control the airborne concentration of asbestos fibers.

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- GG. "HEPA-Filtered Vacuum" shall be a vacuum cleaner specifically designed for and equipped with HEPA-filtration.
- HH. "Install" shall mean set in place completely ready for normal use or service, including all necessary mounting facilities, connections and testing.
- II. "Isolation Barriers" shall mean the construction of partitions, the placement of solid materials, and the plasticizing of apertures to seal off the workplace from surrounding areas and to contain asbestos fibers in the work area.
- JJ. "Lockout" shall mean the safe, approved means for shutting down HVAC equipment, electrical panels or breakers and water so that they cannot be inadvertently turned back on.
- KK. "Log" shall mean an official record of all activities that occurred during the project and it shall identify the District, Contractor, workers, floor number, date, work area, and other relevant information to the project.
- LL. "Major Abatement" shall mean the removal of ACM under contained conditions utilizing full isolation and negative pressure ventilation systems.
- MM. "Minor Abatement" shall mean the removal of ACM utilizing "glovebag" methods or modified containment.
- NN. "Outside Air" shall mean the air outside the buildings and structures.
- OO. "Outside/Ambient Air Samples" shall mean samples collected outside of the containment area in the building and analyzed using the NIOSH 7400 Method.
- PP. Presumed Asbestos-Containing Material (PACM) means thermal systems insulation or surfacing material found in buildings constructed no later than 1980, unless rebutted according to 8 CCR 1529 (k)(4).
- QQ. "Project" or "Project Site" shall refer to Mira Mesa High School, 1 Marauder Way, San Diego, California.
- RR. "Protect Fixed Items" shall mean to cover with solid enclosures and 6-mil polyethylene sheeting, and secure by taping or gluing water and airtight.
- SS. "Provide" shall mean furnish (or supply) and install.
- TT. "Regulated Area" shall have the meaning set forth in 8 CCR 1529, which is an area established by the employer to demarcate areas where Class I, II, and III asbestos work is conducted, and any adjoining area where debris and waste from such asbestos work accumulate; and a work area within which airborne concentrations of asbestos, exceed or there is a reasonable possibility they may exceed the permissible exposure limit.
- UU. "Remove Asbestos" shall mean to make a surface free of all visible fibrous materials or microscopically detectable asbestos fibers.

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- VV. "Renovation" shall mean an addition or alteration or a change or modification of building or the service equipment therefore which is not classified and an ordinary repair.
- WW. "Repair" shall mean corrective action using specified work practices (e.g. glove bag, plastic tent procedures, etc) to minimize the likelihood of fiber release from minimally damaged area of ACM.
- XX. "Replacement Material" shall mean any material approved by the District used to replace ACM.
- YY. "Seal" or "Block and Seal" shall mean preparing a space or area such that there is no air movement or passage to and from the area. "Isolation barrier" shall mean the system of seals or other items, which prevent air movement to and from any work area.
- ZZ. "Shift" shall mean a worker's or simultaneous group of workers' complete daily term of work.
- AAA. "Surface Barriers Protective Coverings or Poly" shall mean the plasticizing of walls, floors, and fixed objects within the work area to prevent contamination during subsequent abatement activities.
- BBB. "Surfactant" shall mean a chemical wetting agent added to water to improve penetration into asbestos-containing materials and thereby reduce the generation of airborne asbestos fibers.
- CCC. "Work Area" shall mean an area where asbestos removal or other abatement procedures are being performed. A work area is considered a contaminated space between the times preparation begins and the time the area is certified clean by the Consultant.
- DDD. "Work Place" shall mean the work area and the project site.

1.6 PRE-ABATEMENT MEETINGS

- A. Pre-Abatement Conference: Conduct conference at Project Site.
1. The District will arrange a Pre-Abatement Conference, attended by a representative of the District, the Consultant, and the Contractor.
 2. The Contractor shall identify his Supervisor at this conference.
 3. Provide electronic copies of "Action Submittals" at least five working days prior to this conference.
 4. Pre-Abatement Conference topics may include, but are not limited to, the following:
 - a. Contractor listing of existing site condition (e.g. damage).
 - b. Contractor and supporting vendor site access and parking.
 - c. Coordination of Contractor access routes to the work area, including approved doors, stairways, corridors, and elevators.
 - d. Availability of building utility services, such as power, water, and drains.

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- e. Determination of equipment and other movable items to be removed from the work area(s) by the Contractor, and the location of temporary storage space.
- f. Location, coverage, and use of isolation barriers and decontamination facilities.
- g. Emergency Response Procedures.

1.7 ACTION SUBMITTALS

- A. Asbestos Abatement Plan prepared and signed by a Competent Person. The Plan shall include minimally the following:
 - 1. The proposed removal methods including a detailed listing of all materials, tools, equipment, and expendable supplies that will be used during the project. For each listed item provide (as appropriate) the manufacturer's name, catalog number or model, a description of its function and location of use, an actual sample or photocopy of manufacturer's brochure. The listing shall include at a minimum spray encapsulants, wetting agents, spray adhesives (including Material Safety Data Sheets (MSDS), and equipment including HEPA-vacuums, HEPA-filtered exhaust fans, respirators, protective clothing, waste containers, protective fireproof plastic coverings, sealing tapes, materials and compounds, temporary power and electric equipment, shower water pumps and filters, encapsulating equipment, and materials for constructing decontamination facilities and barriers.
 - 2. A sketch or written description detailing the regulated work area, decontamination set-up, waste-load out, location and number of negative machines.
 - 3. A description of the exhaust system including proposed number, capacity, and location of HEPA exhaust units, and the method of discharge to the building exterior.
 - 4. A work sequencing plan that includes the number of shifts, shift times, and number of workers per shift for each phase of remediation work. Include name, summary of experience, and certifications for asbestos work of all personnel, including supervisors who may be used during the contract period (minimum of one qualified supervisor is required).
 - 5. A waste disposal plan including the labeling of waste containers, proposed waste hauler, and proposed landfill(s) for friable and non-friable asbestos waste.
 - 6. A security plan including the locations of warning signs, prevention of unauthorized entry into the area, log book forms for recording entries into the work areas, accident prevention, equipment, and methods to communicate between personnel inside and outside the work areas.
 - 7. An emergency/contingency plan including emergency ingress/egress from the work areas, accident notification policy, emergency fire and accident response procedures (including emergency decontamination procedures).

1.8 INFORMATIONAL SUBMITTALS

- A. Pre-Abatement Submittals:

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1. Copies of notifications to government entities, including San Diego Air Pollution Control District and California-OSHA (Division of Occupational Safety and Health). Notifications by Contractor are limited to only those parties Contractor is required to notify by law and this specification. Notification to the Project Inspector and Consultant are also required at least 5 days prior to commencement of each phase or mobilization of asbestos work.
2. Signed documentation of training and education of all proposed workers, including respirator fit tests and copies of OSHA specified medical exams with respirator approvals.
3. List of all Sub-Contractors proposed for this project, with their specialty and qualifications along with submittals meeting the same requirements.
4. Proposed waste hauler and copies of applicable licenses, including solid waste transportation registration issued by the California Department of Health Services Toxic Substance Division.
5. Proposed landfill for disposal of waste materials and letter from landfill authorizing hauler to dispose there.
6. A copy of the Contractor's State of California, Department of Industrial Relations, Division of Occupational Safety and Health, Certificate of Registration for Asbestos-Related Work.

B. Submittals During Abatement Work:

1. Regulated area entry logs showing names of person entering the workspace, date and time of entry and exit.
2. Safety log, including record of any accident, emergency evacuation, and any other safety and health incident.
3. Monitoring results as conducted by the Contractor's Representative shall be submitted on a daily basis to the Consultant.
4. Recording/Printouts of negative pressure manometer readings inside containment shall be submitted on a daily basis to the Consultant.

1.9 CLOSEOUT SUBMITTALS

A. Submit immediately upon completion of abatement work:

1. Copies of manifests and receipts acknowledging disposal of all hazardous and non-hazardous waste material from the project showing delivery date, quantity, and appropriate signature of landfill's authorized representative.
2. A copy of the entry-exit logbook.
3. All personal monitoring results.

1.10 PERFORMANCE REQUIREMENTS

A. Authority to Stop Work:

1. The District retains the authority to stop abatement work at any time the District and Consultant determines that conditions are not within the specifications and applicable regulations. The stoppage of work shall continue until conditions have

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been corrected and corrective steps have been taken to the satisfaction of the Consultant and/or District.

2. Stop Work Orders may be issued for, but not limited to, the following:
 - a. Poor work practices related to fiber control, including but not limited to failure to adequately wet and failure to keep regulated area clean and free from debris.
 - b. Excessive airborne fibers inside or outside the work area.
 - c. Breaks in barriers.
 - d. Loss of negative air pressure (i.e. a manometer reading of less than 0.02 inches of water) for any OSHA Class I Work.
 - e. Any other situation (outside the work area) where the District and/or Consultant establishes that the airborne clearance criterion is reached (i.e. fiber concentration at or greater than 0.01 fibers/cc outside containment). When the clearance criterion of 0.01 fibers/cc is reached for non-work areas, stop work and initiate cleanup procedures to reduce airborne fiber levels to below 0.01 f/cc for non-work areas.

B. Project Supervision:

1. Provide English-speaking on-site Supervisor for each work area at all times while abatement work is in progress. The Supervisor shall be a Competent Person, as defined by 8 CCR 1529, and must be experienced in asbestos abatement work, knowledgeable of all EPA, OSHA, and local regulations, and capable of skillfully executing all work promptly, efficiently, and in compliance with all requirements of this Specification.
2. Upon request of the District and/or Consultant, submit proof of qualifications and project experience for the Supervisor.
3. The District reserves the right to have any supervisory personnel removed if they do not demonstrate the requisite experience or skills to safely direct the work, and adequately protect their own employees or District.
4. Instruct, train, and provide required protective devices for all workers of other trades who must enter any work area before it is certified clean. The instruction shall include, at a minimum, proper use and fitting of respiratory protective devices and protective clothing, entry and exit procedures for all work areas, hazards, or asbestos exposure, work procedures, and other safety requirements contained in this Specification.
 - a. Proof of such instructions for other trades shall be supplied prior to being allowed to enter the work area.
 - b. The instruction does not relieve the other trades from the regulatory requirements for medical surveillance and other requirements of 8 CCR 5144 for the use of respiratory protective devices. Copies of the medical surveillance examinations shall also be provided prior to being allowed to enter the work area.

C. Availability of Trained Personnel:

1. Since other construction-related activities cannot commence until the successful decontamination of the work area, it is imperative that a sufficient number of

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trained personnel be provided for the duration of abatement activities to complete the work within the required schedule.

2. Do not staff the project with untrained, unqualified, or any unapproved personnel to speed up the completion of the abatement work.

D. Protection of Persons and Property:

1. General Safety Requirements:

- a. Initiate, maintain, and supervise all safety precautions and programs in connection with the Work. Take all reasonable precautions for the safety of, and provide reasonable protection to prevent damage, injury, or loss to:
 - 1) All employees on the Work and other persons who may be affected thereby.
 - 2) All Work and all materials and equipment to be incorporated therein.
 - 3) Other property at the Project Site and adjacent thereto.
 - b. Give all notices and comply with all applicable laws, ordinances, rules, regulations, and orders of any public authority bearing on the safety of persons and property and their protection from damage, injury, and loss.
 - c. Remedy all damage or loss of any property caused in whole or in part by the Contractor, any Sub-Contractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable, and not attributable to the fault or negligence of the Contractor. The Contractor shall be responsible for the protection of any finished work from damage or defacement by his/her operation.
2. Assess and control the real or potential impacts of the Work upon the District's Life Safety Systems (e.g. smoke detectors, sprinkler systems, etc.). Establish coordination prior to any commencement of work, subject to modification by the District at any time, based on the District's assessment of risks to the function of the life safety systems associated with the Contractor's actions.
 3. Establish an effective safety program in accordance with the requirements set forth in 8 CCR Subchapter 4, Construction Safety Orders and 29 CFR 1926 Safety and Health Regulations for Construction, Subpart A through Z.

E. Respiratory Protection:

1. Provide all workers, foremen, superintendents, authorized visitors, and inspectors personally issued and marked respiratory protective equipment approved by NIOSH. When respirators with disposable filters are employed provide sufficient filters for replacement as necessary by the worker or authorized visitor. Filters shall be disposed of as contaminated waste.
2. Instruct and train each worker involved in asbestos abatement (Class I, II, III) or maintenance and repair of friable asbestos-containing materials in proper respiratory use and require that each worker always wear a respirator properly fitted on the face in the work area from the start of any operation that may cause airborne asbestos fibers until the work area is completely decontaminated and cleared for re-occupancy. Use respiratory protection appropriate for the fiber

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- level encountered in the work place or as required for other toxic or oxygen-deficient situations encountered.
3. A respirator providing a minimum protection factor of 10 and equipped with a HEPA/P100 filter shall be used as long as 0.5 f/cc is not exceeded within the work area. If exceeded, all work inside the work area shall stop, and corrective actions-(cleaning) will be required until fiber levels are reduced to less than 0.5 f/cc. Filtering facepiece device respirators are not permitted.
 4. Unless otherwise permitted, respiratory protection as specified herein shall be worn at all times, including preparation of the work areas, loading and unloading of waste containers in the work area or at the transport truck, and cleaning of work area.
 5. Facial hair such as beards, long sideburns, and moustaches that interfere with the seal of air purifying type respirators are prohibited. Workers with eye corrective lenses (contact lenses or glasses) shall wear the corrective lenses in a manner that is in compliance with 8 CCR 1529 and 8 CCR 5144.
 6. Respiratory protection use, inspection, maintenance, decontamination, and storage procedures shall meet the requirements of 8 CCR 5144. In addition:
 - a. Respiratory protection shall be the last piece of worker protection equipment to be removed. Workers must wear respirators in the shower when going through decontamination procedures as stated herein.
 - b. Airline respirators with HEPA-filtered disconnect shall be disconnected in the equipment room and worn into the shower. Powered air-purifying respirator face pieces shall be worn into the shower. Filter/power pack assemblies shall be decontaminated in accordance with manufacturers' recommendations.
 - c. Whenever respirator design permits, workers shall perform a positive and negative air pressure fit test each time a respirator is worn. Powered air-purifying respirators shall be tested for adequate flow (using the methods specified by the manufacturer) every four (4) hours of use and each time the worker enters or exits the work area. Maintain written logs of these tests.
 - d. Furnish to the Consultant written documentation that each worker is medically approved to wear respirators and has been properly trained in their use, inspection, care, maintenance, and fit testing pursuant to the Contractor's written Respirator Plan.
 7. Except to the extent that more stringent requirements are written directly into the Contract Documents, the following regulations and standards have the same force and effect (and are made a part of the Contract Documents by reference) as if copied directly into the Contract Documents, or as if published copies were bound herewith. Where there is a conflict in requirements set forth in these regulations and standards, the more stringent requirements must be met.
 - a. OSHA U.S. Department of Labor Occupational Safety and Health Administration, Safety and Health Standards 29 CFR 1910, Section 1001 and Section 1910.134, 29 CFR 1926.
 - b. NIOSH National Institute for Occupational Safety and Health.
 - c. California Code of Regulations 8 CCR 5144.

F. Personal Protective Equipment:

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1. Provide to all workers, foremen, superintendents and authorized visitors and inspectors that may enter the asbestos regulated work area protective disposable clothing consisting of full-body coveralls, head covers, gloves, 18-inch high boot-type covers or reusable footwear, and eye protection.
2. Provide hard hats and safety shoes as required by job conditions and safety regulations.
3. Reusable footwear, hardhats, and eye protection devices shall be left in the "Contaminated Equipment Room" until the end of the asbestos abatement work, at which time they shall be disposed of as ACM waste or transferred to another work area by methods approved by the Consultant.
4. All disposable protective clothing shall be discarded and disposed of as asbestos waste every time the wearer exits from the workspace to the outside through the decontamination facilities.

G. Decontamination Facilities:

1. Worker decontamination enclosure systems shall be provided at all locations where workers will enter or exit the work area. At a minimum, one system at a single location is required.
2. Worker decontamination enclosure systems constructed at the project site shall utilize 6-mil black or opaque polyethylene sheeting or other approved materials for privacy.
3. The personal decontamination unit shall not be located inside the work area without written authorization from the District and/or Consultant.
4. Alternate methods of providing Decontamination facilities may be submitted to the District and/or Consultant for approval. Implementation of these alternative methods may not proceed without written approval by the District and/or Consultant.
5. For OSHA Class I (Friable) work, the worker decontamination enclosure system shall consist of at least a clean room, a shower room, and an equipment room, each separated from the other and from the work area by airlocks.
6. For OSHA Class II (Non-friable) work or a work area for the removal of an ACCM, the worker decontamination enclosure system shall consist of at least a clean room and an equipment room, each separated from each other and the work area by airlocks.
7. The clean room shall be sized for the work crew. Space for storing respirators shall be provided in this area. Clean work clothes, clean disposable clothing, replacement filters for respirators, towels and other necessary items shall be provided in adequate supply in the clean room. A location for posting notices shall also be provided in this area.
8. The shower room shall contain one or more showers to adequately accommodate workers. Each showerhead shall be supplied with warm and cold water, and be protected against leakage of any kind. An adequate supply of soap, shampoo and towels shall be supplied by the Contractor and be available at all times. Shower water shall be drained, collected, and filtered through a system with at least a 0.5 to 1.0 micron particle size collection capacity.
9. The equipment room shall be used for the storage of equipment and tools at the end of a shift after the tools have been decontaminated using HEPA-filtered vacuum and/or wet cleaning techniques, as appropriate. Replacement filters, stored in sealed containers until used, for filtration equipment, extra tools, containers, surfactants and other materials and equipment that may be required

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during abatement activities may also be stored in the equipment room. A walk-off pan (e.g. a small children's swimming pool or equivalent), filled with water, shall be located in the room for workers to clean off foot coverings after leaving the work area and prevent excessive contamination of the worker decontamination enclosure system. A drum lined with a labeled 6-mil polyethylene bag for collection for disposable clothing shall be located in the equipment room. Contaminated footwear shall be stored in this area for reuse the following workday.

H. Worker Protection Procedures:

1. Provide all personnel throughout the abatement process with the specified protective clothing and respiratory protection. Ensure that all personnel entering and leaving the workspace follow the following procedures:
 - a. Entering from the outside: Change from street clothes into the protective clothing and wear clean protective gear, go through Shower Room into Dirty Equipment Room, pick up equipment and tools, and enter the Work Area.
 - b. Exiting from the Work Area: Dispose of all protective clothing into plastic bags labeled for asbestos waste. Do not take off the respirator, but still wearing the respirator, enter the shower, and shower thoroughly. Remove respirator and wash and wipe thoroughly to decontaminate the respirator. After drying, enter the Clean Room, store the decontaminated respirator in the assigned space, and dress into street clothes.
2. Post written procedures in workplace and train all personnel on the procedures for the evacuation of the injured and the handling of potential fires. Provide air to a seriously injured worker without delay for decontamination. Make provisions to minimize exposure of rescue workers and to minimize spreading of contamination during evacuations and fire procedures.
3. Instruct all employees and workers in the proper care of their personally issued respiratory equipment, including daily maintenance, sanitizing procedures, etc.
4. Contractor's project supervisory personnel shall inspect all respiratory equipment at the beginning of each work period, including breaks and lunch periods. Written records of these inspections shall be maintained and provided to the Consultant.

I. Exposure Controls and HEPA-Filtered Exhaust Ventilation:

1. Install inside the work area one or more portable HEPA-filtered exhaust units to maintain the area, including the Decontamination Facilities, under negative air pressure, and to reduce or control airborne asbestos fiber concentrations. Provide a contingency plan for maintaining negative air requirements in the event of mechanical failure.
2. To determine the number of required units, compute the total cubic footage of all workspaces within the work and determine the air moving capacity of all the HEPA-filtered units to be used in each workspace. This measurement shall be made in cubic ft/min. under a filter load equivalent to two inches of static pressure.

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- a. The exhaust(s) must be capable of providing: 1) at least four (4) full air changes per hour in the work area and for "Class I Work"; 2) an inward velocity through any openings, including the decontamination facilities, of at least 200 fpm; and 3) a static negative air pressure inside the area of a minimum of 0.02 inches water column. Each exhaust system shall have a dedicated power system and shall be operated continuously (24 hours/day) in accordance with "Specifications and Operating Procedures for the Use of Negative Pressure Systems for Asbestos Abatement," Guidance for Controlling Asbestos-Containing Materials in Building, EPA report Number 560/5-85-024 (1985).
- b. Each exhaust unit shall be equipped with the following:
 - 1) Magnehelic gauge to monitor the unit's air pressure difference across the filters and to interpret the magnehelic reading to CFM.
 - 2) Automatic shut off for filter failure or filters absence.
 - 3) Audible alarm with flashing red light for unit shutdown.
 - 4) Amber Flashing warning light for excessive filters loading.
 - 5) A safety system that prevents unit from being operated with the HEPA filter in backwards.
- c. All-exhaust air shall pass-through HEPA filters before being discharged to the exterior of a building. The exterior exhaust discharge point shall be at least 10 feet from a receptor such as an air intake port, or louvers.
- d. Before starting any work, submit in writing the proposed number, capacity, and location of exhausts, and the method of discharge to the building exterior. Work shall not be permitted until the Consultant approves the proposed exhaust system.
- e. Exhaust systems shall be operated twenty four (24) hours per day at all times during preparation, removal, encapsulation, and cleanup tasks as specified herein; and until final "clean air" certification is obtained for the area, and Consultant directs Contractor to shut the system down.
- f. On loss of negative air pressure or electric power, all work activities in the area shall stop immediately and shall not resume until power is restored and the HEPA-exhaust systems are operating again. When power failure or loss of negative pressure lasts, or is expected to last, longer than one hour, the following shall occur:
 - 1) The make-up air inlets in the decontamination facilities and any other make-up air inlets shall be sealed airtight;
 - 2) The decontamination facilities shall be sealed airtight after the evacuation of all personnel from the work area;
 - 3) All adjacent areas shall be monitored for asbestos fiber concentration upon discovery of, and subsequently throughout the power failure.
- g. Provide and continuously operate for all "Class I Work" an automatic air pressure differential recording instrument that produces a permanent record. Recorder shall have a range of -0.09" H2O to +0.09" H2O. Copies of the recorded reading shall be maintained and provided daily to the Consultant.
- h. This system must conform to the previously described requirements and 29 CFR 1926.58 Appendix F "Exhaust Air Filtration System."

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J. Air Monitoring:

1. Consultant Air Monitoring:

- a. Provide full cooperation and support to the Consultant throughout the course of the monitoring work. The Consultant will closely and continuously monitor the performance and execution of the work. The monitoring work will be performed inside both the work area and the surrounding area to ensure full compliance with these specifications and all applicable regulations. Ambient air samples will be collected and analyzed by the Consultant. Consultant monitoring and inspections will include air samples in the workspace, air samples in the areas surrounding the work areas and the outside, checking of the Contractor's standard operating procedures, engineering controls, respiratory protection equipment, packing, packaging, transporting and disposal of asbestos, decontamination facilities and procedures, and any other aspects of the abatement process that may impact the health and safety of the people and the pollution of the environment.
- b. The District will bear all costs in connection with the laboratory work required in Paragraph above. However, the costs of all subsequent laboratory analysis taken because the limits specified were exceeded on the initial tests shall be borne by the Contractor. The Contractor shall also conduct and bear the cost of personal air samples for OSHA compliance.
- c. The Contractor will receive copies of all laboratory reports presenting the results of the Consultant's air monitoring and inspection.

2. Contractor Air Monitoring:

- a. The Contractor shall be responsible for personal air monitoring to document compliance of his workers with OSHA regulations using the methods as reiterated below.
- b. The sampling person and analysis laboratory performing this work shall be an independent party not financially or managerially connected to the contractor.
- c. The laboratory shall be successfully participating in the American Industrial Hygiene Association (AIHA) NIOSH Proficiency Analytical Testing (PAT) program.
- d. Air sampling materials and equipment requirements are as follows:
 - 1) Personal sampling shall be performed pursuant to NIOSH Method 7400, phase contrast microscopy.
 - 2) The filter assembly shall be upstream of all other components in the sampling train. An airflow-measuring device (when used) shall be downstream of the filter and the pump assembly, or integral with the pump assembly.
 - 3) Sampling pumps shall supply constant flow.
 - 4) An airflow measuring/metering device shall be used, and shall be high quality rotameter, mass flow, dry gas meter, or critical orifice.

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Measuring devices shall have a range of at least 1.5 times the desired flow rate and be readable to at least +or -5 % of the desired flow rate. They shall be calibrated against standards of higher accuracy before and after sampling. The calibrations shall be recorded.

- 5) Numbers and frequencies of personal air sampling shall be as required by OSHA regulations but not less than (1) sample per eight (8) hour work shift during times of asbestos removal work.
- 6) Results of sample analysis shall be provided to the Consultant within twenty four (24) hours of collection.
- 7) All other air sampling for compliance with the Specifications shall be performed by the Consultant at no cost to the Contractor except where the Contractor fails specified tests.
- 8) Use a pre-approved "chain of custody" form for all personal air samples collected.

1.11 QUALITY ASSURANCE

A. Notifications, Permits, Warning signs, Labels, and Posters:

1. Provide the required written pre-notification to EPA, SDAPCD, CAL/OSHA, and any other regional, state, and local authority having jurisdiction over the project. Copies of the pre-notifications shall be delivered to the Consultant before any work begins. The Contractor must secure all other permits required for the work, including disposal of asbestos in an approved landfill.
2. Provide the necessary follow-up notices that may be required, obtain all permits, and pay all governmental taxes, fees and other costs in connection with his work. File all necessary drawings, prepare all documents, and obtain all necessary approvals of all governmental departments having jurisdiction.
3. Include in the work, without extra compensation, all labor, materials, services apparatus, to comply with all applicable laws, ordinances, rules, and regulations.
4. All materials and work shall comply with the specifications of the National Fire Protection Association (NFPA), National Electrical Code (NEC/NFPA 70), Underwriters Laboratories (UL), local utility companies, and the County Department of Health, with the California Building Code, and Contract requirements that are in excess of the applicable codes, rules, or regulations. The contract provisions shall be given precedence, unless special permission is granted by the Consultant.
5. Comply with the requirements of the federal, state, and local regulations related to asbestos as listed in herein.
6. Erect OSHA-specified warning signs around the workspace and at every point of potential entry from the outside including the entrance to the decontamination facility's clean room. The signs shall conform to OSHA requirements with the words "Danger, Asbestos Hazard, and Do Not Enter." The warning signs shall be a bright color so that they can be easily noticed. The size of the sign and its lettering shall be no less than OSHA requirements.
7. Provide OSHA and DOT-required labels as well as NESHAPS labeling requirements for all plastic bags and drums utilized to transport contaminated material from the work areas to the EPA approved disposal landfill.

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8. Provide any other signs, labels, warnings, and posted instructions that are necessary to protect, inform and warn workers and visitors of the hazard from asbestos exposure. Also, post in a prominent and convenient place (i.e. the clean room of the decontamination facility) for worker's use a copy of the latest applicable regulations of OSHA, EPA, and NIOSH; and a copy of these Specifications.

B. Electrical Safety Requirements:

1. The non-current carrying parts of fixed, portable, and plug-connected equipment shall be grounded. Portable tools and appliances protected by an approved system of double insulation need not be grounded. All light and power circuits in asbestos removal areas shall be ground fault protected.
2. Extension cords shall be the 3-wire type, shall be protected from damage, and shall not be fastened with staples, hung from nails, or suspended from wires. Splices shall have soldered wire connections with insulation equal to the cable. Worn or frayed cords shall not be used.
3. Safe lighting equipment shall be provided with a preference for floodlights rather than indiscriminate use of unprotected lamps hung from temporary wiring. Exposed bulbs shall be guarded to prevent accidental contact. Temporary wiring shall be properly insulated and substantially supported. Circuits shall be designed and fused. All temporary lighting inside the asbestos work area shall be waterproofed.
4. Receptacles for attachment plugs shall be approved, concealed contact type. Where different voltages, frequencies, or types of current are supplied, receptacles shall be of such design that attachment plugs are not interchangeable.
5. Each disconnecting means for motors and appliances and each service feeder or branch circuit at the point where it originates shall be legibly marked to indicate its purpose.
6. Coordinate all power requirements with the District, including ground fault interrupted (GFI) panel design and extension cord requirements.

C. Scaffolding, Rigging, and Hoisting:

1. Unless otherwise specified, provide all scaffolding, rigging, hoisting, and other services necessary to complete the Work.
2. Remove all equipment from the project site when no longer required, unless written authorization is given by the District and/or Consultant.

D. Emergency Precautions:

1. Establish emergency and fire exits from the work area for the workers. All emergency exits that must pass through a work area shall be equipped with two (2) full sets of protective clothing and respirators at all times.
2. Notify only the District and parties that are required by law to be notified. District and Consultant shall determine if any agencies other than those required by the law shall be notified.
3. Be prepared to administer appropriate first aid to injured personnel at the site after decontamination. Seriously injured personnel shall be treated immediately in the work area or evacuated without performing decontamination. When an

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injury occurs, stop work and implement fiber reduction techniques (e.g., water spraying) until the injured person has been removed from the work area.

PART 2 - PRODUCTS

2.1 GENERAL

- A. No materials, equipment, or tools belonging to the District shall be used by the Contractor, except in case of an emergency and upon explicit authorization by the District.
- B. Deliver all materials and equipment to the site in the original containers bearing the name of the manufacturer and details for proper storage and usage.
- C. All materials or equipment delivered to the site shall be unloaded, temporarily stored, and transferred to the work area in a manner, which shall not interfere with operations of the District.
- D. The District and/or Consultant must approve unloading and temporary storage sites and transfer routes in advance.
- E. Damaged or deteriorated materials may not be used and must be promptly removed from the project site. Materials, that have become contaminated by asbestos-containing materials shall be packaged as ACM, and disposed of in an approved, secure asbestos landfill.
- F. All materials, tools, and equipment must comply at a minimum with this specification and all applicable federal, state, and local regulations.

2.2 MATERIALS

- A. Plastic Sheeting: Sheet shall be fire-retardant polyethylene sized in lengths and widths to minimize the frequency of joints. The minimum thickness shall be that which prevents release of asbestos through tearing, separation, or other reasonably foreseeable means, and in no case shall be thinner than:
 - 1. 6-mil thick (0.15 mm) for use as wall and floor barriers.
 - 2. 4-mil thick for use as ceiling barriers and for all other uses.
- B. Plastic Bags: Bags shall be 6-mil (0.15 mm) minimum polyethylene, or sufficiently thicker for large bags so as to prevent release of asbestos through tearing, separation or other reasonably foreseeable means and shall be labeled with OSHA asbestos warning or capable of being so labeled.
- C. Tape: Tape shall be capable of sealing joints of adjacent sheets of plastic and of attaching plastic sheet to finished or unfinished surfaces of dissimilar materials, and shall be capable of adhering under dry and wet conditions, including wetting by amended water.

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- D. Glue: Glue shall be capable of sealing plastic to finished surfaces without damaging the surfaces when removed. Mist or water, encapsulating agent, or any other materials to be used in the work area must not affect the bonding strength and resulting seal integrity.
- E. Surfactants (Wetting Agents): Surfactants shall be used so as to produce a material that result in wetting of the asbestos-containing material and retardation of fiber release during disturbance of the material equal to or greater than that provided by the use of one ounce of a surfactant consisting of 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with five gallons of water. Surfactants shall be certified by their manufacturer as complying with EPA regulations controlling the use of volatile organic compounds, and such State and local regulations under an EPA-approved State Implementation Plan.
- F. Encapsulants: Encapsulants shall be classified or certified by Underwriters Laboratories, and shall not degrade the function of any replacement material. They shall be certified by their manufacturer as complying with EPA regulations controlling the use of volatile organic compounds, and such State and local regulations under an EPA-approved State Implementation Plan. For use with fireproofing, any replacement fire-resistive assembly including an encapsulant shall meet the requirements of this specification and existing building requirements, whichever are more stringent, and:
 - 1. Bulk encapsulants. When used as a bulk encapsulant (penetrating or bridging) on fireproofing, the combination of encapsulant and specific fireproofing (trade name) to which it is applied shall be classified or certified by Underwriters Laboratories, and have a maximum flame spread value of 5 or 10 for exposed or concealed fireproofing, respectively, and smoke developed value of 0, when tested in accordance with ASTM Method E 84 or UL Standard 723.
 - 2. Lock-down (post-removal) encapsulants. When used as a lock-down (post-removal) encapsulant on a surface after removal of asbestos-containing material, the encapsulant must be classified or certified by UL for use with the specific fireproofing material (trade name) and applied at the specified rate of application.
- G. Asbestos disposal packaging: Packaging shall be suitable to receive and retain any asbestos-containing materials until disposal or conversion at an approved site. The packaging shall be both air and watertight.
 - 1. Labeling. Packaging of asbestos-containing material shall be labeled in accordance with regulations of EPA (e.g., 40 CFR 61.150), OSHA (e.g., 29 CFR 1926.1101, 8 CCR 1529), DOT (e.g., 49 CFR 172.400, 172.446; except for limited quantity shipments which are not being shipped by air (49 CFR 172.203, 173.155), and State or local occupational safety and health, or environmental agencies (where applicable).
 - 2. Marking. Packaging of asbestos-containing material shall be marked in accordance with DOT regulations (e.g., 49 CFR 172.300); except for limited quantity shipments (49 CFR 172.301).
- H. Warning Signs: Signs shall be as required by EPA (e.g., 40 CFR 61.150), OSHA (e.g., 29 CFR 1926.1101, 8 CCR 1529), State occupational safety and health or environmental agencies (where applicable), and this contract.

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- I. Glove bags: Bags shall be made of 10 10-mil (0.25 mm) minimum clear polyethylene. Bag shape shall include "shoulders" to be used with straps. Sizes and shapes chosen shall be suitable for the pipe and fitting formations included in this contract. The bags shall have a closure system, such as a double zipper or self-closing cloth strip. The bags shall have a zipper lock or equivalent feature, which seals the lower part of the bag from the top part to remove asbestos- containing debris.
- J. Brushes: All brushes shall have nylon bristles. Wire brushes are excluded from use due to their potential to shred asbestos fibers into smaller fibers. Wire brushes may be used on pipe joint insulation upon prior written approval from the District and Consultant.

2.3 TOOLS AND EQUIPMENT

- A. Airless Sprayer: Amended water and surface sealers shall be applied with an airless or other low-pressure sprayer or injector suitable for the specific application.
- B. HEPA-Filtered Exhausts: Air inside the asbestos removal area shall be exhausted to the atmosphere (i.e. building exterior) through a High Efficiency Particulate Air (HEPA) filter.
 - 1. A sufficient number of HEPA-filtered portable exhaust units shall be provided for each work area in order to provide:
 - a. At least four (4) complete changes of air per hour;
 - b. An inward velocity through all openings of at least 200 fpm;
 - c. A static negative pressure of at least 0.02 inches of water.
 - 2. The HEPA-filter shall be preceded by replaceable pre-filters and the unit must be designed such that it cannot be operated unless the HEPA-filter is in place.
 - 3. The units must be designed with lights and alarms that indicate that the filters are properly installed and function and that determine when the filters must be changed.
 - 4. Flexible metal or similar materials hose(s) (e.g. ducts) of sufficient length must also be provided to allow the units to discharge to the exterior of the building.
- C. Vacuum Equipment: All vacuum equipment used for cleaning up shall be HEPA-filtered. At least one HEPA vacuum shall be equipped with floor (hard surface and carpet) cleaning attachments.
- D. Scaffolding/Staging/Ladders: Shall meet OSHA safety regulations, including 29 CFR 1926.450-452. Where electrical power and water are used inside a work area, no electrically conductive ladders (e.g., aluminum or steel) shall be used (except for hinges and feet).
- E. Transportation: Transportation methods shall comply with the provisions of EPA Title 40, Part 61, Subparts A, and B and with any hazardous or special waste regulations for temporary storage, transport, and disposal if such codes are enforced in states or cities where the waste will be generated, stored, transported, or disposed of. All containers shall be labeled in accordance with 8 CCR 1529, 29 CFR 1926.58(K) (2), 40 CFR 61,

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Subparts A and M, and 49 CFR Parts 171 and 172, Hazardous Waste Substances: Final Rule.

- F. Other Tools and Equipment: Furnish all equipment such as lumber, nails, ladders, HEPA vacuums, and hardware and supplies, which may be required to construct and dismantle the decontamination areas and the barriers that isolate the work area. Provide other suitable tools for the abatement activities including but not limited to: hand scrapers, wire brushes, sponges, mops, and shovels.
- G. Electrical: Electrical tools and equipment shall meet all applicable codes and regulations, including, in particular, 8 CCR 1760, 29 CFR 1910.304 and 29 CFR 1926.400-449.
 - 1. Grounding. Ground fault circuit-interrupters shall always be used for all electrical equipment, except to the extent provided in an assured equipment grounding conductor program, 29 CFR 1926.404, if established and implemented in the Plan of Action.
 - 2. Additional requirements. Other OSHA requirements for equipment grounding conductors, beyond those described in the grounding paragraph, apply.

PART 3 - EXECUTION

3.1 WORK AREA PREPARATION

- A. Prepare the work area as described in this section. Preparation work shall be performed according to the following general sequence of steps and procedures to insure that proper containment and protection systems are installed prior to any work, which could generate airborne asbestos fibers:
 - 1. Remove and relocate any non-fixed items (not removed by the District) to storage areas designated by the District.
 - 2. HVAC: Isolate, clean by HEPA vacuuming and washing, and seal airtight with plastic and tape all HVAC system diffuses, grills, and registers in or servicing the work area.
 - 3. Pre-cleaning: Carefully clean all surfaces in the work area that may be contaminated with any dust or debris by using wet methods and a vacuum equipped with a HEPA filter. Comply with Article "Pre-Cleaning of Asbestos Contaminated Surfaces."
 - 4. Isolate all electrical systems as directed by the District and provide temporary power and lighting as required for the work area and affected non-work areas. Comply with Article "Electrical Systems."
 - 5. Barriers: Cover any window or other opening with polyethylene sheeting. All walls to remain shall also be protected from damage during the work and erect or install Decontamination Facility and HEPA exhaust system.
 - 6. Installation of Decontamination System: Install the decontamination enclosure system.
 - 7. Signage: Post adequate warning signs denoting the potential danger of airborne asbestos at designated entrances to work areas including, as a minimum, those described at 29 CFR 1926.1101, 8 CCR 1529, and State occupational safety and

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health and fire safety regulations (where applicable). Prevent access to posted areas by unauthorized or inadequately protected persons.

8. Fire equipment: Adequate portable fire extinguisher equipment shall be maintained within the work area meeting at least the requirements of 8 CCR 1922, 29 CFR 1910.157 and (where applicable) State occupational safety and health regulations and fire safety regulations.

- B. Obtain Consultant's approval of all preparation work before starting removal of asbestos material.

3.2 ELECTRICAL SYSTEMS

- A. The scope of the required electrical isolation and protection work includes isolation and protection of electrical equipment, which is in the area from which asbestos must be removed, and could therefore possibly become a hazard through contact or water spray short-circuiting. Shutdown of electrical circuits shall include providing labor to monitor, inspect, and service temporary power circuits, lighting, and equipment as required by local codes and regulations. Provide "Lock Out" system on all electrical panels or equipment that will be shut off during the removal process.
- B. Provide temporary lighting in the work area where asbestos removal is performed. Inspect the removal work area for the condition of electrical conduit and junction boxes. Correct all potentially unsafe conditions. Do not proceed with removal work until all potentially unsafe conditions have been corrected.
- C. All materials and workmanship shall conform to the latest editions of the following codes, standards, and specifications:
 1. National Electrical Code (NEC) - most recent edition.
 2. National Bureau of Standards, Handbook H30, National Electrical Safety Code.
 3. State and Local codes, and all other authorities having jurisdiction.
 4. Underwriter Laboratories (UL).
 5. National Board of Fire Underwriters.
 6. California-OSHA.
- D. Temporary lighting and power systems shall meet or exceed all OSHA, state, and local regulations; temporary lighting levels shall meet or exceed OSHA requirements and provide surface lighting for nighttime work.
- E. Visit the site as necessary to investigate existing electrical conditions and isolation requirements.
- F. Prior to switching circuits at panels, review the existing directory. Do not shut down any circuits without advanced notification and approval of the District.
- G. All costs associated with the isolation of electrical systems and installation of temporary power and lighting shall be borne by the Contractor.
- H. Comply with all applicable electrical safety regulations.

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3.3 PRE-CLEANING OF ASBESTOS CONTAMINATED SURFACES

- A. Cleaning of surfaces that are potentially contaminated with asbestos-containing dust and debris shall be required to prevent this dust from becoming airborne and posing an exposure risk, or interfering with perimeter air monitoring activities. Cleaning action shall be performed as a preliminary exposure control procedure, prior to performing other actions associated with the Work.
- B. Cleaning shall consist of HEPA vacuuming followed by wet mopping or wiping of surfaces in a manner that prevents dust generation, but effectively rids the surface of all visible debris, dust, film, and grime.
- C. Each HEPA vacuum shall be separately equipped with an airtight, securely attached hose of appropriate length and a collection wand, brush or other special attachment appropriate to the required cleaning task. The equipment shall be operable at all times and shall contain no air leaks. The Consultant will review verification of the efficiency of the equipment's filtration (i.e. manufacturer's equipment data sheets).
- D. Cleaning Procedures:
 - 1. Remove large pieces of debris by hand, and then dry vacuum all surfaces using HEPA filtered equipment and a collection attachment that minimizes dust generation.
 - 2. Lightly wet the surface of any material that produces airborne fibers using an airless sprayer and amended water.
 - 3. Collect, package, label, and dispose of vacuumed material as asbestos-contaminated waste.
 - 4. Thoroughly wet wipe or mop all surfaces to remove any remaining dirt or grime, being careful not to wet or damage any electrical equipment, furniture, or other sensitive surfaces.
 - 5. All surfaces to completely dry, then inspect the surfaces for any visible remaining dirt or fibrous material.
 - 6. HEPA vacuum any remaining dirt or grime using an efficient collection attachment.
 - 7. Collect and pump all wastewater through a 5-micron filter, utilizing a multistage filtration system. Dispose of filtered material and filter as asbestos waste.
 - 8. Request that the Consultant perform a visual inspection of the cleaning work, prior to continuing any other specified actions.

3.4 ISOLATION OF OSHA CLASS I (FRIABLE) CONTAINMENT WORK AREAS

- A. Work Area Isolation and Protection for Friable Asbestos-Containing Materials:
 - 1. Isolate the work area for the duration of work by completely closing and sealing all openings and doorways into the work area including, but not limited to, heating and ventilation ducts, doorways, windows, floors and ceiling penetrations, and lighting. Isolation/sealing shall be accomplished by using two

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- (2) layers of 6-mil plastic sheeting taped securely in place, or by caulking, including the construction as noted in numbers 4 and 5 below. The work area shall be protected and sealed airtight to the extent possible, and be subject to the approval of the Consultant.
2. Emergency and fire exits shall be maintained.
 3. Shutdown and isolate heating, cooling and ventilating air systems to prevent contamination and fiber dispersal to other areas of the property.
 4. Thoroughly pre-clean all dust or debris from any fixed objects, floors, walls, or other equipment within the work area using HEPA vacuuming equipment and wet washing. Do not use dry brooms, brushes, mops, or non-HEPA vacuum cleaners for this pre-cleaning work. Seal all seams, joints, covers, or casings with tape, and enclosed fixed objects or equipment with a minimum of two layers of 6-mil plastic sheeting secured and sealed airtight with duct tape.
 5. Cover floor and walls with a minimum two (2) independent layers of 6-mil plastic sheeting, turning each layer up onto walls a minimum of 16" and fasten securely to wall. Cover walls with two (2) layers of 6-mil plastic sheet extending to flow, overlapping the two (2) floor sheets by not less than 12" excluding the turn-up. All joints in plastic sheets shall be taped and glued in a manner to prohibit air movement, and to prevent passage of water or other liquids. The bottom layer of floor poly shall be securely fastened to the floor to prevent creases or slippage that would pose a hazard to workers. Any floor drains or other openings shall be sealed individually with two (2) layers of 6-mil sheeting and tape, and then covered by the remaining two (2) layers of poly. Pits, pumps, and other openings shall be covered to prevent a tripping hazard and then covered with two (2) layers of 6-mil sheeting.
 6. Install work area HEPA-filtered exhaust systems as previously specified in Section 1.6 (J) of these Specifications.
 7. Post warning signs in English and Spanish meeting the requirements of 8 CCR 1529 (k)(7) and OSHA 29 CFR 1926.58 (k)(1), and (k)(2)(ii) at the outside doorway to the decontamination facility which shall be the only non-emergency entrance into the work area. The Consultant may also request that the Contractor post additional warning signs around the work area or at other potential entrances or exposure points in accordance with California Proposition 65.
 8. Warning signs shall be readily visible to any person attempting to enter the work area.
 9. All waste shall be disposed of as hazardous waste and packaged as specified herein.
 10. Negative pressure will be established in the work area by placement and operation of sufficient number of HEPA-filtered portable exhaust units in order to provide:
 - a. At least four (4) complete changes of air per hour;
 - b. An inward velocity through all openings of at least 200 fpm;
 - c. A static negative pressure of at least 0.02 inches of water.
 11. Negative pressure shall be measured and recorded using a pressure differential monitor (manometer or magnehelic-type). The monitor shall be calibrated according to the manufacturer specifications and equipped with a printer.
- B. After the friable asbestos removal work area has been prepared as specified above, request a formal site inspection by the Consultant. No removal, demolition or other

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disturbance of asbestos-containing material, dust, or debris shall occur until the Consultant has inspected and approved the site preparation work.

3.5 ISOLATION OF OSHA CLASS II (NON-FRIABLE) CONTAINMENT WORK AREAS

A. Work Area Isolation and Protection of Non-Friable Asbestos-Containing Materials Located on the Interior of a Building:

1. Isolate the work area for the duration of work by completely closing and sealing all openings and doorways into the work area including, but not limited to, heating and ventilation ducts, doorways, windows, floors and ceiling penetrations, and lighting. Isolation/sealing shall be accomplished by using two (2) layers of 6-mil plastic sheeting taped securely in place, or by caulking. The work area shall be protected and sealed airtight to the extent possible, and be subject to the approval of the Consultant.
2. Emergency and fire exits shall be maintained.
3. Shutdown and isolate heating, cooling and ventilating air systems to prevent contamination and fiber dispersal to other areas of the property.
4. Thoroughly pre-clean all dust or debris from any fixed objects, floors, walls, or other equipment within the work area using HEPA vacuuming equipment and wet washing. Do not use dry brooms, brushes, mops, or non-HEPA vacuum cleaners for pre-cleaning work.
5. Seal all seams, joints, covers, or casings with tape, and enclosed fixed objects or equipment with a minimum of two layers of 6-mil plastic sheeting secured and sealed airtight with duct tape.
6. Cover walls with one (1) layer of 6-mil plastic sheet extending a minimum of four feet from floor (splashguards). All joints in plastic sheets shall be taped and glued in a manner to prohibit air movement, and to prevent passage of water or other liquids.
7. Any floor drains or other openings shall be sealed individually with two (2) layers of 6-mil sheeting and tape. Pits, pumps, and other openings shall be covered to prevent a tripping hazard and then covered with two (2) layers of 6-mil sheeting.
8. Install work area HEPA-filtered exhaust systems as previously specified herein.
9. Post warning signs in English and Spanish meeting the requirements of 8 CCR 1529 (k)(7) and OSHA 29 CFR 1926.58(k)(1) and (k)(2)(ii) at the outside doorway to the decontamination facility which shall be the only non-emergency entrance into the work area.
10. Warning signs shall be readily visible to any person attempting to, enter the work area.
11. All waste will be disposed of as non-hazard waste and packaged as specified herein.

B. Work Area Isolation and Protection of Non-Friable Asbestos-Containing Roofing Materials:

1. Install plastic sheeting, for use as drop cloths, around the perimeter of the building, where necessary.
2. Post warning signs in English and Spanish meeting the requirements of 8 CCR 1529 (k)(7) and OSHA 29 CFR 1926.58(k)(1) and (k)(2)(ii) at the edges of the plastic sheeting and at the access point to the roof.

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3. Warning signs shall be readily visible to any person attempting to access the roof of the building.
4. Isolate roof level heating and ventilation air intake sources or shall arrange with the District to have the ventilation system shut down. The work area shall be subject to the approval of the Consultant.
5. Seal all seams, joints, covers, or casings with tape, and enclosed fixed objects or equipment with a minimum of two layers of 6-mil plastic sheeting secured and sealed airtight with duct tape.

C. Work Area Isolation and Protection of Outdoor Non-Friable Asbestos-Containing Cementitious Asbestos-Containing Siding, Shingles, or Transite Panels.

1. Install plastic sheeting, for use as drop cloths, around the perimeter of the building, where removal is to occur.
2. Post warning signs in English and Spanish meeting the requirements of 8 CCR 1529 (k)(7) and OSHA 29 CFR 1926.58(k)(1) and (k)(2)(ii) at the edges of the plastic sheeting.
3. Warning signs shall be readily visible to any person approaching the work area.
4. Isolate the work area from the interior of the building by completely closing and sealing all openings and doorways from the work area into the building including, but not limited to, heating and ventilation ducts, doorways, and windows. The work area shall be subject to the approval of the Consultant.
5. Seal all seams, joints, covers, or casings with tape, and enclosed fixed objects or equipment with a minimum of two layers of 6-mil plastic sheeting secured and sealed airtight with duct tape.

D. After the non-friable asbestos removal work area has been prepared as specified above, request a formal site inspection by the Consultant. No removal, demolition or other disturbance of asbestos-containing material, dust, or debris shall occur until the Consultant has inspected and approved the site preparation work.

3.6 ISOLATION OF ACCM REMOVAL AREAS

A. Work Area Isolation and Protection of Asbestos-Containing Materials:

1. For interior work areas, isolate the work area for the duration of work by completely closing and sealing all openings and doorways into the work area including, but not limited to, heating and ventilation ducts, doorways, windows, floors and ceiling penetrations, and lighting. Isolation shall be accomplished by using one (1) layer of 6-mil plastic sheeting taped securely in place, or by caulking, including the construction as noted in number 2 below. The work area shall be protected and sealed airtight to the extent possible, and be subject to the approval of the Consultant.
2. For exterior work areas, seal all openings and doorways to the interior of the building within the work area including, but not limited to, heating and ventilation ducts, doorways, windows, floors and ceiling penetrations, and lighting. Isolation shall be accomplished by using one (1) layers of 6-mil plastic sheeting taped securely in place, or by caulking. The work area shall be segregated from the interior of the building, to the extent possible, and be subject to the approval of the Consultant.

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3. Emergency and fire exits shall be maintained.
 4. Shutdown and isolate heating, cooling and ventilating air systems to prevent contamination and fiber dispersal to other areas of the property.
 5. Cover floor with one layer of 6-mil plastic sheeting, to serve as a drop cloth.
 6. Post warning signs in English and Spanish meeting the requirements of 8 CCR 1529 (k)(7) and OSHA 29 CFR 1926.58(k)(1) and (k)(2)(ii) at the entry to the work area which shall be the only non-emergency entrance into the work area.
 7. Warning signs shall be readily visible to any person attempting to, enter the work area.
 8. All waste will be disposed of as construction debris and packaged as specified herein.
- B. After the ACCM removal work area has been prepared as specified above, request a formal site inspection by the Consultant. No removal, demolition or other disturbance of asbestos-containing construction material, dust, or debris shall occur until the Consultant has inspected and approved the site preparation work.

3.7 REMOVAL PROCEDURES FOR ALL OPERATIONS

- A. Vacuum cleaners equipped with HEPA filters shall be used to collect all debris and dust containing ACM and PACM.
- B. Wet methods shall be used to control exposure during any asbestos handling, removal, cutting, and clean-up, unless the Contractor can demonstrate that the use of wet methods is infeasible due to (for example) creation of an electrical hazard or safety hazard during roofing abatement. Any exceptions to the requirement for wet methods must be approved in advance by the District or Consultant.
- C. Waste and debris contaminate with asbestos must be promptly cleaned-up and stored in leak-tight containers or impermeably wrapped.

3.8 OSHA CLASS I (FRIABLE) REMOVAL PROCEDURES

- A. Friable materials may include the removal of floor tile and adhesive by mechanical methods.
- B. Amended water (wetting agent) mixed and carefully applied using an airless sprayer as specified by the manufacturer, shall continuously be used to control the release of asbestos fibers from the material prior to and during removal. The amended water shall be applied in sufficient quantity to fully penetrate and saturate the material before it is removed. Wetting shall commence up to 24 hours before removal work to ensure effectiveness.
- C. Removal Methods:
1. No asbestos removal work shall begin until the work area has been prepared and approved by the Consultant.

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2. Removal workers shall wear minimally half face air-purifying respirators with P-100 filters and protective clothing as previously described throughout all removal, cleanup, and waste handling operations.
 3. Small test patches of asbestos material shall be wetted, and then removed and examined by the Consultant and Supervisor to determine degree of saturation prior to removing the bulk of the material. With prior approval, the Contractor may use removal encapsulants instead of amended water; applied per manufacturer's and federal guidelines.
 4. After large areas of the asbestos material have been fully wetted and tested, the asbestos shall be carefully removed in small sections by using hand scrapers or other suitable tools or mechanical devices as allowed by federal, state, and local regulations. This includes chemical removal of floor tile mastic in association with mechanical buffers and/or use of a bead blaster.
 5. As the material is removed, it shall be promptly wetted and packed into impermeable, labeled 6-mil polyethylene, disposal bags. When each bag is full, the packaged material shall be sprayed with amended water, sealed (using duct tape or other fastener as approved by the Consultant), and transported to a temporary storage area inside the work area.
 6. Repeatedly spray the material to prevent it from drying out.
 7. After obtaining written approval of the cleaning from the Consultant, seal all substrate surfaces from which asbestos material was removed with at least one (1) coat of an approved penetrating encapsulant.
 8. Minimize contamination of the work floor, the exterior of disposal containers, and all other surfaces within the work area. At the end of each shift, all surfaces shall be cleaned of all materials and then HEPA vacuumed or wet mopped.
 9. Workers must enter and exit the regulated work area through a decontamination facility. The decontamination facility and work area entry/exit procedures must meet the requirements of 9 CCR 1529 (j)(1).
 10. The decontamination facility shall be wet cleaned (a minimum of two times) using wet cleaning methods upon completion of any waste removal when the worker decontamination facility's shower room alternates as a waste container wash room. The shower room shall be washed with cloths or mops saturated with a detergent solution immediately prior to wet cleaning.
 11. The decontamination facility shall be wet cleaned and HEPA vacuumed, as appropriate, after each shift change and meal break.
 12. Excessive water accumulation or flooding in the work area shall require work to stop until the water is collected and disposed of properly.
- D. Upon completion of removal work, but prior to commencing encapsulation or post-removal cleaning of the work area, request the Consultant conduct an inspection and approve the removal work.

3.9 OSHA CLASS II (NON-FRIABLE) REMOVAL PROCEDURES

- A. Non-friable friable materials may include floor tile and adhesive removed by hand tools.
- B. Amended water (wetting agent) mixed and carefully applied using an airless sprayer as specified by the manufacturer, shall continuously be used to control the release of asbestos fibers from the material prior to and during removal. The amended water shall

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be applied in sufficient quantity to fully saturate the material before it is removed. Wetting shall commence up to 24 hours before removal work to ensure effectiveness.

C. Removal Methods:

1. No asbestos removal work shall begin until the work area has been prepared and approved by the Consultant.
2. Removal workers shall wear minimally half face air-purifying respirators with P-100 filters and protective clothing as previously described throughout all removal, cleanup, and waste handling operations.
3. Small test patches of asbestos material shall be wetted, and then removed and examined by the Consultant and Supervisor to determine degree of saturation prior to removing the bulk of the material. With prior approval, the Contractor may use removal encapsulants instead of amended water; applied per manufacturer's and federal guidelines.
4. After large areas of the asbestos material have been fully wetted and tested, the asbestos shall be carefully removed in small sections by using hand scrapers or other suitable hand tools. No tools or equipment shall be used to render material friable without prior approval by District. Floor tile and mastic will be removed with hand tools and wet methods.
5. As the material is removed, it shall be promptly wetted and packed into impermeable, labeled 6-mil polyethylene, disposal bags. When each bag is full, the packaged material shall be sprayed with amended water, sealed (using duct tape or other fastener as approved by the Consultant), and transported to a temporary storage area inside the work area.
6. Material shall not be dropped or thrown to the ground. Removed asbestos-containing roofing material, siding, panels, or shingles shall be passed to the ground by hand or lowered to the ground via a covered, dust-tight chute, crane, or hoist.
7. Repeatedly spray the material to prevent it from drying out.
8. After obtaining written approval of the cleaning from the Consultant, seal all substrate surfaces from which asbestos material was removed with at least one (1) coat of an approved penetrating encapsulant.
9. Minimize contamination of the work floor, the exterior of disposal containers and all other surfaces within the work area. At the end of each shift, all surfaces shall be cleaned of all materials and then HEPA vacuumed or wet mopped.
10. Workers must enter and exit the regulated work area through a decontamination facility. The decontamination facility and work area entry/exit procedures must meet the requirements of 29 CCR 1529 (j)(2).
11. The decontamination facility shall be wet cleaned (a minimum of two times) using wet cleaning methods upon completion of any waste removal when the worker decontamination facility's shower room alternates as a waste container wash room, the shower room shall be washed with cloths or mops saturated with a detergent solution immediately prior to wet cleaning.
12. The decontamination facility shall be wet cleaned and HEPA vacuumed, as appropriate, after each shift change and meal break.
13. Excessive water accumulation or flooding in the work area shall require work to stop until the water is collected and disposed of properly.

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- D. Upon completion of removal work, but prior to commencing encapsulation or post-removal cleaning of the work area, request the Consultant conduct an inspection and approve the removal work.
- E. All asbestos-containing materials shall be removed, gross debris cleaned up, and waste bags removed from the work area prior to approval from the Consultant.

3.10 ACCM REMOVAL PROCEDURES

- A. Amended water (wetting agent) mixed and carefully applied using an airless sprayer as specified by the manufacturer, shall continuously be used to control the release of asbestos fibers from the material prior to and during removal. The amended water shall be applied in sufficient quantity to fully saturate the material before it is removed. Wetting shall commence up to 24 hours before removal work to ensure effectiveness.
- B. Removal Methods:
 - 1. No asbestos removal work shall begin until the work area has been prepared and approved by the Consultant.
 - 2. Removal workers shall wear half face air-purifying respirators with P-100 filters and protective clothing as previously described throughout all removal, cleanup, and waste handling operations.
 - 3. Small test patches of asbestos material shall be wetted, and then removed and examined by the Consultant and Supervisor to determine degree of saturation prior to removing the bulk of the material. With prior approval, the Contractor may use removal encapsulants instead of amended water; applied per manufacturer's and federal guidelines.
 - 4. After large areas of the asbestos material have been fully wetted and tested, the asbestos shall be carefully removed in small sections by using hand scrapers or other suitable hand tools. No tools or equipment shall be used to render material friable without prior approval by District. Floor tile and mastic shall be removed with hand tools and wet methods.
 - 5. As the material is removed, it shall be promptly wetted and packed into impermeable, labeled 6-mil polyethylene, disposal bags. When each bag is full, the packaged material shall be sprayed with amended water, sealed (using duct tape or other fastener as approved by the Consultant), and transported to a temporary storage area inside the work area.
 - 6. Repeatedly spray the material to prevent it from drying out.
 - 7. Minimize contamination of the work floor, the exterior of disposal containers and all other surfaces within the work area. At the end of each shift, all surfaces shall be cleaned of all materials and then HEPA vacuumed or wet mopped.
 - 8. The decontamination facility shall be wet cleaned (a minimum of two times) using wet cleaning methods upon completion of any waste removal when the worker decontamination facility's shower room alternates as a waste container wash room, the shower room shall be washed with cloths or mops saturated with a detergent solution immediately prior to wet cleaning.
 - 9. Excessive water accumulation or flooding in the work area shall require work to stop until the water is collected and disposed of properly.

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- C. Upon completion of removal work, but prior to commencing encapsulation or post-removal cleaning of the work area, request the Consultant conduct an inspection and approve the removal work.

3.11 CLEANING AND FINAL DECONTAMINATION

- A. After all asbestos-containing (or contaminated) materials have been removed, remove all wastes and perform a thorough multi-stage final cleanup and decontamination of the work area per the methods indicated below. Final cleaning shall be performed only after all waste is packaged and removed, but prior to re-installing equipment or dismantling any barriers, decontamination facility, or protective coverings. Cleaning shall be performed before a visual inspection and air testing by the Consultant. HEPA-exhaust systems shall operate continuously throughout the cleaning and air testing process until the Consultant authorizes their shutdown and removal from the site. Notify the Consultant at least 24 hours in advance of the expected completion time of site cleaning in order to allow the scheduling of air clearance testing.
- B. Methods and Approvals: Cleaning methods and approvals shall consist of the following tasks performed in the list order:
 - 1. Remove all visible accumulations of asbestos debris on the protective coverings on floors, walls, and other surfaces, and then HEPA vacuum all surfaces to pick up excess water and gross saturated debris.
 - 2. After HEPA vacuuming, the work area air shall be lightly misted (with amended water), and then all protective coverings on ceilings, walls, floors, and other items in the work area shall be wiped thoroughly clean (first cleaning).
 - 3. After completing the above steps (1) and (2), request the Consultant to inspect the site. To facilitate scheduling of this inspection, notify the Consultant of the anticipated completion time of the above initial cleaning work 24 hours in advance.
 - 4. If the Consultant observes any asbestos waste or fibers within the work area during the inspection, perform additional cleanup and decontamination as directed by the Consultant.
 - 5. If the Consultant approves this first cleaning, slowly remove the upper layer of all protective poly coverings on floors, walls, and other surfaces and package them in 6-mil waste bags. The waste bags shall then be removed from the work area. The bottom layer of protective poly coverings, the decontamination facilities, the HEPA exhaust systems, all barrier walls, and seals on HVAC components shall remain in place and in use.
 - 6. After these upper protective coverings are moved, the work area shall be completely wet wiped and vacated for at least twelve (12) hours to allow fiber settling and while the Consultant collects and analyzes a final set of air samples according to NIOSH Method 7400 (PCM).
 - 7. Upon obtaining the Consultant's written approval of final clean work area as specified herein, unless otherwise permitted, drying time shall be as specified by the manufacturer before final air sampling is conducted.
 - 8. After successful completion of final air clearance testing as specified herein, carefully remove in listed order the decontamination facilities, any temporary barrier walls or tunnels, seals on HVAC components. The HEPA exhaust systems shall be removed only after all other items are removed. A HEPA

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vacuum shall be kept on site during this final disassembly work to cleanup any dust or debris.

9. If any of the post cleaning PCM air sample results are above 0.01 fiber/cc (or a preexisting level of normal background fibers if shown to be higher than 0.01 f/cc by the Consultant), the Consultant may require additional cleaning, decontamination, air testing and a final inspection, which shall be repeated by the Consultant.
10. Workers shall wear approved respiratory and personnel protective equipment throughout all cleanup and waste disposal activities.

3.12 DISPOSAL

- A. Determine current waste handling, packaging, labeling, transportation, and disposal regulations for the work site and for each waste disposal landfill. Comply fully with these regulations and all U.S. Department of Transportation, EPA requirements and state and local regulations.
- B. Definition: Wastes are defined as all asbestos-containing or potentially contaminated materials or other items, which have not been completely cleaned or sealed to the satisfaction of the Consultant, while inside the work area, and must be removed from the job site. Asbestos wastes may include building materials, insulation, disposal clothing and protective equipment, plastic sheeting and tape, exhaust systems or vacuum filters, Contractor equipment, or other materials designated by state or local authorities or the Consultant or which have been potentially contaminated with asbestos and have not been fully cleaned inside the work area by vacuuming followed by thorough washing.
- C. All waste material shall be promptly placed in 6-mil polyethylene bags as it is generated. A sufficient number of waste bags shall be located in the immediate work area, and in the Equipment (dirty) room of the Worker Decontamination Facility. Count the bags and estimate the total volume leaving the work area, and maintain a written record of such (waste log).
- D. Warning labels, having waterproof print and permanent adhesive, imprinted on the sides of all waste bags or transfer containers. All waste bags must have the generator's name and address including area where waste was generated.
- E. A fine water spray shall be used to keep the waste in containers thoroughly wet at all times. When a waste bag is full, it shall be securely sealed with tape or other secure fastener.
- F. The following procedures shall be followed whenever containers or equipment are removed, from the work area:
 1. All combustible rubbish and debris, including properly bagged asbestos shall be properly disposed of at the end of each working day.
 2. The Clean Room shall be considered a holding area only during the period of active waste transfer for the purpose of the loading of carts or drums. Storage of waste in carts or a drum in the clean room is prohibited.

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3. Waste removal shall not occur during worker shift changes or when workers are showering or changing. Care shall be taken to prevent short-circuiting and cycling of air outward through the shower and clean room when used for waste removal.
 4. Workers are to be stationed in each room/area of the decontamination facility to transfer the containers and equipment to or from adjacent sections. These workers in the clean room or holding area shall enter from uncontaminated areas with appropriate personal protective equipment; or prior to the start of the waste transfer, these workers shall exit the work area, fully de-contaminated, and subsequently don't clean personal protective equipment.
 5. External surfaces of contaminated containers and equipment shall be cleaned by wet cleaning and HEPA-vacuuming in the work area before moving such items into the decontamination facility airlock. Workers shall not enter the airlock during this procedure.
 6. The containers of waste and the equipment shall be removed from the airlock by workers stationed in the washroom during waste removal operations.
 7. Once in the washroom, external surfaces of contaminated containers and equipment shall be cleaned a second time by wet cleaning.
 8. The cleaned containers of waste and equipment shall be placed in uncontaminated leak-tight plastic bags (or 6-mil sheeting if physical characteristics necessitate and permit). Air volume shall be minimized, and the bags or sheeting shall be sealed. Items that may puncture or tear the plastic bags or sheeting shall be placed in a hard wall container such as a drum, and then sealed.
 9. The clean re-containerized items shall be moved into the airlock for subsequent transfer to the holding area. The washroom workers shall not enter this airlock or the work area until waste removal is finished for the period.
 10. Re-containerized items and cleaned equipment shall be removed from the air lock to the holding area by workers who have entered from uncontaminated areas with appropriate personal protective equipment.
 11. The re-containerized items of waste and cleaned, bagged equipment shall be placed in open top, watertight plastic carts or drums. The carts or drums shall be HEPA-vacuumed and wet cleaned immediately following the removal of the containers of waste from them, and the location of where they are emptied shall be HEPA-vacuumed.
 12. The exit from the waste decontamination facility shall be monitored and secured at all times to prevent unauthorized entry.
 13. The carts and drums may be temporarily stored in a holding area at the work site outside the work place until a transport vehicle arrives, but such storage areas must be pre-approved by the District.
- G. Waste Container Storage: Sealed waste bags may be temporarily stored in a pre-designated and approved outside area, until a truckload quantity is obtained. The temporary storage area shall be predominantly identified and posted with signs, and waste containers shall be covered with polyethylene sheeting or otherwise protected from further contamination.
- H. Waste Removal Scheduling: All waste containers shall be decontaminated and removed from the site before final cleanup is started and isolation barriers are taken down. Pre-schedule and obtain approval of the Consultant for all time periods during which he desires to re-move waste bags from the facility. Once a truckload of waste

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containers has accumulated, arrange for transportation to the disposal site. Waste shall not be stored in the work area or waste decontamination facilities. Outside bag, storage must be monitored and secured at all times to prevent tampering. Storage must be in secure areas.

I. Waste Transportation and Disposal Regulations:

1. Determine and insure compliance with: 1) the current waste handling regulations applicable to each work site; and 2) the current regulations for transporting and disposing, waste at each ultimate disposal landfill. Comply fully with these regulations and with all U.S. Department of Transportation, State, EPA, and all federal and local requirements.
2. At no additional cost to the District, maintain a valid solid waste transportation registration issued by the California Department of Health Services Toxic Substance Division and obtain, complete, and fully comply with any other local hazardous waste manifesting requirements.
3. Transportation methods shall comply with the provisions of EPA Title 40, Part 61, Subpart M, Title 22 of the California Administrative Code, Division 4 Environmental Health, Chapter 30, Minimum Standards for Management of Hazardous and Extremely Hazardous Wastes, and with any hazardous waste regulations for temporary storage, transport, and disposal if such codes are enforced in states where the waste shall be stored, transported or disposed of.

J. Waste Container Removal and Disposal Procedure:

1. Provide waste packaging, transportation, and approved landfill disposal, plus all related recordkeeping.
2. Package, label, and remove all asbestos waste as specified. Packaging shall be accomplished in a manner that minimizes waste volume, but ensures waste containers shall not tear or break.
3. Provide legal transportation of asbestos wastes to the disposal landfill. Verify actual delivery, receipt, and disposal of each load of waste at the design landfill.

3.13 FINAL INSPECTION AND TESTING

- A. After a minimum of two (2) thorough cleanings of the work area, if a high degree of cleanliness has been achieved, notify the Consultant that the work area is ready for inspection and final testing. The Consultant and the Contractor shall visually inspect the work area for detection of any visible asbestos dust, debris or other contamination. If the visual inspection does not detect any dust, debris or other signs of contamination, final air testing shall commence.
- B. The final test shall consist of collecting air samples within the work area to establish that the airborne fiber concentrations do not exceed 0.01 f/cc, as determined by transmission electron microscopy (TEM) for Class I removal areas and phase contrast microscopy (PCM) for Class II removal areas. At the discretion of the District TEM may also be employed for one or two of the samples in Class II areas to confirm the results of the final testing via PCM. If the results of the final testing exceed 0.01 f/cc, thorough wet cleaning, and/or HEPA vacuuming shall be repeated until the required clearance levels are achieved.

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- C. After achieving the levels of cleanliness and decontamination, as specified herein and as confirmed by the final inspection and air testing, the Consultant and Contractor shall thoroughly inspect the work area to determine whether any damage has been done to finishes, equipment, or any other part of the work space.
- D. Any damage to finishes, floors, walls, or other items or fixtures that have been the result of actions by the Contractor shall be repaired to original condition without any additional cost to District. A comparison to the pre-construction inspection report shall be the basis for the assessment of damages to be addressed.

END OF SECTION 02 82 33

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SECTION 02 83 33

REMOVAL AND DISPOSAL OF MATERIAL CONTAINING LEAD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Hazardous Building Materials Survey Reports, prepared by the District's Consultant, are available in the bid documents.

1.2 REFERENCE DOCUMENTS

- A. The current issue of the following documents are incorporated herein and shall govern the conduct of the Work. Where conflict among requirements or with this specification exists, the more stringent requirements shall apply.
- B. Code of Federal Regulations (CFR):
 - 1. 29 CFR 1910, Occupational Safety and Health Standards, General.
 - 2. 29 CFR 1910.134 Respiratory Protection.
 - 3. 29 CFR 1910.1025 Lead.
 - 4. 29 CFR 1910.1200, Hazard Communication.
 - 5. 29 CFR 1926 Occupational Safety and Health Standards, Construction.
 - 6. 29 CFR 1926.55, Gases, Vapors, Fumes, Dusts, and Mists.
 - 7. 29 CFR 1926.59, Hazard Communication.
 - 8. 40 CFR 61 Subpart A and Subpart M, USEPA, National Emission Standards for Hazardous Air Pollutants (NESHAP).
 - 9. 40 CFR 261, Identification and Listing of Hazardous Waste
 - 10. 40 CFR 262, Standards Applicable to Generators of Hazardous Waste
 - 11. 40 CFR 263, Standards Applicable to Transporters of Hazardous Waste
 - 12. 40 CFR 266, Standards for the Management of Specific Hazardous Wastes.
 - 13. 40 CFR 745, Lead Renovation, Repair, and Painting Program.
- C. California Code of Regulations (CCR):
 - 1. Title 5, Sections 32240 through 32045, Lead Safe Schools Protection Act.
 - 2. Title 8, Section 1514, Personal Protective Equipment.
 - 3. Title 8, Section 1531 Construction Respiratory Protective Equipment.
 - 4. Title 8, Section 15 32 .1, Lead in the Construction Industry.
 - 5. Title 8, Section 3203, Injury and Illness Prevention Program.
 - 6. Title 8, Section 5144, Respiratory Protective Equipment.
 - 7. Title 8, Section 5155, Airborne Contaminants.
 - 8. Title 8, Section 5194, Hazard Communication.

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9. Title 8, Section 5216 General Industry Construction Safety Orders, Lead Regulations.
10. Title 17 Sections 35001-36100 Accreditation, Certification and Work Practices for Lead Based Paint and Lead Hazards.
11. Title 22, Division 4, Minimum Standards for Management of hazardous and extremely hazardous waste.

D. Local Regulations:

1. San Diego Municipal Code, Division 10, Sections 54.1001-54.1015, Lead Hazard Prevention and Control Ordinance.

E. American National Standards Institute (ANSI):

1. ANSI Standard Z9.2 Fundamentals Governing the Design and Operation of Local Exhaust Ventilation Systems.

F. American Society for Testing and Materials (ASTM):

1. ASTM Standard E1728 Standard Practice for Collection of Settled Dust Samples Using Wipe Sampling Methods for Subsequent Lead Determination.

G. Testing Methods:

1. NIOSH Method 7082, Lead by Flame Atomic Absorption Spectrophotometry.
2. EPA Publication SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.
3. EPA Testing Method 3050B, Acid Digestion of Sediments, Sludges, and Soils.
4. EPA Method 7420, Lead (Atomic Absorption, Direct Aspiration).

1.3 SUMMARY

- A. Section includes the furnishing of all labor, materials, facilities, equipment, services, employee training, permits, agreements, waste transport and disposal necessary to perform the work required for removal of materials containing lead in accordance with these specifications, EPA, APCD, OSHA, NIOSH, State of California regulations, and any other applicable federal, state and local government regulations. Whenever there is a conflict or overlap of the above references, the most stringent provisions are applicable.
- B. The Work includes protection and decontamination of components, fixtures, contents, and equipment remaining in the work area prior to and during lead activities, including abatement and paint stabilization.
- C. Perform the work and provide service as needed to accomplish abatement of lead containing materials at the Project Site. Specific locations and materials to be removed/disturbed are indicated on the Drawings. Sampling data for identification of lead containing materials is available from the District Construction Manager.

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- D. Comply with all requirements of this specification for work involving any amount of lead and includes lead abatement, component removal/replacement, paint stabilization, and any other control measures to reduce lead in areas with lead-based paint, presumed-lead based paint, and paint with lead content exceeding the San Diego City Ordinance threshold requiring lead-safe work practices of 0.5 mg/cm² or 1000 ppm lead. Alternate and innovative technologies and procedures are encouraged and must be submitted in detail for approval prior to any work being performed. Any alternative technologies submitted must have been written by a Certified Industrial Hygienist (CIH) or State of California Certified Lead Project Designer or Project Monitor.
- E. In the event materials containing lead in addition to those indicated in the Drawings are discovered, do not disturb. Immediately notify the District Construction Manager who will have the additional materials tested.
- F. Related Requirements:
 - 1. Section 02 82 33 "Removal and Disposal of Asbestos Containing Materials" for asbestos abatement.
 - 2. Section 02 84 33 "Removal and Disposal of Universal Waste and PCB" for Universal Waste and PCB abatement.

1.4 ALLOWANCES

- A. Allowances for removal and disposal of materials containing lead in addition to those indicated on the Drawings are specified in Section 01 21 00 "Allowances."

1.5 DEFINITIONS

- A. All terms not defined herein shall have the meaning given in the applicable publications and regulations.
- B. "Airlock" shall refer to a system for permitting ingress or egress of personnel or equipment while minimizing movement of contaminated air between a contaminated area and an uncontaminated area.
- C. "Air Monitoring" shall refer to the process of measuring the lead content of a volume of air using NIOSH method 7082 or other method approved by the District. Flow rate and sample volume shall be in accordance with the method chosen.
- D. "Authorized Visitors" shall mean the District, a visitor authorized by the District, or any representative of a regulatory agency or other agency having jurisdiction over the project.
- E. "Clearance Inspection" shall refer to an onsite limited investigation of single surface dust wipe sampling or soil performed by the Consultant at the completion of lead hazard reduction activities for deteriorated lead-based paint. Samples will be collected no sooner than 60 minutes after the completion of lead hazard reduction activities. Dust wipe samples will be analyzed in accordance with EPA Test Method SW-846 or other method approved by the District and/or Consultant.

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- F. "Clean Room/Clean Area" shall mean an uncontaminated room having facilities for the storage of employees' street clothing and uncontaminated materials and equipment, and that complies with the OSHA change room standard in 29 CFR 1910.141. The clean area shall contain handwashing facilities, clean clothes, clean cloths, storage for a HEPA vacuum, and respirator storage space. Contaminated equipment or personnel shall not be permitted in this area. The floors and walls of this area shall be covered with 6-mil polyethylene sheeting.
- G. "Consultant" shall mean the consulting industrial hygienist. The Consultant is an independent party retained by the District to provide consultation services for lead-related activities.
- H. "Containment Barrier" shall refer to a system, process, or barrier surrounding and sealing the outer perimeter of the work area, consisting of walls, floors, and/or ceilings. The containment barrier is designed to ensure that lead-contaminated dust, lead-contaminated soil, or lead paint contaminants are not blown, spread, or tracked from inside to outside of a work site.
- I. "Contaminated Equipment Room" shall refer to a contaminated area or room within the decontamination enclosure system that adjoins the work area, with provisions for storage of contaminated clothing or equipment.
- J. "Decontamination Area" shall refer to an enclosed area adjacent and connected to a regulated area and consisting of an equipment room, shower area, and a clean room, that is used for the decontamination of workers, materials, and equipment contaminated with lead, without permitting lead concentrations to migrate to uncontaminated areas. See OSHA regulation at 29 CFR 1926.58).
- K. "De minimus levels" shall mean an area less than:
 - 1. Two square feet in any interior room;
 - 2. Twenty square feet on an exterior surface; or
 - 3. Ten percent of the surface area on any component part.
- L. "Deteriorated paint" shall refer to paint that is cracking, flaking, chipping, peeling, or otherwise separating from the substrate.
- M. "Disposal" shall refer to all procedures necessary to transport lead-containing or contaminated waste removed from the project site and deposit it in a waste disposal site or a conversion site in compliance with applicable regulations.
- N. "Disposal Site" shall mean a site approved by the EPA and/or applicable State and local hazardous waste control agencies for the disposal of lead-containing wastes.
- O. "District" shall mean the San Diego Unified School District.
- P. "Disturb" or "Remove paint" shall refer to any action that creates friction, pressure, heat, or a chemical reaction upon any paint on an interior or exterior surface so as to abrade, loosen, penetrate, chip, cut through, remove, or eliminate paint from that surface. This includes all lead hazard correction activities, all demolition activities, and

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all surface preparation activities performed upon an interior or exterior surface containing paint.

- Q. "Doorway" shall refer to a device to allow passage of personnel or equipment from one room to another while restricting air movement between the rooms so as to minimize the dispersal of lead.
- R. "Equipment Room" or "Change Room" means a contaminated room located within the decontamination area that is supplied with impermeable bags or containers for the disposal of contaminated protective clothing and equipment.
- S. "HEPA Filter" shall refer to a High Efficiency Particulate Absolute filter capable of trapping and retaining 99.97% of particles with aerodynamic equivalent diameters greater than or equal to 0.3 micrometers.
- T. "HEPA Filtered or HEPA Vacuum Equipment" shall refer to equipment equipped with a HEPA filter in the exhaust outlet, and so designed and maintained that 99.97% of particles with aerodynamic equivalent diameters greater than or equal to 0.3 micrometers in the inlet air are collected and retained. All such equipment used under this contract shall be certified by manufacturers as meeting ANSI Z9.2.
- U. "HVAC system" shall refer to the heating/ventilation/air conditioning system of the building(s) within the project site.
- V. "Lead-based paint" or "lead paint" shall refer to paint or other surface coating that contains equal to or greater than 1.0 milligram per square centimeter or 0.5 percent by weight lead.
- W. "Lead-contaminated dust" shall refer to dust that contains lead equal to or greater than 40 micrograms per square foot ($\mu\text{g}/\text{ft}^2$) for interior floor surfaces, 250 $\mu\text{g}/\text{ft}^2$ for interior horizontal surfaces, and 400 $\mu\text{g}/\text{ft}^2$ for exterior floor and exterior horizontal surfaces.
- X. "Lead-contaminated soil" shall refer to bare soil containing lead equal to or greater than 400 parts per million (ppm) in children's play areas and 1000 ppm in all other areas.
- Y. "Lead hazard" shall mean:
 - 1. The existence of deteriorated paint over a surface larger than the de minimus levels if the structure was built before 1979;
 - 2. The disturbance of lead-based paint or presumed lead-based paint without containment barriers;
 - 3. The creation or maintenance of a condition that may result in persistent and quantifiable lead exposure; or
 - 4. The presence of lead-contaminated dust or lead-contaminated soil.
- Z. "Limited quantity" references DOT regulations, under which 66 pounds (30 kg) or less with inner packaging up to 11 pounds (5 kg) each in strong outer packaging (49 CFR 171.8, 173.155).

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- AA. "Safety Data Sheet (SDS)" shall refer to information on a product, supplied by the manufacturer, which provides the information listed by OSHA in 29 CFR 1910.1200 and 8 CCR 5194.
- BB. "mg/cm²" shall refer to milligrams per square centimeter.
- CC. "Presumed lead-based paint" shall refer to paint or surface coating affixed to a component in or on a school constructed before 1993 or other structure constructed before 1979.
- DD. "Primitive air locks" shall refer to air locks constructed using two sheets of plastic. The first one is taped on the top, the floor, and two sides of doorway. Next, a slit is cut six feet high down the middle of the plastic, not all the way to the floor. The second sheet of plastic is taped across the top of the door only, so that it acts as a flap. The flap opens into the work area.
- EE. "Project" or "Project Site" shall refer to Mira Mesa High School, 1 Marauder Way, San Diego, California.
- FF. "Regulated Area" shall refer to an area where lead exposure can reasonably be expected to be, or where airborne concentrations of lead exceed, or can reasonably be expected to exceed, 50 µg/m³. This includes any area in which work is being performed that disturbs or removes paint and to which access is restricted to prevent migration of contaminants.
- GG. "Removal" shall refer to procedures necessary to remove lead-based paint, lead-containing/contaminated materials, and lead waste from designated areas in a safe manner, and dispose of these materials at a disposal site.
- HH. "Transport" shall refer to hauling of lead-containing wastes from a building to the disposal site and deposit of the wastes therein by a firm currently approved by the EPA for the transport of hazardous wastes and approved by any state or local agencies having jurisdiction.
- II. "µg/m³" shall refer to micrograms per cubic meter.
- JJ. "µg/ft²" shall refer to micrograms per square foot.
- KK. "Wash room" shall refer to a room contiguous to a clean room and an equipment room in the decontamination area, equipped with one or more wash basins to adequately accommodate the workers. Provide an adequate supply of soap, shampoo, and towels.
- LL. "Wet cleaning" shall refer to the process of eliminating lead contamination from building surfaces and objects by methods that render lead adequately wet. Such methods include use of cloths and mops, or low-flow amended water sprays, or other cleaning tools that have been dampened with clean and/or amended water.
- MM. "Work Area" shall refer to an area where lead-based paint or presumed lead-based paint is disturbed or abatement is conducted.

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1.6 PRE-REMOVAL MEETINGS

- A. Pre-Removal Conference: Conduct conference at Project Site.
 - 1. The District will arrange a Pre-Removal Conference, attended by a representative of the District, the Consultant, and the Contractor.
 - 2. The Contractor shall identify his Supervisor at this conference.
 - 3. Provide electronic copies of "Action Submittals" at least five working days prior to this conference.
 - 4. Pre-Removal Conference topics may include, but are not limited to, the following:
 - a. Contractor listing of existing site condition (e.g. damage).
 - b. Contractor and supporting vendor site access and parking.
 - c. Coordination of Contractor access routes to the work area, including approved doors, stairways, corridors, and elevators.
 - d. Availability of building utility services, such as power, water, and drains.
 - e. Determination of equipment and other movable items to be removed from the work area(s) by the Contractor, and the location of temporary storage space.
 - f. Location, coverage, and use of isolation barriers and decontamination facilities.
 - g. Emergency Response Procedures.

1.7 ACTION SUBMITTALS

- A. Lead Compliance Plan. The Plan shall meet the requirements of 8 CCR 1532.1 e(2)(B) and include minimally the following:
 - 1. A description of each activity during which lead is emitted including equipment used, material involved, controls in place, crew size, employee job responsibilities, operating procedures and maintenance practices.
 - 2. A description of the specific means that will be employed to achieve compliance and, where engineering controls are required, engineering plans and studies used to determine methods selected for controlling exposure to lead.
 - 3. A report of the technology considered in meeting the PEL.
 - 4. Air monitoring data that documents the source of lead emissions.
 - 5. A detailed schedule for implementation of the program, including documentation such as copies of purchase orders for equipment, construction contracts, etc.
 - 6. A work practice program that includes compliance items related to protective work clothing and equipment, housekeeping, hygiene facilities, hygiene practices, and regulated areas and other relevant work practices.
 - 7. An administrative control schedule, if applicable.
 - 8. A description of arrangements made among contractors on multi-contractor sites with respect to informing affected employees of potential exposure to lead and of regulated areas.
 - 9. Any other relevant information.

1.8 INFORMATIONAL SUBMITTALS

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A. Pre-Removal Submittals:

1. Copies of all notifications, permits, applications, licenses and like documents required by federal, state, or local regulation in proper fashion, including CDPH form 8551, Cal-OSHA Notification, and notice to occupants if applicable. Notification shall be given to the District and Consultant at least 5 working days prior to the beginning of each phase or mobilization of work involving lead.
2. Copies of each worker's medical clearance to wear respirators.
3. Statement by the examining medical doctor that medical exams required by California-OSHA for lead work took place, and when, for each employee to be used on the project.
4. Record of successful respirator fit testing performed by a qualified individual within the previous twelve months, for each employee to be used on this project with the employee's name and fit test date, fit test method, and model and size of respirator with each record. NOTE: In the event employees are hired after the project start date, supply the proper documentation as required at least 24 hours in advance of their start.
5. Name of designated competent person(s), certificate(s) of training, and copies of "Lead-Related Construction Supervisor" certifications granted by the California Department of Public Health.
6. List of all supervisors and workers intended to be assigned to the project and copies of CDPH Lead-Related Construction Certifications granted by the California Department of Public Health.
7. Proposed Emergency Plan and route of egress from work areas in case of fire or injury, including the name and phone number of nearest medical assistance center. This shall be conspicuously posted at the work site and filed with proper agencies.
8. The name and address of Contractor's personal air monitoring and waste disposal lead testing laboratory(ies) including certification(s) of ELPAT accreditation for heavy metal analysis and National Lead Laboratory Accreditation Program (NLLAP) and American Industrial Hygiene Association (AIHA) accredited for lead analysis for air monitoring laboratory.
9. Safety Data Sheets (SDS) on all materials and chemicals to be used on the project.
10. Name, address, and ID number of the hazardous waste hauler, waste transfer route, and proposed disposal site.
11. Name, address, and ID number of the proposed construction debris disposal site.
12. Name, address, and ID number of hazardous waste disposal site. Documentation must be submitted from these sites proving they are licensed to accept such waste and will accept such waste.
13. A copy of the Contractor's CAL-OSHA Lead Compliance Plan, in accordance with Title 8, Section 1532.1.
14. A copy of the Contractor's CAL-OSHA Respiratory Protection Program, in accordance with Title 8, Section 5144.
15. A copy of the Contractor's CAL-OSHA Injury and Illness Prevention Program, in accordance with Title 8, Section 3203.

B. Submittals During Removal Work:

1. Remediation Progress Report.
2. Results from personal air samples.

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3. Results from waste testing.
4. Results from other testing.
5. Medical, Fit Test and CDPH Lead-Related Construction Certification twenty-four (24) hours in advance of any new employees starting on the project.

1.9 CLOSEOUT SUBMITTALS

A. Submit immediately upon completion of lead-related work:

1. Copies of manifests and receipts acknowledging disposal of all hazardous and non-hazardous waste material from the project showing delivery date, quantity, and appropriate signature of landfill's authorized representative.
2. All personal monitoring results.
3. All waste characterization test results.

1.10 PERFORMANCE REQUIREMENTS

A. Applicable Standards:

1. Per California Department of Public Health, all paint on schools applied prior to January 1, 1993 is "presumed lead-based paint", and requires compliance with the most current laws and regulations including SB460 effective January 1, 2003.
2. Per CAL-OSHA and Federal OSHA, whenever construction activities disturb lead in any amount, the employer must assume that employees may be exposed to lead and comply with the requirements of the "Lead in Construction Standard" Title 8, Section 1532.1.
3. Per the City of San Diego Ordinance 19732, any person who disturbs or removes paint in the interior or exterior of a dwelling unit or structure constructed prior to January 1, 1979, or from any surface on a steel structure, shall use lead-safe work practices, unless a certified Inspector/Assessor determines, prior to the commencement of activities which disturb or remove paint, that the concentration of lead in paint is below 1,000 parts per million or 0.5 milligrams per square centimeter.

B. Contractor Personnel Qualifications:

1. All workers assigned to this project shall have been trained in accordance with California Construction Safety Orders, 1532.1, Lead-Related Construction, and shall hold "Lead-Related Construction Worker" certifications granted by the California Department of Public Health.
2. Provide one full-time onsite Supervisor whose duties shall include coordination, safety, security, and execution of all phases of the Work. The Supervisor shall not be used as a worker. The Supervisor shall hold "Lead-Related Construction Supervisor" certifications granted by California Department of Public Health.

C. Contractor Responsibilities:

1. Notifications /Approvals: In proper and timely fashion, make all applicable and necessary notifications to relevant federal, state, and local authorities and obtain

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and comply with the provisions of all permits or applications required by the work specified, as well as make all required submittals required under those auspices. The costs for all permits, applications, fees the like, are to be borne by the Contractor.

2. Notice to Occupants: Provide a "Notice to Occupants", meeting the requirements of the City of San Diego Lead Ordinance Section 54 .1 006, at least seven business days prior to any activities that disturb or remove presumed-lead based paint, lead-based paint, or paint containing greater than 1000 ppm or 0.5 mg/cm² lead. Provide notice to the District and Consultant and post at the work area.

D. Work and Scheduling Requirements:

1. Work shall be carried out in sequential phases. Inspection and approval of each phase by the Consultant shall be sought and gained before proceeding to the next phase. Work shall proceed in accordance with the schedule agreed upon by the District and approval of each phase by the Consultant shall be sought and gained prior to proceeding to the next phase. As a Contract requirement, any reasonable delay caused by this requirement shall not constitute a basis for claim against the District or Consultant.
2. Project Sequence:
 - a. Extend full cooperation to District in all matters involving the use of District's facilities. At no time shall Contractor cause or allow to be caused conditions that may cause risk or hazard to the public or conditions that might impair safe use of the facility. The use of the facility's electricity, water or like utilities by the Contractor shall be in accordance with Section 01 50 00 "Temporary Facilities and Controls."
 - b. Coordinate the work of this Section with that of all other trades. Work shall not proceed in any area without the express consent of the District and Consultant. Be available within 24 hour's notice for additional work or rework if after acceptance of the work it is found that full remediation was not achieved from the initial work effort as determined by the District and Consultant.

E. Protection of Persons and Property:

1. General:
 - a. Provide medical surveillance and biological monitoring on all workers in accordance with 8 CFR 1532.1.
2. Respiratory Protection:
 - a. Provide workers and supervisory personnel with NIOSH approved respirators and P-100 (HEPA) filters. Respiratory protection shall be implemented for all work performed under this Section. The respirators shall be sanitized and maintained according to the manufacturer's specifications. Disposable respirators are not acceptable under any circumstances.
 - b. Maintain on-site a sufficient supply of P-100 filters to allow workers and supervisory personnel to change contaminated filters per manufacturer's

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- recommendations or when breathing resistance increases. Comply with all applicable regulations.
- c. Respirators shall be individually assigned to removal workers for their exclusive use. All respiratory protection shall be provided to workers in accordance with the respiratory protection program, which must include all items specified by CAL-OSHA Respiratory Protection Program Title 8, Section 5144, including but not limited to medical clearance, fit-testing, training, cleaning, storage, inspection, and maintenance. A copy of this program shall be kept at the worksite, and shall be posted in the clean area.
 - d. Additional respiratory protection using adsorbent media, such as organic vapor cartridges, may be needed when handling some coating products. If this is the case combination cartridges that are equipped with P-100 filters in series with the appropriate adsorbent media are required. Consult the Safety Data Sheets (SDS) and obtain the proper cartridges as necessary.
 - e. Facial hair such as beards, long sideburns, and moustaches that interfere with the seal of air purifying type respirators are prohibited. Workers with eye corrective lenses (contact lenses or glasses) shall wear the corrective lenses in a manner that is in compliance with 8 CCR 1529 and 8 CCR 5144.
3. Personal Protective Equipment:
- a. Provide personal protection, in the form of disposable coveralls to all workers, supervisors, and authorized visitors entering the work area during activities disturbing lead.
 - b. Provide each worker with disposable suits every day. Under no circumstances shall anyone entering the removal area be allowed to reuse a contaminated uniform. In addition to disposable suits for the workers, supply suits for the Consultant and other personnel who are authorized to inspect the worksite. Disposable suits, such as TYVEK suits, and other personal protective equipment (PPE) must be donned prior to entering work area. A clean area shall be provided for workers to put on suits and other personal protective equipment and to store their street clothes.
 - c. Work clothes shall consist of disposable full-body suits, head covers, gloves with cuffs extending outside the sleeves of the protective suit, boot or shoe covers, and other protection as needed. Hard hats shall be worn, as required.
 - d. Provide eye protection to personnel engaged in lead operations when the use of a full-face respirator is not required.
 - e. Goggles with side shields shall be worn when working with a material that may splash or fragment, or if protective eyewear is specified on the Safety Data Sheet (SDS) for that product.
 - f. All disposal protective clothing shall be discarded and disposed of as lead-contaminated waste every time the wearer exits from the workspace to the outside. All exits from the workspace will be through the decontamination facilities, except in the event of an emergency.
4. Air Monitoring:

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- a. General: Perform personal air sampling during activities involving lead. The results of such sampling shall be posted, provided to individual workers, and submitted to District and/or Consultant as described herein.
 - b. Sampling: Take samples for the duration of the work shift or for eight hours, whichever is less. Personal air samples need not be taken every day after the first day if working conditions remain unchanged, but must be taken every time there is a change in the removal operation, in terms of either the site or the type of work. Sampling will be used to determine eight-hour time-weighted average (TWA) exposure.
 - c. Sampling Results: Transmit air sampling results to the District and/or Consultant and individual workers in written form no more than forty-eight (48) hours after the completion of a sampling cycle. The reporting document shall list each sample's sampling time and date, personnel monitored, flow rate, sample duration, analytical laboratory, analytical results, and shall include an interpretation of the results. Air sample analysis results shall be reported in micrograms/cubic meter ($\mu\text{g}/\text{m}^3$).
 - d. Testing Laboratory: The Contractor's testing lab shall be National Lead Laboratory Accreditation Program (NLLAP) and American Industrial Hygiene Association (AIHA) accredited for lead analysis.
 - e. Air Monitoring Frequency: The air monitoring frequency for Contractor operations shall be in accordance with the requirements set forth in Title 8, Section 15 32 .1.
5. Damage and Repairs to Project Site: Work activities involving lead shall be performed without damage to the building(s), including, but not limited to, structural members, ceilings, pipes, walls, or light fixtures. Provide protection of these items and materials as part of work area preparation. Where work activities involving lead causes damage, patch, repair, replace or otherwise restore the damaged items to their original condition or replace with better materials, with no additional cost to the District. This includes repair of surfaces damaged during component removal as described herein.

1.11 QUALITY ASSURANCE

- A. District's Role: The performance and execution of the project will be monitored by the District. The District will bear costs associated with the independent laboratory and inspection work required in these Specifications for clearance testing, third party oversight, and oversight sample analyses, unless otherwise noted.
 - B. Consultant's Role: The District shall retain the services of a CDPH-certified Lead Project Monitor for the purposes of management of the work activities involving lead described herein. The Consultant will represent the District in all phases of the work activities involving lead, at the discretion of the District. Regard the Consultant's direction as authoritative and binding, as provided herein, in matters particularly involving, but not limited to, approval of work areas, review of monitoring results, completion of various segments of work, final completion of work activities involving lead, submission of data, and daily field punch list items.
1. Inspections: In addition to various daily inspections of the lead work area and work practices, the Consultant will make three mandatory inspections during the

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work, one during each phase of removal. Each inspection must be requested by the Contractor and be performed by the Consultant. The work being inspected must meet the Consultant's satisfaction before work may begin for the next phase of work. Failure on the part of the Contractor to obtain the Consultant's approval before proceeding to the next scheduled phase is regarded as a violation of this Section. In the event of this occurring, the Consultant will request work to be stopped and the District will be contacted to intervene. The three inspections are as follows:

- a. Work Area Preparation Completed: Have all pre-removal preparations of the work area complete, seek, and review approval from the Consultant to proceed.
- b. Post Removal Inspection: Work shall have been completed including renovation, removal, paint stabilization, or abatement. Final clean-up of all visible debris final cleaning techniques of wet washing and HEPA vacuuming will have been completed.
- c. Final Clearance: The Consultant will perform final clearance wipe testing as soon as possible after final clean-up activities are completed, or as appropriate.

PART 2 - PRODUCTS

2.1 GENERAL

- A. No materials, equipment, or tools belonging to the District shall be used by the Contractor, except in case of an emergency and upon explicit authorization by the District.
- B. Deliver all materials and equipment to the site in the original containers bearing the name of the manufacturer and details for proper storage and usage.
- C. All materials or equipment delivered to the site shall be unloaded, temporarily stored, and transferred to the work area in a manner, which shall not interfere with operations of the District.
- D. The District and/or Consultant must approve unloading and temporary storage sites and transfer routes in advance.
- E. Damaged or deteriorated materials may not be used and must be promptly removed from the project site. Materials, that have become contaminated with lead shall be packaged as lead waste, characterized, and disposed of in an approved landfill.
- F. All materials, tools, and equipment must comply at a minimum with this specification and all applicable federal, state, and local regulations.

2.2 MATERIALS

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- A. Plastic Sheet: Sheet shall be fire-retardant polyethylene sized in lengths and widths to minimize the frequency of joints. The minimum thickness shall be 6-mils.
- B. Barrier Tape: Tape labeled as "CAUTION-LEAD HAZARD-DO NOT ENTER WORK AREA UNLESS AUTHORIZED" or similarly labeled, for use on the exteriors of the buildings.
- C. Tape: Tape shall be capable of sealing joints of adjacent sheets of plastic and of attaching plastic sheet to finished or unfinished surfaces of dissimilar materials, and shall be capable of adhering under dry and wet conditions, including wetting by amended water.
- D. Lead Disposal Packaging: Packaging shall be suitable to receive and retain any lead-containing materials until disposal or conversion at an approved site. The packaging shall be both air and watertight.
 - 1. Bags: Disposal bags shall be double 6-mil thick polyethylene, pre-printed with labels as required by 8 CCR Section 15 32 .1.
 - 2. Labeling: Stick-on labels as per EPA, OSHA, and DOT requirement for disposal drums.
- E. Warning Signs: Signs shall be as posted to each entrance to and from the work area undergoing lead hazard reduction in accordance with Title 17 CCR 35001-36100 and 8 CCR 1532.1.
- F. Flexible duct: For ventilation units (if required).
- G. Spray adhesive: Must be fire-retardant.

2.3 TOOLS AND EQUIPMENT

- A. Airless Sprayer: Amended water and surface sealers shall be applied with an airless or other low-pressure sprayer or injector suitable for the specific application.
- B. Air Purifying Equipment: Equipment used to establish negative pressure in the work area shall be HEPA-filtered. If negative air machines will be exhausted inside any part of the building, they must be DOP tested and certified on site or have a certification of passing DOP testing attached.
- C. Vacuum Equipment: All vacuum equipment used for cleaning up shall be HEPA-filtered. Each HEPA-filtered vacuum brought onsite must be DOP tested and certified. DOP testing can be conducted on or off site, providing that each unit has a certification (of passing DOP testing) attached. At least one HEPA vacuum shall be equipped with floor (hard surface and carpet) cleaning attachments.
- D. Scaffolding/Staging/Ladders: Shall meet OSHA safety regulations, including 29 CFR 1926.450-452 and 8 CCR 1637. Where electrical power and water are used inside a work area, no electrically conductive ladders (e.g., aluminum or steel) shall be used (except for hinges and feet).

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- E. Transportation Equipment: Shall be suitable for loading, temporary storage, transport, and unloading of lead-contaminated materials without exposure to persons or property. Equipment shall be currently registered with the State for transport of hazardous wastes and be currently certified by the State for vehicle inspection.
- F. Other Tools and Equipment: Furnish all equipment such as lumber, nails, ladders, hardware, and supplies that may be required to construct and dismantle the decontamination areas and the barriers that isolate the work area. Provide other suitable tools for the lead-related activities including but not limited to hand scrapers, wire brushes, sponges, mops, and shovels.
- G. Electrical: Electrical tools and equipment shall meet all applicable codes and regulations, including, in particular, 29 CFR 1910.304, 29 CFR 1926.400-449, and 8 CCR 1760.
 - 1. Grounding. Ground fault circuit-interrupters shall always be used for all electrical equipment, except to the extent provided in an assured equipment grounding conductor program, 29 CFR 1926.404, and 8 CFR 2405.4.
 - 2. Additional requirements. Other OSHA requirements for equipment grounding conductors, beyond those described in the grounding paragraph, apply.
- H. Fire extinguishers.
- I. Portable eye washes.

PART 3 - EXECUTION

3.1 WORK AREA PREPARATION

- A. Signage: Prior to the preparation of a building for work activities involving lead, place warning signs immediately outside all entrances and exits to the building, warning that lead-related work is being conducted in the vicinity. The signs shall be in English and Spanish, at least 20 inches by 14 inches with bold lettering, and not smaller than 2 inches tall, and read: "WARNING: LEAD PAINT REMOVAL HAZARD; UNAUTHORIZED ENTRY PROHIBITED; NO SMOKING, EATING OR DRINKING ALLOWED IN THE WORK AREA.
- B. Access to the Work:
 - 1. The District will provide specific access as required during the project to the Contractor's personnel assigned to the project. Allow only authorized personnel into the work area.
 - 2. Maintain a bound logbook in which any person entering or leaving the lead work area must sign and enter the dates and times of entry and departure.
 - 3. Use of waste containers onsite shall be controlled under the following requirements:
 - a. Location of waste containers onsite shall be coordinated with the District and Consultant.

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- b. The waste containers shall be solid enclosed containers, lined with two layers of 6-mil polyethylene sheeting locked and secured at all times, when not in immediate use.
 - c. Comply with all federal, state, and local regulations and ordinances regarding lead waste storage.
 - d. Do not allow anyone access to the building unless they have successfully completed a training program and are wearing a properly fitted respirator, unless stated otherwise by the Consultant.
- C. Containment: Establish "containment" as specified in tables 8.1, 8.2, and 8.3 of the HUD guidelines and Appendix A of the City of San Diego Lead Ordinance, as applicable. Copies of these tables are included in Appendix A of this Section.
 - 1. Decontamination Unit: At a minimum construct a two-stage decontamination unit. This unit shall be connected to the work area (abatement or paint stabilization) for the decontamination of workers contaminated with lead. The decontamination unit shall consist of an equipment room, dirty room, and wash area in series. Ensure that employees enter and exit the work area through this unit. In addition, the decontamination unit shall be constructed with 6-mil polyethylene sheeting on floors, walls, and ceiling. Doors through this unit shall be constructed as described in Appendix A of this Section.
 - 2. Clean Area: Select a clean area outside the lead work area for the workers to change into protective equipment. This area shall contain hand washing facilities, clean cloths, storage for a HEPA vacuum, and respirator storage space. Contaminated equipment or personnel shall not be permitted in this area. The floors and walls of this area shall be covered with 6-mil polyethylene sheeting.
 - 3. Lead Work Area: Pre-clean all surfaces with a HEPA vacuum and remove any furniture, or other movable objects. All debris gathered during this clean up shall be disposed of properly. Requirements are the same for abatement or paint stabilization area(s).
 - 4. Deteriorated Lead-Based Paint: Clean any surfaces impacted by deteriorated lead-based paint. The cleaning of these surfaces shall be completed during establishing "containment" for the work area.
- D. Approvals and Inspections. All temporary facilities, work procedures, equipment, materials, services, and agreements must strictly adhere to and meet this Section along with EPA, OSHA, NIOSH, HUD regulations, recommendations, and guidelines, as well as any other federal, state, and local regulations. Where there exists an overlap of these regulations and guidelines, the most stringent one applies. All work performed by the Contractor is further subject to approval of the District and/or Consultant.

3.2 WORK AREA PROCEDURES

- A. In order to avoid possible exposure to dangerous levels of lead and to prevent possible contamination of areas outside the demarcated work area, work shall follow the general guidelines listed below.
 - 1. Work Area Entry: At no time shall a worker or other authorized personnel entering the work area go further than the Clean Area without proper respiratory

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protection and protective clothing. Work area entry is through the decontamination area.

2. Work Area Departure: The worker shall remove all gross contamination, debris, and dust from the disposable suit by completely HEPA vacuuming them before leaving work area. Work area exit is through the decontamination area.
3. Personal Protective Equipment: All persons leaving the work area must remove their PPE (except respirators) before leaving. Suits shall be removed "inside out" to minimize the dispersal of lead dust.
4. Equipment: All equipment used by the workers inside the work area shall be either left in the work area or thoroughly decontaminated before being removed from the area. Extra work clothing (in addition to the disposable suits supplied by the Contractor) shall be left in the clean area until the completion of work in that area. The clean area shall be cleaned of all visible debris and disposable materials daily.
5. Footwear: As with additional clothing, all footwear shall be left inside the clean area until the completion of the job and then shall be HEPA vacuumed or discarded as contaminated waste.
6. Shock hazards.
 - a. Use safe procedures to avoid electrical hazards. Power shall be shut off and checked before work begins when a hazard exists.
 - b. All extension cords and power tools used within the work area shall utilize in-line Ground Fault Circuit Interrupters (GFCI).

- B. Prohibited Practices. Under no circumstances shall workers or supervisory personnel eat, drink, smoke, chew gum, chew tobacco, or remove their respirators in the work area. To do so shall be grounds for the District and/or Consultant to stop all operations. Only in the case of life threatening emergency shall workers or supervisory personnel be allowed to remove their protective respirators while in the work area. In this situation, respirators are to be removed for as short of duration possible.

3.3 WORK ACTIVITIES INVOLVING LEAD

A. General:

1. Workmanship: All lead-related work activities shall be conducted in a professional workman-like manner. Since any lead-related work procedure may cause damage to the substrate and/or adjacent surface if performed improperly, strict work controls are required.
2. Approval: Receive prior approval from the District and Consultant before using any materials or equipment. No methods involving open flame, wire brushing, or dry scraping alone, or with the aid of flammable solvent or abrasive compound, or solvents containing methylene chloride, shall be used in removing paint.
3. Disposal: All leaded materials, residues, debris, or soil contaminated as a result of lead-related work, must be treated, and/or disposed of in accordance with regulations and guidelines of EPA, HUD, state and local regulations and ordinances, and all other applicable agencies.
 - a. All such materials shall be wrapped in 6-mil plastic sheeting with all edges and seams sealed or placed in 6-mil plastic bags with the top of the bags

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- twisted so as to form a loop. The loop shall then be sealed. The bags of residue/debris shall then be further containerized in an additional 6-mil plastic bag.
 - b. The sealing process shall include the use of a waterproof tape of sufficient strength so as to maintain the integrity of the seal.
 - c. All components shall have all nails and/or other hardware flattened or removed prior to disposal.
 - d. The residue/debris shall be lightly misted prior to placement for disposal.
 - e. The residue/debris shall be carefully handled so as to prevent rupture, or in any way diminishing container integrity.
 - f. All wastewater shall be collected and tested prior to disposal. Consider filtering the water through a 5-micron filter prior to testing.
- 4. Damage and Repairs to Project Site: Work activities involving lead shall be performed without damage to the building(s), including, but not limited to, structural members, ceilings, pipes, walls, or light fixtures. Provide protection of these items and materials as part of work area preparation. Where work activities involving lead causes damage, patch, repair, replace or otherwise restore the damaged items to their original condition or replace with better materials, with no additional cost to the District. This includes repair of surfaces damaged during component removal as described herein.
 - 5. Responsibilities and Supervision: Use approved lead-related work practices during the course of the work. Abide by all of the worker protection and safety specifications as outlined. Provide electrical service sufficient for the equipment to be used during lead-related work. Provide plumbing so that adequate services are available for washing down the areas after lead-related work and for personal hygiene. Provide an on-site lead abatement Supervisor/Competent Person during all phases of work activities involving lead.
- B. Component Removal Procedures: All bundles of "containers" of removed components and/or debris shall be carefully handled to reduce the potential of ripping, bursting, or otherwise diminishing the integrity of the bundle or "container".
- 1. Care shall be taken so that leaded materials are neither burned, made to become dusty, nor result in further exposure to workers, occupants, children or observers.
 - 2. Care shall be taken to avoid damage to adjacent areas during the removal of components to be replaced. Run a utility knife around the edge (score) of the component substrate and the adjacent (non-abated) substrate to cut any bonding between the substrates and thereby eliminate damage.
 - 3. If components to be removed contain gross areas of loose or peeling paint, these areas shall be wet scraped or HEPA vacuum prior to removal. The paint chips shall be contained either in the HEPA vacuum or in a separate 6-mil polyethylene bag. Temporary encapsulant expressly for this purpose is also acceptable.
 - 4. Components that are removed for replacement shall be wrapped and stored for disposal, or disposed of in accordance with the applicable codes and requirements of this Section.
 - 5. Wood Component Removal: A pry device shall be utilized to carefully remove the components. Once the component has been removed, the resulting material shall be cut into lengths that are easily managed for the purposes of containerization. Containerization shall be accomplished by removing or flattening all nails to prevent punctures or tearing and wrapping the material in

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six-mil plastic sheeting. The wrapping shall be finalized by securing with waterproof tape of sufficient strength at all edges and seams, so as to prevent diminishing the integrity of the container.

C. Paint Film Stabilization.

1. Substrate Repairs:

- a. Prior to stabilizing lead-based paint, correct substrate surfaces defects. Remove loose, unsound, or deteriorated substrates.
- b. Place in 6-mil polyethylene disposal bag and dispose of in accordance with applicable regulations.

2. Paint Removal.

- a. Wet Scraping: Remove all loose, flaking, and deteriorated paint by wet scraping. Continually mist surface with water during scraping. Clean any generated debris by HEPA-vacuum.
- b. Wet Sanding: Prepare finish surfaces by wet sanding, feathered edges lightly. Keep surface wet while sanding. Use hand sanding and HEPA-vacuum debris. If mechanical sanders are used they must be equipped with integrated HEPA-filtered dust collection.

3. Surface Cleaning.

- a. Dust and chips: HEPA vacuum surface after drying.
- b. Chemically treat surface if necessary for good paint adhesion. Follow manufacturer's printed instructions for system used.
- c. Test surface for pH following chemical treatment.

3.4 CLEANING AND FINAL CLEARANCE

- A. End of Day Cleaning: Thirty (30) minutes prior to the end of each workday, the lead work area must be cleaned of all debris. Under no circumstances will lead clean-up be permitted when active LBP removal work, lead paint stabilization, or other work involving disturbance of lead paint, presumed-lead based paint, or paint exceeding the City of San Diego threshold requiring lead-safe work practices is proceeding. All interior surfaces in the work area shall be cleaned of dust and debris. Such cleaning shall include a thorough HEPA vacuuming of all affected surfaces, as determined by the Consultant. Additionally, such cleanings may require the use of a lead-specific cleaner. All waste materials generated during this daily clean up shall be disposed of as hazardous waste, unless analytical testing proves otherwise.
- B. Equipment Cleaning: Durable equipment, such as power and hand tools, generators, and vehicles shall be cleaned prior to removal from unit undergoing lead paint removal or paint stabilization or the site. All equipment shall be cleaned by HEPA vacuuming and wet washing with a lead-specific cleaner.
- C. High Efficiency Particulate Air (HEPA) Vacuum: Obtain HEPA vacuum attachments, such as various size brushes, crevice tools, and angular tools to be used for varied

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applications and service the HEPA vacuum routinely to assure proper operation. Caution shall be used any time the HEPA vacuum is opened for filter replacement or debris removal. Operators shall wear a full set of protective clothing and equipment, including respirators, when using the HEPA vacuuming equipment or removing/replacing used filters.

- D. Preliminary Cleanup: Upon completion of the abatement, stabilization, or interim control and a satisfactory visual inspection by the District and/or Consultant in a given work area, perform a preliminary clean-up. This clean-up includes removal of any contaminated material, equipment, or debris including polyethylene sheeting from the work area. The polyethylene sheeting shall first be sprayed or misted with water for dust control, the resulting debris removed, and then the sheeting shall be folded in upon itself.
1. Large Debris: Large debris from work activities involving lead shall be wrapped in polyethylene sheeting at least six mil thick, sealed with heavy-duty duct tape, and stored until proper disposal.
 2. Small Debris: Prior to picking up or collecting small debris, the surfaces of this debris will be sprayed with a fine mist of water. The debris will be picked up, collected, and placed into a single plastic bag, at least 6-mil thick. The bags shall not be overloaded, shall be securely sealed, and shall be stored in the designated area until disposal. Dry sweeping is not permitted in the work area; wet sweeping is required.
 3. Plastic Sheeting: Removal of surfaces 6-mil polyethylene sheeting shall begin from upper levels. Removal of ground polyethylene sheeting shall begin at the corners and folded into the middle to contain the dust or residue. All collected polyethylene sheeting shall be placed in 6-mil polyethylene bags for proper disposal as described in these Specifications.
 4. HEPA Vacuum: Once the 6-mil polyethylene sheeting is removed from the work area, cleaning shall begin with a thorough HEPA vacuuming of all surfaces, starting at the ceilings, proceeding down the walls and including window, door, and door trim and floor. The floor shall be vacuumed last, beginning at the farthest corners from the entrance to the work area. HEPA vacuuming shall again be performed as noted above, after the following wet wash.
 5. Wet Wash: Next, wet wash or mop the same surfaces with a lead-specific cleaner and allow surfaces to dry. Then a second HEPA vacuuming of the surfaces will be performed by the contractor, as described above. By the conclusion of the cleaning phase, all visible dust and debris shall have been completely removed.
 6. Hygiene, Cleaning Equipment and Supplies. Special attention shall be given to personal hygiene and the cleaning of supplies and equipment. All mop heads; sponges and rags shall be replaced or changed daily, at a minimum. Rags, mop heads or sponges may be reused if the Contractor has them cleaned via a washing system specially equipped with HEPA filtration.
 7. Detergents: Prepare and use detergents specifically designed for lead abatement work. The manufacturer's recommended coverage will be followed. Detergent solutions should be replaced as needed.
 8. Wastewater. The wastewater from the clean-up shall be contained and disposed of according to all applicable federal, state, county, and local regulations and guidelines. In no instance shall wastewater be disposed in storm sewers (e.g., yard inlet or street drain) or sanitary sewers (e.g., toilet, sink, or any other

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household/ residential/ commercial type drain system) without specific governmental approval.

- E. Visual Inspection: Request a visual inspection by the Consultant. If the area does not pass a visual inspection, re-clean the area.
- F. Work Area Clearance: When all surfaces have passed visual inspection, wipe samples shall be performed by the Consultant. This shall be performed after completion of the final clean up. The standards for passing a wipe test are outlined herein. Should laboratory results indicate that the wipe test clearance level is exceeded, re-clean the affected area, at no additional cost to the District, utilizing the methods specified above. Re-testing will then be performed to verify compliance with the mandated levels. Pay for all additional testing and provide, at no additional cost, a re-cleaning of an affected area until the clearance level is achieved. Bear any additional expenses, such as relocation expenses and Consultant fees, due to failure of clearance testing.
- G. Finish Coatings. Finished coatings, including but not limited to stains, primer, sealers, and poly coatings, if used, shall only be applied upon approval by the District and/or Consultant. Any surface requiring painting shall be primed with an approved primer.
- H. Final Clearance. Final clearance shall take place after finish coating has been applied. Final clearance shall include visual inspection and wipe sampling as per Section 3.4 (I) and (J).
- I. Inspection/Clearance Standards. When clean-up has been completed and all surfaces have been sealed, wipe samples by the Consultant will be performed. The following standards shall be met for all "clearance" requirements.

Type of Procedure	Number and Location of Wipe Samples
Interior Treatments	Two wipe samples from every treated room (up to four rooms) as follows: <ul style="list-style-type: none">• One interior window sill or window trough, alternating between rooms (one floor if window not present)• One floor
Exterior Treatments	Two wipe samples as follows: <ul style="list-style-type: none">• At least one dust sample on a horizontal surface in part of the outdoor living area• One window trough sample on each floor where exterior work was performed

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Type of Procedure	Number and Location of Wipe Samples
Notes: (1) An area is a room, closet, pantry, hall, portion of room (such as the dining area of a kitchen/dining room), etc. If a room and its closet are both abated, they can be treated as one area for purpose of wipe testing. (2) Other applicable areas may also have wipe samples taken, at the discretion of the Consultant in conformance with the HUD Guidelines for the Evaluation and Control of LBP Hazards in Housing.	

- J. Wipe Standards. The standards for passing a wipe test are:
1. Floors. 40 micrograms per square foot or less.
 2. Interior window sills/surfaces. 250 micrograms per square foot or less.
 3. Exterior horizontal window and floors. 400 micrograms per square foot or less.
- K. Retests: Should laboratory results indicate that the wipe test clearance level is exceeded, re-clean the affected area, at no additional cost to the District, utilizing the methods specified above. Retesting will then be performed to verify compliance with the mandated levels. Pay for all additional testing and Consultant fees, and provide at no additional cost a re-cleaning of an affected area until the clearance level is achieved.

3.5 DISPOSAL OF WASTE MATERIALS

- A. All materials, whether hazardous or non-hazardous, shall be disposed in accordance with all laws and the provisions of this Section and all applicable federal, state, county or local regulations and guidelines. Assure compliance with all laws and regulations relating to this disposal.
- B. General Applicability.
1. Contact the regional EPA, state, and local authorities to determine lead-containing or contaminated debris disposal requirements.
 2. The requirements of Resource Conservation and Recovery Act (RCRA) shall be complied with as well as California solid waste plan requirements. During lead-related work, do not leave debris on the property, incinerate debris, dump waste by the road or in an un-authorized dumpster, or introduce lead contaminated water into storm or sanitary sewers.
- C. Disposal Requirements.
1. Dispose of the following materials as hazardous waste in accordance with this Section:
 - a. All paint chips and paint chip debris.
 - b. Lead-containing or contaminated materials exceeding regulatory thresholds.

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2. Test the following materials individually and provide results to District and Consultant, to determine whether they are to be considered hazardous.
 - a. Wastewater used to decontaminate.
 - b. Rags, sponges, mops, HEPA filters, respirator cartridges, and other materials used for lead-related work and clean-up and containment.
 - c. Other waste derived from work activities involving lead.
- D. Hazardous Waste Tests.
 1. Perform the Toxicity Characteristic Leaching Procedure (TCLP) to determine whether the wastes are classified as non-hazardous solid or hazardous waste as defined under RCRA. Representative samples shall be required of all material to be disposed.
 2. If any of these samples are above the TCLP regulatory limits, dispose of all of that type of material as hazardous waste.
 - a. Meet the requirements of the State of California, as per Title 22, CCR 66261 and other related regulations. This will include, if applicable, other waste testing, such as Total Threshold Limit Concentration (TTLC) and Soluble Threshold Limit Concentration (STLC).
 - b. Submit written manifest to District prior to removing any waste from the site and submit a complete manifest to District after waste is disposed of. The following documents are made applicable and part of this Section: 40 CFR 241, 257, 261, 262, and 49 CFR 172, 173, 178, and 179, Department of Transportation (DOT) Regulations.
- E. Disposal of Non-Hazardous Contaminated Solid Waste: The following procedures shall be followed for the disposal of all non-hazardous materials:
 1. Place all non-hazardous contaminated materials in six-mil polyethylene bags that are airtight and puncture resistant. Pieces of wood or other types of substrates that do not fit into plastic bags shall be wrapped and labeled "DANGER, LEAD DUST."
 2. Place all disposable cleaning materials, such as sponges, mop heads, filters, disposable clothing in 6 mil plastic bags and seal.
 3. Clean surfaces, equipment, and bag large debris. Remove plastic sheeting and tape from covered surfaces. Prior to removing the plastic sheeting, lightly mist the sheeting in order to keep dust down and fold inward to form tight bundles to bag for disposal. Place all plastic sheeting in 6-milthick plastic bags and seal. Any bags shall be labeled "Danger, Lead Dust."
 4. Bag and seal vacuum bags and filters in 6-mil thick plastic bags.
 5. Place all contaminated clothing or work area clothing used during lead-related work, in 6-mil thick plastic bags for disposal prior to leaving the work area.
 6. Contain and properly dispose of all liquid waste, including lead dust-contaminated wastewater.
 7. HEPA vacuum the exterior of all liquid waste containers, prior to removing the waste containers from the work area, and wet wipe the containers to ensure that there is no residual contamination. Containers shall then be moved out of the work area into the designated storage area.

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8. Ensure that all waste is transported in covered vehicles to a landfill, or lined landfill, if available, in accordance with applicable DOT and EPA Regulations.
 9. Submit to the District and/or Consultant for approval, the waste transfer procedure, and route, and shall comply with all EPA and DOT regulations concerning hazardous and non-hazardous waste removal and transportation.
- F. Disposal of Hazardous Waste: The following procedures shall be followed for disposal of all material as hazardous waste:
1. Comply with the RCRA and with all applicable state and local regulations.
 2. Comply with all EPA regulations.
 3. Prepare for disposal as follows:
 - a. Packaged and sealed in containers approved under 49 CFR 173, 178, and 199.
 - b. Containers shall be numbered to correspond to the seal number, labeled with the type of materials, date it was filled and sealed, seal number, and weight of sealed container in addition to the information required under 49 CFR 172.
 - c. A log shall be prepared at time of filling, identifying each numbered container and the information from above. A copy of this log shall be turned over to the Consultant within three working days after the containers are filled.
 - d. Name, location, and telephone number of the disposal site used. A copy of the sites state and locally issued license, and a signed agreement that they will accept the hazardous lead waste, shall be provided to the Consultant.
 - e. Name, address, and telephone number of any waste subcontractors used. Provide copies of licenses and signed agreements to the Consultant.
 - f. Submit copies of the Hazardous Waste Manifest as required herein.
 4. Waste Transportation: All Hazardous Waste shall be transported by a certified hazardous waste transporter. Require the certified hazardous waste transporter to follow RCRA and DOT regulations.
 5. Prior to the removal of any hazardous waste, the below listed information must be received in writing by the District and Consultant for their review and approval. Once approval is received from the District and Consultant, the waste may be transported as required.
 - a. Quantity of hazardous waste.
 - b. Type of waste materials.
 - c. Method of containerizing waste or waste treatment and appropriate licensing, certification and regulatory approvals.
 - d. Proposed waste hauler and disposal route.
 - e. Proposed waste disposal site or landfill.
 6. Receipts from the waste hauler and waste disposal site or landfill must be received and approved by District and Consultant per regulation.
- G. Storage Requirements: Any item found to be hazardous, by way of testing, shall be kept in a secured area or lockable and DOT approved container that is inaccessible to all persons other than lead-related work personnel. All hazardous waste shall be

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labeled "Hazardous Waste" and a date that the Contractor began to collect waste in that container. All hazardous and non-hazardous waste shall be kept in totally and completely separate containers. Until TCLP testing proves an item to be non-hazardous, all items shall be considered hazardous and stored in a secured area or lockable container.

- H. Regulations: Comply with the RCRA and/or any other applicable federal, state, or county law, regulation and/or guidelines, whichever is most stringent.
- I. Emergency Procedures: Keep and properly maintain a suitable fire extinguisher(s) on site; have an immediate means of communication with a regulatory agency in the event of an emergency; keep a list of phone numbers of regulatory agencies on site, make sure all employees know how to deal with all types of accidents, make one person who is always on site the emergency coordinator to ensure that emergency procedures are carried out in the event an emergency arises; and keep and maintain a "right to know" manual that is in an easily accessible location and in an area that is known to all employees.

END OF SECTION 02 83 33

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APPENDIX A

WORKSITE PREPARATION

Table 8.1 – Interior Worksite Preparation Levels (not including windows)

Description	Level 1	Level 2	Level 3	Level 4
Typical Applications (Hazard Controls)	Dust removal and any abatement or interim control method disturbing no more than 2 square feet of painted surface per room.	Any interim control or abatement method disturbing between 2 and 10 square feet of painted surface per room.	Same as Level 2.	Any interim control or abatement method disturbing more than 10 square feet per room.
Time Limit Per Building	One workday.	One workday.	Five workdays.	None.
Occupant Location	Inside building, but outside work area. Occupant must have lead-safe passage to bathroom, at least one living area, and entry/egress pathways. Alternatively, occupant can leave the dwelling during the workday.	Same as Level 1.	Outside the building; but can return in evening after day's work and cleanup are completed. Occupant must have safe passage to bathroom, at least one living area, and entry/egress pathways upon return. Alternatively, occupant can leave until all work is completed.	Outside the building for duration of project; cannot return until clearance has been achieved.

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Table 8.1 – Interior Worksite Preparation Levels (not including windows)

Description	Level 1	Level 2	Level 3	Level 4
Containment and Barrier System	Single layer of plastic sheeting on floor extending 5 feet beyond the perimeter of the treated area in all directions. No plastic sheeting on doorways is required, but a low physical barrier (furniture, wood planking) to prevent inadvertent access is recommended. Children should not have access to plastic sheeting (suffocation hazard).	Two layers of plastic on entire floor. Plastic sheet with primitive airlock flap on all doorways. Doors secured from inside the work area need not be sealed. Children should not have access to plastic sheeting (suffocation hazard).	Two layers of plastic on entire floor. Plastic sheet with primitive airlock flap on all doorways to work areas. Doors secured from inside the work area need not be sealed. Overnight barrier should be locked or firmly secured. Children should not have access to plastic sheeting (suffocation hazard).	Two layers of plastic on entire floor. If entire unit is being treated, cleaned, and cleared, individual room doorways need not be sealed. If only a few rooms are being treated, seal all doorways with primitive airlock flap to avoid cleaning entire unit. Doors secured from inside the work area need not be sealed. Children should not have access to plastic sheeting (suffocation hazard).

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Table 8.1 – Interior Worksite Preparation Levels (not including windows)

Description	Level 1	Level 2	Level 3	Level 4
Warning Signs	Required at entry to room but not on building (unless exterior work is also under way).	Same as Level 1.	Posted at main and secondary entryways.	Posted at building exterior near main and secondary entryways.
Ventilation System	Building ventilation system turned off, but vents need not be sealed with plastic if they are more than 5 feet away from the surface being treated. Negative pressure zones (with negative air machines) are not required, unless large supplies of fresh air must be admitted into the work area to control exposures to other hazardous substances (for example, solvent vapors).	Turned off and all vents in room sealed with plastic. Negative pressure zones (with negative air machines) are not required, unless large supplies of fresh air must be admitted into the work area to control exposure to other hazardous substances (for example, solvent vapors.)	Same as Level 2.	Same as Level 2.
Furniture	Left in place uncovered if furniture is more than 5 feet from working surface. If within 5 feet, furniture should be sealed with a single layer of plastic or moved for paint treatment. No covering is required for dust removal.	Removed from work area. Large items that cannot be moved can be sealed with a single layer of plastic sheeting and left in work area.	Same as Level 2.	Same as Level 2

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Table 8.1 – Interior Worksite Preparation Levels (not including windows)

Description	Level 1	Level 2	Level 3	Level 4
Cleanup (See Section 3.4 for further details)	HEPA vacuum, wet wash and HEPA vacuum all surfaces and floors extending 5 feet in all directions from the treated surface. For dust removal work alone, a HEPA vacuum and wet wash cycle is adequate (i.e. no second pass with a HEPA vacuum). Also wet wash and HEPA vacuum floor in adjacent area(s) used as pathways to work area. Do not store debris inside building overnight; transfer to a locked secure area at the end of each day.	HEPA vacuum, wet wash and HEPA vacuum <i>all</i> surfaces in room. In addition, wet wash and HEPA vacuum floor in adjacent area(s) used as pathway to work area. Do not store debris inside building overnight; use a secure locked area.	Remove top layer or plastic from floor and discard. Keep bottom layer of plastic on floor for use on the next day. HEPA vacuum, wet wash and HEPA vacuum <i>all</i> surfaces in room. In addition, wet wash and HEPA vacuum floor in adjacent area(s) used as pathway to work area. Do not store debris inside building overnight; use a secure locked area.	Full HEPA vacuum, wet wash and HEPA vacuum cycle
Clearance Inspection/Dust Sampling	Visual clearance only.	If lead-based paint or presumed lead-based paint clearance inspection with single surface dust sampling	If lead-based paint or presumed lead-based paint clearance inspection with single surface dust sampling	If lead-based paint or presumed lead-based paint clearance inspection with single surface dust sampling

Note: Floor sanding and abrasive blasting on lead-based paint or presumed lead-based paint are not included in Table 8.1. Worksite preparation requirements are more stringent and area preparation must be approved by Consultant or District prior to beginning work.

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SECTION 02 84 33

REMOVAL AND DISPOSAL OF UNIVERSAL WASTE AND PCB

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Hazardous Building Materials Survey Reports, prepared by the District's Consultant, are available in the bid documents.

1.2 REFERENCE DOCUMENTS

- A. The current issue of the following documents are incorporated herein and shall govern the conduct of the Work. Where conflict among requirements or with this specification exists, the more stringent requirements shall apply.
- B. Code of Federal Regulations (CFR):
 - 1. 29 CFR 1910.134, Respiratory Protection.
 - 2. 40 CFR 273, Standards for Universal Waste Management.
 - 3. 49 CFR Parts 101, 106, 107, 171 to 180, The Transportation Safety Act, Hazardous Material Transportation Act.
- C. California Code of Regulations (CCR):
 - 1. Title 8, Division 1, Chapter 4, Construction Safety Orders.
 - 2. Title 8, Section 5144 Respiratory Protective Equipment.
 - 3. Title 22, Division 4.5, Hazardous Waste Management.
- D. State and Local Regulations: California Health and Safety Code, Division 20.

1.3 SUMMARY

- A. Section includes the abatement of potential hazards relating to materials falling under the RCRA Universal Waste Rule (UWR), materials potentially containing polychlorinated biphenyls (PCB), and UWR/PCB contaminated materials.
- B. Perform the work and provide service as needed to accomplish removal, containment, transport, and disposal of UWR/PCB containing/contaminated materials. Furnish all labor, materials, equipment, services, insurance (specifically covering the handling of UWR/PCB waste), decontamination facilities, waste characterization testing services, and disposal of all UWR/PCB containing/contaminated materials including, but not limited to:

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1. Removal and disposal/recycling of potentially mercury-containing fluorescent light tubes from light fixtures and other non-incandescent light bulbs.
2. Removal and disposal/recycling of potentially mercury-containing switches from thermostats.
3. Removal and disposal/recycling of potentially tritium-containing exit signs.
4. Removal and disposal/recycling of potentially Freon™-containing air conditioning units and refrigeration systems.
5. Removal and disposal/recycling of lead/acid batteries.
6. Removal of all potentially PCB-containing ballasts from light fixtures. All light fixtures shall be visually inspected prior to removal or retrofitting to determine if they contain PCBs. Those ballasts marked as “No PCBs” or “PCB Free” shall be considered as such. Those ballasts that are unmarked shall be considered PCB containing and properly handled.
7. Proper cleanup and disposal of light fixtures if ballast oils have breached its container.
8. Removal and disposal/recycling of any building material falling under the Universal Waste Rule as indicated on the Drawings or as directed in writing by the District.
9. Placement of all contaminated items generated as a result of work activities and clean up in approved storage containers.
10. Proper packaging of all PCB or PCB-contaminated items including the use of an approved absorbent to contain any leaks that may occur during transportation to the disposal facility.
11. Marking and labeling of all UWR/PCB materials and items for storage and disposal/recycling purposes.
12. Transport of all UWR/PCB items, and containers to a disposal facility and/or to an approved off-site processing site for recycling.
13. Waste characterization of all building materials removed from the site.
14. Recordkeeping in accordance with all applicable local, state, and federal regulations.
15. Preparing manifests, bills of lading, and all other required documentation for transportation, processing, and disposal of UWR/PCB for signature by the District.

C. Related Requirements:

1. Section 02 82 33 “Removal and Disposal of Asbestos Containing Materials” for asbestos abatement.
2. Section 02 83 33 “Removal and Disposal of Materials Containing Lead” for lead abatement.

1.4 ALLOWANCES

- A. Allowances for removal and disposal of UWR/PCB items are specified in Section 01 21 00 “Allowances.”

1.5 ACTION SUBMITTALS

- A. Product Data: For absorbent, solvent, and/or cleaning agent.

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1.6 INFORMATION SUBMITTALS

- A. Site Specific Work Plan describing procedures, products and materials for the containment of the regulated work area (where appropriate), removal of UWR and PCB-containing/contaminated liquids and solids, decontamination of equipment and disposal of equipment that contained UWR and PCBs, waste storage containers, spill clean-up, personnel decontamination, emergency contact numbers and procedures, first aid treatment, and temporary on-site storage procedures. This work plan shall include the names and daytime phone numbers of all key personnel, the location of all required on-site documentation and emergency equipment, and delineation of the work area. A generalized, "boiler-plate" type of plan will not be accepted. The Plan shall include minimally the following:
1. Overall Statement: Overall statement of procedures proposed for use in complying with the regulations and requirements included in this specification.
 2. Quality Assurance Program: A description of the program, to include at a minimum:
 - a. Control Measures: Measures to assure control of unsafe or unhealthy conditions; prevent spills or leaks, damage to the building or its furnishings; avoid buildup of UWR/PCB containing/contaminated materials; and ensure reliability of sampling and analysis.
 - b. Cleanup: Waste cleanup procedures and disposal plan, including on-site waste packaging method (e.g., scooping and bagging, vacuum hose transfer with small (or large) bagging, etc.); name and description of any on-site waste transfer equipment, including evidence of training and experience in its use, and description of decontamination unit around any such equipment to be located outside the work area; name and location of disposal site(s), each having an EPA Identification Number as a hazardous waste disposal site; and copies of applicable Identification Numbers, certificates and registrations for hazardous waste transporter(s), transferer(s), treater(s) and disposal site(s), and converter(s).
 - c. Pollution Control: Detailed description of the methods to be employed to control pollution and minimize generation of hazardous and non-hazardous waste.
 - d. Protection of occupants and visitors. Methods to be used to assure the safety and health of building occupants and visitors at the site from the effects of the work.
 3. Emergency Preparedness:
 - a. Emergency Procedures: Procedures to be followed in the event of critical circumstances including but not limited to fire, electric shock, life-threatening -bodily injury inside or outside of the containment area, a major breach in the containment barrier, the detection of airborne contamination or debris outside of the containment area, splitting or spilling of waste containers en route to a waste vehicle.
 - b. Emergency Contact Information: Contact information, including a list of names and telephone numbers (with area codes) of the Contractor's contact persons, the District, or other contact persons as designated by the District, the fire department, police department, general emergency number

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- (if used), and local hospital or similar emergency care unit available at all times work is to be performed. A copy of this emergency contact information is to be kept at the job site, available for inspection by the District and/or an Authorized Visitor, and updated as required.
- c. Contingency Plan: A plan that addresses procedures to be followed should work area containment be breached, a release of hazardous materials occur, visual inspection or air monitoring clearance criteria for a work area not be met in a timely manner, etc.
- 4. Materials:
 - a. List of materials to be used, including such items as protective clothing, respiratory protection, absorbents, solvents, waste storage containers, item containers, and all appurtenances.
 - 5. Safety Data Sheets (SDS):
 - a. Safety Data Sheets for any materials to be brought to the site for which SDS's are provided by the manufacturers or distributors. For items for which an SDS is not available, submit the name of the manufacturer, brand name, and catalog/part number for each item.
 - 6. Performance: A statement describing the proposed organization of the work, including:
 - a. Sequencing of work.
 - b. Shifts: Length and projected times of day of work shifts.
 - c. Interfacing: Interface of trades involved in the work.
 - d. Special procedures: A detailed description of any proposed methods of special abatement procedures, where used. Submit manufacturer's technical specifications and product description literature for the methods and equipment used.
 - 7. Protective Equipment: A Protective Equipment (PPE) Program including a Respiratory Protection Program, to include:
 - a. Equipment: A list of all equipment, tools, and materials available for use on this project.
 - b. Medical Surveillance: A description of the Contractor's medical surveillance program for persons under the supervisory control of the Contractor who may be occupationally exposed to hazardous substances under this contract. Minimal qualifications shall be as specified in 29 CFR 1910.134 and 8 CCR 5144.
- B. Qualification Data: For abatement contractor and waste hauler.
 - C. Copy of waste hauler license.
 - D. Contractor's USEPA identification number.

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1.7 CLOSEOUT SUBMITTALS

- A. Submit immediately upon completion of abatement work:
 - 1. Compliance certificate verifying that all UWR/PCB wastes have been properly treated and disposed of.
 - 2. Copies of manifests, permits, or other documents currently in effect relating to the specific UWR/PCB wastes transported, treated, and disposed of, except as otherwise stated in this Section.
 - 3. A copy of all final manifests. (As the waste generator, the District will sign the complete waste manifests, upon approval, for all UWR/PCB items/wastes generated during the course of this project. These manifests will accompany the waste loads to disposal and be properly completed by the hauler and disposal agent, as required under federal and state hazardous waste management statutes. Return the final manifest to the District by registered mail within the designated time period under federal statutes.)
 - 4. Certifications of incineration (for fluids) and/or recycling.
 - 5. Records and storage data to include:
 - a. Name of the firm performing the work of this section and technician in charge.
 - b. Number and size of drums and other storage containers.
 - c. Weight in kilograms or gallons of content for each drum or other storage container.
 - d. Date placed in storage.

1.8 PERFORMANCE REQUIREMENTS

- A. Project Supervision:
 - 1. Provide English-speaking on-site Supervisor who is experienced, trained, knowledgeable, and qualified in the techniques of UWR/PCB abatement, handling of UWR/PCB waste and UWR/PCB-contaminated materials, and cleaning of UWR/PCB-contaminated areas.
- B. Protection of Persons and Property:
 - 1. General Safety Requirements:
 - a. Initiate, maintain, and supervise all safety precautions and programs in connection with the Work.
 - b. Take all precautions and measures required to protect employees, inspection personnel, the District, the District's Representative, and the public from exposure to UWR/PCB solids, liquids, and vapors.
 - c. All personnel authorized for entry into the work areas shall be instructed in the proper procedures for working with or around electrical hazards and UWR/PCB containing/contaminated materials.
 - d. All electrical equipment, upon which UWR/PCB-related activities are to be performed, shall be de-energized, locked out/tagged out, and permanently disconnected from any power source prior to the commencement of work.

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- e. Consumption of food or tobacco products shall not be permitted in any of the work areas where UWR/PCB materials, volatile solvents, or other hazardous materials are present. In addition, no open flames shall be permitted in these areas. Signage to this effect shall be posted at each entry and exit from the work areas.

C. Work Area Protection and Demarcation:

- 1. Prior to commencing any UWR/PCB-related work activities, provide barricades, roping, and warning signs to clearly identify and effectively guard against unauthorized entry into the work area.
 - a. At a minimum, barricades shall consist of yellow sawhorses, set end-to-end.
 - b. Ropes are to be yellow in color and supported by the use of weighted bottom pipe type supports.
 - c. Warning signs shall be suspended from the rope and placed at intervals of approximately 10 feet. Warning signs for the work area shall be approximately 18 inches square, with a yellow background and black lettering. Signs shall read "DANGER - KEEP OUT - TOXIC CHEMICAL WORK AREA."
 - d. Place barricades in order to maintain a minimum of 25 feet from all perimeters of the work being conducted to the barricades, where feasible.
- 2. Confine all equipment, such as tools and containers, to the work area until the work is complete, containers are sealed, and equipment has been properly decontaminated and safely stored for transport.

D. Personal Protective Clothing, Equipment, and Personal Protective Procedures:

- 1. At all times when UWR/PCB fluids or mixtures in any volume are not sealed in drums, containers, or electrical equipment, workers shall wear the following:
 - a. Gloves impermeable to both UWR/PCB and the clean-up agent in use.
 - b. Disposable coverall, impermeable to both UWR/PCB and the clean-up agent in use.
 - c. Appropriate eye protection to ensure that eyes are protected from liquid splatter or exposure to concentrated vapors or fumes.
 - d. If appropriate, respiratory protection appropriate for the concentration of the hazardous material(s) present and atmosphere present. If utilized, supplied air must meet the requirements for Grade D air, at a minimum.
- 2. Provide protective clothing, eye protection, and breathing apparatus, as required for authorized inspection personnel, the District, and other authorized personnel upon request.
- 3. The UWR/PCB work area shall not be left unattended from the start of work activities until all UWR/PCB and incidentals have been sealed in approved containers. If immediate transportation to a UWR/PCB storage facility or disposal facility is not feasible, the work area must be secured in a manner approved by the District.

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4. During work procedures and at all, times when UWR/PCB-containing/contaminated fluids in any volume are not sealed in drums, containers, or electrical equipment, all personnel entering the work area must don protective clothing and equipment. Upon exiting the work area, all disposable protective clothing shall be stored in appropriate waste storage drums and sealed, for subsequent transportation to the on-site storage facility or disposal facility.
5. Workers with cuts or scratches shall cover these wounds sufficiently to prevent accidental contact with hazardous materials within the regulated work area, prior to entering the regulated work area. Similarly, workers who incur accidental minor cuts or scratches in the course of work activities will immediately leave the work area, cleanse the wound with medical grade soap, and seal the wound before returning to the work area.

1.9 QUALITY ASSURANCE

- A. Single Party Responsibility: The contractor performing the work shall be responsible for, and shall accomplish all, UWR/PCB-related work activities.
- B. Abatement Contractor Qualifications: The Contractor shall be fully experienced in the handling, storage, and transport of UWR, UWR-contaminated articles, and PCB-related waste, and shall warrant to the District that he/she is familiar with the codes and requirements applicable to UWR/PCB work.
- C. Waste Hauler Qualifications: Currently licensed by the State of California Department of Public Health for the transporting, handling, and hauling of extremely hazardous wastes, including UWR/PCB-related wastes.

PART 2 - PRODUCTS

2.1 GENERAL

- A. No materials, equipment, or tools belonging to the District shall be used by the Contractor, except in case of an emergency and upon explicit authorization by the District.
- B. Deliver all materials and equipment to the site in the original containers bearing the name of the manufacturer and details for proper storage and usage.
- C. All materials or equipment delivered to the site shall be unloaded, temporarily stored, and transferred to the work area in a manner, which shall not interfere with operations of the District.
- D. The District and/or Consultant must approve unloading and temporary storage sites and transfer routes in advance.
- E. Damaged or deteriorated materials may not be used and must be promptly removed from the project site.

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- F. All materials, tools, and equipment must comply at a minimum with this specification and all applicable federal, state, and local regulations.

2.2 MATERIALS

A. Storage Containers:

1. All UWR/PCB fluids and UWR/PCB-contaminated fluids, including flush and cleaning solvents and mixtures, shall be stored in sealed Department of Transportation (DOT) 17E closed top drums or other waste container approved for the storage of these materials.
2. For the purposes of this Section, PCB-contaminated fluids are defined as containing more than 5 but less than 500 parts per million (ppm) PCBs. PCB fluids are defined as containing PCBs in concentration of 500 ppm or greater. Flush solvents shall be assumed to contain more than 500 ppm PCBs.
3. All UWR/PCB soil wastes and items used in the course of work, such as rags, absorbents, and protective clothing, shall be stored in sealed DOT 17C open type drums or other waste container approved for the storage of these materials.

B. Solvents, Cleaning Agents, and Absorbents:

1. Select an appropriate solvent in which UWR are shown to be soluble. Select an appropriate solvent, in which PCBs are shown to be at least 5% soluble, by weight. Solvents specified by the USEPA include: kerosene, diesel fuel, terpene hydrocarbons, and a mixture of terpene hydrocarbons and terpene alcohols. Care shall be taken to limit the complexity of the waste stream. In all cases where solvents are used in the course of work, provide proper ventilation to ensure that the resulting fumes/vapors are not dispersed to occupied building areas either as a result of natural convection or via air intakes for building ventilation systems.
2. The manufacturer's recommendations for applications and requirements for California Occupational Safety and Health Administration (Cal OSHA) shall be strictly observed.
3. Select an appropriate cleaning agent in which UWR are shown to be soluble. Select an appropriate cleaning agent, in which PCBs are shown to be at least 5% soluble, by weight. Care shall be taken to limit the complexity of the waste stream. Numerous non-toxic cleaning agents, shown to meet or exceed the solubility standard, are commercially available. In all cases where cleaning agents are used in the course of work, provide proper ventilation to ensure that the resulting fumes/vapors are not dispersed to occupied building areas either as a result of natural convection or via air intakes for building ventilation systems. The manufacturer's recommendations for applications and requirements for Cal-OSHA shall be strictly observed.
4. Select an appropriate absorbent.

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PART 3 - EXECUTION

3.1 SPILL CLEAN-UP, CONTAINERIZATION, AND MARKING

A. Clean-up of Work Area, UWR/PCB, and Spills:

1. After the last UWR/PCB-containing light ballast has been removed and all fluids and solids have been cleaned from the fixture, all tools and equipment used in the work shall be decontaminated and properly stored for future use.
2. All tools that have come into contact with UWR/PCBs at any concentration will be double washed/rinsed with an appropriate cleaning agent, wiped cleaned, and properly stored.
3. At a minimum, all exterior surfaces of equipment that may have come into contact with UWR/PCBs or contaminated solids or fluids either during the course of work activities or due to past leaks will be double washed/rinsed with an appropriate cleaning agent and wiped clean.
4. All metal surfaces and surfaces with impermeable liners which have come into contact with UWR/PCBs or UWR/PCB mixtures in the course of work or as a result of past leaks shall be thoroughly cleaned using combinations of absorbents and solvents or cleaning agents. Minimum cleaning requirements for these surfaces will include the removal of bulk material and two rinses with the cleaning agent for the affected surfaces. The work area shall be effectively ventilated during operations such that vapors used during decontamination and cleaning are not vented to occupied building areas. Upon completion of UWR/PCB-related activities, if fumes or vapors are still present in levels that could impede breathing or be considered toxic under state and/or National Institute of Occupational Safety and Health (NIOSH) standards, the Contractor shall provide additional ventilation to accelerate drying. If needed, auxiliary breathing apparatus may only be used by personnel trained in the use of this equipment and experienced in conducting UWR/PCB-related work while wearing such apparatus, which can impede safe work practices.
5. The USEPA, Region IX, regards soil, asphalt, wood, cement, and concrete as porous materials that absorb UWR/PCBs. Where practical, these materials must be removed when they are within the spill or contamination boundary.
6. Completion of decontamination activities shall be inspected by the Contractor's Environmental Monitor, by collecting an appropriate number and type of samples for the specific UWR and/or PCBs and surfaces. The Contractor is responsible for all cost associated with spill clean-up and oversight.

B. Containerization and Marking:

1. All liquids generated as a result of work activities and clean-up operation shall be placed in appropriate work containers and the containers sealed.
2. All solids, such as absorbents, rags, disposable clothing, soil, and other incidentals, shall be placed in appropriate work containers and the containers sealed.
3. All drums and items containers utilized shall be permanently marked as to the specific contents and dated. In addition, each drum and container shall be marked with the standard Environmental Protection Agency, UWR or PCB label, as appropriate (40 CFR 273) and Hazardous Waste label (40 CFR 262).

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3.2 HANDLING AND TRANSPORTATION TO STORAGE FACILITIES

- A. All closed and open top drums must be permanently sealed and marked prior to loading on the transport vehicle. Filled drums shall be loaded onto the transport vehicle by the following methods:
 - 1. By a hoist or lift truck capable of utilizing a two-point drum lifter;
 - 2. By a hoist or lift truck provided with a band-around type drum lifter; or
 - 3. By a lift truck, lifting the drums from underneath by a pallet attached to the drum by a banding arrangement.
 - 4. HEPA vacuum all surfaces in the work area, including walls, ceilings, windows, and floors.
- B. The drums shall not be lifted by:
 - 1. Any rope, chain, or cloth slings tied about the drum;
 - 2. Placement of drums on bare fork lift trucks;
 - 3. Forcing drums between the forks of a lift truck; or
 - 4. Any commercial drum lifter exerting force on the sides of the drums.
- C. All drums and containers shall be secured to the transport vehicle to prevent movement while in transit.
- D. Transportation:
 - 1. All UWR/PCB items and drums containing liquids, solids, and incidentals shall be transported to an off-site UWR/PCB-approved and permitted recycling/disposal facility.
 - 2. The Contractor performing this section of the work shall be licensed for the transport and hauling of extremely hazardous waste. Provide a route plan that clearly identifies the routes proposed while transporting UWR/PCB items from the various work sites to off-site facilities.
 - 3. A minimum of two operators shall be in attendance at all times while UWR/PCB items are being transported, loaded, and unloaded.
 - 4. A motor carrier driver or other person must comply with the Federal Motor Carrier Safety Rules when he/she is transporting UWR, PCB, or other hazardous materials by a motor vehicle, which must be placarded or marked in accordance with DOT 177.
 - 5. Every motor vehicle transporting or storing items containing UWR, PCB, or other hazardous materials must be operated and parked in compliance with the law, ordinances, and regulations of the state jurisdiction of which it is being operated in, unless they are at variance with specific regulations of the DOT which are applicable to the operation of that vehicle and impose a more stringent obligation or restraint.
 - 6. All containers must be properly secured in place to ensure that no equipment items or containers can come loose or are unsafely placed into the transport vehicle. This may include chaining, roping, strapping, or winching. The driver of the vehicle must stop the vehicle in a safe location at least once during each two hours or 100 miles traveled, whichever is less, and inspect the contents of the shipment. At the time of inspection, if any form of binding is found to be loose,

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the driver shall immediately take action to remedy the situation for safe transportation.

7. Any equipment, drums, or other items carried in an open, flatbed, or stake type truck shall be covered with a tarp to protect it from the elements.
8. A motor carrier that transports "Hazardous Waste" must furnish the driver of each motor vehicle the following documents:
 - a. A copy of this Section.
 - b. A document containing instruction on procedures to be followed in the case of an accident or delay. The documents must include the names and telephone numbers of the people to be contacted, the types of hazardous wastes being transported, and the precautions taken in emergencies, such as fires, accidents, or leakages.
 - c. Manifest and permit documents described in these specifications and required for waste transport.
9. A motor vehicle being operated must be marked if that vehicle is:
 - a. Transporting UWR, PCBs, or hazardous materials of a kind that require the vehicle be marked or placarded in accordance with DOT 177;
 - b. Commercial vehicles must display the name or trade name of the carrier operating the vehicle. These vehicles must display markings that designate the carrier as being a commercial vehicle "for hire."

3.3 UWR/PCB DISPOSAL

- A. Treat and dispose of all UWR/PCB wastes collected and generated during the execution of the Work.
- B. Except as may be otherwise specifically directed in writing by the District Construction Manager, treat and dispose of all waste UWR/PCB materials as governed by 40 CFR 273, California State Regulations, local regulations, and subsequent amendments).
 1. All UWR fluids, flushing fluids, and other UWR contaminants shall be disposed of by incineration or recycling at a facility approved for such use by the USEPA, and all other controlling regulatory agencies and bodies of the state, county, and municipality of that facility's location. If the Contractor so elects, solid UWR wastes may also be incinerated, as suitable and allowed for this type of disposal.
 2. All PCB fluids, flushing fluids, waste oils, and other fluid contaminants whose total PCB content is equal to or greater than 5 ppm (and are therefore restricted to this mode of thermal destruction) shall be disposed of by incineration or recycling at a facility approved for such use by the USEPA, and all other controlling regulatory agencies and bodies of the state, county, and municipality of that facility's location. If the Contractor so elects, solid PCB wastes may also be incinerated, as suitable and allowed for this type of disposal.
- C. Dispose of all UWR/PCB wastes generated as part of these operations in a legal manner.

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- D. Do not sell, transfer, or recover any material from the wastes received from the Project without their prior written consent from the District.

3.4 UNLOADING AND PLACING IN STORAGE

- A. Transport vehicles shall be unloaded using the same equipment and methods as for loading (Section 3.2.A and 3.2.B).
- B. Materials shall only be placed in temporary storage if approved in writing by the District Construction Manager.
 - 1. Drums and other storage containers shall be placed in a storage facility in locations designated by the District.
 - 2. Drums shall be placed on pallets of sufficient strength to withstand double stacking. Drums shall not be stacked at the time of storage, unless space is limited as determined by the District. Where stacking of drums is necessary, pallets shall be placed between the drum layers.
 - 3. Ample clearance space will be provided around other storage containers in order to facilitate inspection.
- C. Immediately following the unloading of UWR/PCB transport vehicle, inspect the cargo area to check for any fluid leaks. If any fluids are found, the source of the leaking drum or other storage container shall be identified and sealed.
- D. Thoroughly wash/rinse clean with absorbents, solvents, and liquid cleaners the contaminated cargo area. Cleaning agent, solvents, and solids shall be placed in proper drums for disposal.

END OF SECTION 02 84 33

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SPECIFICATIONS

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mix design, placement procedures, and finishes.
- B. Related Sections include the following:
 - 1. Division 2 Section "Cement Concrete Pavement" for concrete pavement and walks.
 - 2. Division 3 Section "Concrete Floors" for concrete floor slabs on grade and suspended slabs.
 - 3. Division 3 Section "Plant-Cast Architectural Concrete" for precast concrete.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

1.4 SUBMITTALS

- A. Product Data: For each type of manufactured material and product indicated.
- B. Design Mixes: For each concrete mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Steel Reinforcement Shop Drawings: Details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement." Include material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports of concrete reinforcement. Include special reinforcement required for openings through concrete structures.
- D. Welding Certificates: Copies of certificates for welding procedures and personnel.

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- E. Material Certificates: Signed by manufacturers certifying that each of the following items complies with ASTM requirements:
 - 1. Cementitious materials and aggregates.
 - 2. Steel reinforcement and reinforcement accessories.
 - 3. Fiber reinforcement.
 - 4. Admixtures.
- F. Concrete delivery tickets.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.
- B. Regulatory Requirements: Concrete construction shall conform to the California Code of Regulations (CCR) Title 24 Part 2, California Building Code, Chapters 16, 16A, 17, 17A, 18, 18A, 19 and 19A, and the requirements specified herein.
- C. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."
- D. ACI Publications: Comply with the following, unless more stringent provisions are indicated:
 - 1. ACI 301, "Specification for Structural Concrete."
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - 1. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. High-density overlay, Class 1, or better.

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- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
- D. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, unless otherwise shown.
- E. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- F. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of the exposed concrete surface.
 - 2. Furnish ties that, when removed, will leave holes not larger than 1 inch in diameter in concrete surface.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed; ASTM A 706, Grade 60, deformed where bars are to be welded or as specified on drawings.
- B. Plain-Steel Wire: ASTM A 82, as drawn.
- C. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

2.3 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected or CRSI Class 2 stainless-steel bar supports.

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2.4 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type II.
 - 1. Fly Ash: ASTM C 618, Class N or F.
- B. Normal-Weight Aggregate: ASTM C 33, uniformly graded.
 - 1. Fine Aggregate: Minimum sand equivalent (ASTM D2410) is 80.
 - 2. Coarse Aggregate: Minimum cleanness value (Caltrans Test cv 227) is 80.
 - 3. Do not use aggregates containing spalling-causing deleterious substances.
- C. Lightweight Aggregate: ASTM C 330.
 - 1. Use expanded shale only.
- D. Water: Potable and complying with ASTM C 94.

2.5 ADMIXTURES

- A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material and to be compatible with other admixtures and cementitious materials. Do not use admixtures containing calcium chloride.
- B. Air-Entraining Admixture: ASTM C 260.
- C. Water-Reducing Admixture: ASTM C 494, Type A.
- D. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
- E. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.

2.6 WATERSTOPS

- A. Flexible PVC Waterstops: CE CRD-C 572, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.
 - 1. Profile: Flat, dumbbell without center bulb.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. PVC Waterstops:
 - a. Greenstreak.
 - b. Meadows: W. R. Meadows, Inc.
 - c. Vinylex Corporation.

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- C. Self-Expanding Strip Waterstops: Manufactured rectangular or trapezoidal strip, sodium bentonite or other hydrophylic material for adhesive bonding to concrete.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Volclay Waterstop-RX; Colloid Environmental Technologies Co.
 - b. Conseal CS-231; Concrete Sealants Inc.
 - c. Hydrotite; Greenstreak.
 - d. Mirastop; Mirafi Moisture Protection, Div. of Royal Ten Cate (USA), Inc.

2.7 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.

2.8 RELATED MATERIALS

- A. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- B. Epoxy-Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, and as follows:
 - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- C. Reglets: Fabricate reglets of not less than 0.0217-inch- thick galvanized steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- D. Dovetail Anchor Slots: Hot-dip galvanized steel sheet, not less than 0.0336 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.9 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.

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2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.

2.10 CONCRETE MIXES

- A. Mix designs shall be subject to approval by the Project Testing Laboratory of record. Contractor shall employ a testing laboratory to design mixes under the supervision of a California Registered Civil Engineer, who shall determine mix proportions to fulfill the specified requirements for strength, aggregate size, and workability. Mix designs shall bear the signature and seal of a California Registered Civil Engineer.
 1. Design mixes in accordance with ACI 318 and CCR Title 24 Part 2, Sec. 1905A, Method B.
 2. Cost for the mix designs will be paid for by the Contractor.
- B. Prepare design mixes for each type and strength of concrete determined by laboratory trial mix method, as follows:
 1. Proportion normal-weight concrete according to ACI 211.1 and ACI 301.
 2. Proportion lightweight structural concrete according to ACI 211.2 and ACI 301.
- C. Normal Weight Concrete: Proportion normal-weight concrete mix as follows:
 1. Compressive Strength (28 Days): As indicated on drawings.
 2. Maximum Slump: 4 inches.
 3. Water-Cementitious Materials Ratio: 0.50 or less.
 4. Minimum Cementitious Materials Content: 517 lb/cu. Yd.
 5. Maximum Slump for Concrete Containing High-Range Water-Reducing Admixture: 8 inches after admixture is added to concrete with 2- to 4-inch slump.
- D. Maximum Size Aggregate: In no case shall the maximum aggregate size used exceed one third of the depth of slabs, nor three fourths of the minimum clear spacing between individual reinforcing bars or bundles of bars.
- E. Lightweight Concrete: Proportion lightweight concrete mix as follows:
 1. Compressive Strength (28 Days): As indicated on drawings.
 2. Calculated Equilibrium Unit Weight: 110 lb/cu. ft. plus or minus 3 lb/cu. ft. as determined by ASTM C 567.
 3. Maximum Slump: 5 inches.
- F. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 1. Fly Ash: 15 percent.
 2. Combined Fly Ash and Pozzolan: 15 percent.

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- G. Maximum Size Aggregate: Maximum aggregate size shall not exceed 1-1/2 inch, nor one third of the depth of slabs, nor three fourths of the minimum clear spacing between individual reinforcing bars or bundles of bars.
- H. Maximum Water-Cementitious Materials Ratio: 0.50 for exposed exterior concrete.
- I. Air Content: Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows within a tolerance of plus 1 or minus 1.5 percent, unless otherwise indicated:
 - 1. Air Content: 3.0 percent for exposed exterior concrete.
- J. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- K. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.
 - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use water-reducing admixture in pumped concrete, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

2.11 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.12 CONCRETE MIXING

- A. Concrete shall be provided by certified automatic concrete batch plants only.
- B. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94, and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- C. Waiver of Batch Plant Inspection: Batch plant inspection may be pursued by the IOR. Concrete plant shall comply with the requirements of ASTM C94, Sections 8 and 9, and be certified to comply with the requirements of the National Ready Mixed Concrete Association. Plant shall be equipped with an automatic batcher in which the total batching cycle, except for the measuring and introduction of an admixture, is completed by activating a single starter device.

PART 3 - EXECUTION

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3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 - 1. Surfaces exposed to view: Class A, 1/8 inch.
 - 2. Surfaces not exposed to view: Class C, 1/2 inch.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.
 - 1. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

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3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor bolts, accurately located, to elevations required.
 - 2. Install reglets to receive top edge of foundation sheet waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 - 3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork, for sides of beams, walls, columns, and similar parts of the Work, that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete provided concrete is hard enough to not be damaged by form-removal operations and provided curing and protection operations are maintained.
- B. Leave formwork, for beam soffits, joists, slabs, and other structural elements, that supports weight of concrete in place for 14 days or until concrete has achieved the following:
 - 1. At least 75 percent of 28-day design compressive strength.
 - 2. Determine compressive strength of in-place concrete by testing representative field- or laboratory-cured test specimens according to ACI 301.
 - 3. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- C. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- D. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 SHORES AND RESHORES

- A. Comply with ACI 318, ACI 301, and recommendations in ACI 347R for design, installation, and removal of shoring and reshoring.
- B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.

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- C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.5 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 - 1. Shop- or field-weld reinforcement according to AWS D1.4 only where indicated or specifically approved.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire fabric in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.6 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated.
 - 2. Form from preformed galvanized steel, plastic keyway-section forms, or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
 - 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 - 6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

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3.7 WATERSTOPS

- A. Flexible Waterstops: Install in construction joints as indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of Work. Field-fabricate joints in waterstops according to manufacturer's written instructions.
- B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, bonding or mechanically fastening and firmly pressing into place. Install in longest lengths practicable.

3.8 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement, unless approved by Architect.
- C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation.
- D. Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Maximum length of wall pour shall be 60 feet. Place each layer while preceding layer is still plastic, to avoid cold joints. Do not allow concrete free-fall to exceed 10 feet.
 - 1. Consolidate placed concrete with mechanical vibrating equipment. Use equipment and procedures for consolidating concrete recommended by ACI 309R.
 - 2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the vibrator. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix constituents to segregate.
- E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.

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2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.
- F. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows, when hot-weather conditions exist:
1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.9 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched. Remove fins and other projections exceeding ACI 347R limits for class of surface specified.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch in height.
1. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, or painting.
- C. Rubbed Finish: Apply the following to smooth-formed finished concrete:
1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture

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matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.10 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.
- D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel-finish concrete surfaces.

3.11 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305R for hot-weather protection during curing.
- B. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing by one or a combination of the following methods:
- C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

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2. **Moisture-Retaining-Cover Curing:** Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3.12 CONCRETE SURFACE REPAIRS

- A. **Defective Concrete:** Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. **Patching Mortar:** Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. **Repairing Formed Surfaces:** Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar.
 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

3.13 FIELD QUALITY CONTROL

- A. **Testing Agency:** Owner will engage a qualified independent testing and inspecting agency to perform tests and submit test reports during concrete placement. Sampling and testing for quality control is specified in Division 1 Section "Quality Requirements".
- B. **Testing Services:** Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 1. **Testing Frequency:** Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mix placed each day.

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2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
 3. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
 4. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of four standard cylinder specimens for each composite sample.
 5. Compressive-Strength Tests: ASTM C 39; test one laboratory-cured specimen at 7 days and two at 28 days. Keep one specimen in reserve.
 - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at age indicated.
- C. Strength of each concrete mix will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
- D. Test results shall be reported in writing to Architect, District inspector, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-and 28-day tests.
- E. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.

END OF SECTION 03 30 00

SPECIFICATIONS

SECTION 04 22 00 CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Concrete masonry units.
 - 2. Decorative concrete masonry units.
 - 3. Pre-faced concrete masonry units.
 - 4. Mortar and grout.
 - 5. Steel reinforcing bars.
 - 6. Masonry-joint reinforcement.
 - 7. Miscellaneous masonry accessories.

1.3 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For the following:
 - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 - 2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315. Show elevations of reinforced walls.
 - 3. Control joints: per drawings
- C. Samples for Verification: For each type and color of the following:

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1. Exposed and Decorative CMUs.
2. Pre-faced CMUs.
3. Pigmented and colored-aggregate mortar. Make Samples using same sand and mortar ingredients to be used on Project.

1.6 INFORMATIONAL SUBMITTALS

- A. Material Test Reports: Signed by manufacturers certifying that each of the following items complies with requirements indicated:
 1. Each type of masonry unit required.
 2. Grout mixes complying with compressive strength requirements of ASTM C 476. Include description of type and proportions of grout ingredients.
- B. Material Certificates: For each type and size of the following:
 1. Masonry units.
 - a. Include data on material properties and material test reports substantiating compliance with requirements.
 - b. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
 2. Integral water repellant used in CMUs.
 3. Cementitious materials. Include name of manufacturer, brand name, and type.
 4. Mortar admixtures.
 5. Grout mixes. Include description of type and proportions of ingredients.
 6. Reinforcing bars.
 7. Joint reinforcement.
 8. Anchors, ties, and metal accessories.
- C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.
- D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602-13/ACI 530.1-13/ASCE 6-13.
- E. Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

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1.7 QUALITY ASSURANCE

- A. Sample Panels: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects.
 - 1. Build sample panels for each type of exposed unit masonry construction in sizes approximately 48 inches long by 48 inches high by full thickness.
 - 2. Build sample panels facing south.
 - 3. Where masonry is to match existing, build panels adjacent and parallel to existing surface.
 - 4. Protect approved sample panels from the elements with weather-resistant membrane.
 - 5. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by the District Project Manager in writing.
 - a. Where sample panels contain deviations from the Contract Documents, approval of sample panels does not constitute approval of deviations unless District Project Manager specifically approves such deviations in writing.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
 - 1. Protect Type I concrete masonry units from moisture absorption so that, at the time of installation, the moisture content is not more than the maximum allowed at the time of delivery.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 FIELD CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.

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- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6. Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.
 - 1. When ambient temperature exceeds 100 deg. F, or 90 deg. F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48-inches ahead of masonry. Set masonry units within one minute of spreading mortar.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6 except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work and will be within 20 feet vertically and horizontally of a walking surface.

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- C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
 - 1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.3 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
 - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 - 2. Provide units for outside corners unless otherwise indicated.
- B. CMUs: ASTM C 90.
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength as indicated.
 - 2. Density Classification: Normal weight.
 - 3. Size (Width): Manufactured to dimensions 3/8 inch less-than-nominal dimensions.
 - 4. Exposed Faces: Finishes to vary in combination per block module as noted on plans.
 - a. Pattern and Texture:
 - 1) C-4: Burnished
 - 2) C-5: Precision
 - 3) C-6: Precision, Painted
 - 5. Colors: Match Architect's samples as selected by Architect from manufacturer's full range and custom range.
- C. Decorative CMUs: ASTM C 90.
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2150 psi.
 - 2. Density Classification: Normal weight.
 - 3. Size (Width): Manufactured to dimensions specified in "CMUs" Paragraph.
 - 4. Pattern and Texture:
 - a. C-7: Breeze Block or Turned Block, Precision.
 - 1) Trim: Insect Frame per plans
 - 5. Colors: Match Architect's samples as selected by Architect from manufacturer's full range and custom range.
 - 6. Special Aggregate: Provide units made with aggregate matching aggregate in Architect's sample.

SPECIFICATIONS

2.4 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150/C 150M, Type I or II. Provide natural color or white cement as required to produce mortar color indicated.
 - 1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C 114.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Per drawings.
- D. Aggregate for Grout: ASTM C 404.
- E. Water: Potable.

2.5 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: As Indicated on drawings
- B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

2.6 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.
- B. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

2.7 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
 - 2. Use portland cement-lime mortar unless otherwise indicated.
- B. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.
 - 1. For masonry below grade or in contact with earth, use Type S.
 - 2. For reinforced masonry, use Type S.

SPECIFICATIONS

3. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type N.
4. For interior nonload-bearing partitions, Type O may be used instead of Type N UNO
5. Provide minimum 28 day compressive strength as indicated on drawings.
6. Limit cementitious materials in mortar to Portland cement and lime.
7. Mortar unused for 1-1/2 hours from initial mix time shall not be used.

C. Pigmented Mortar: Use colored cement product.

1. Pigments shall not exceed 10 percent of Portland cement by weight.
2. If pigments containing carbon black are used, carbon black must be limited to 2 percent of Portland cement by weight.
3. Application: Use pigmented mortar for exposed mortar joints with the following units:
 - a. Decorative CMUs.
 - b. Pre-faced CMUs.
 - c. Where indicated.

D. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type indicated or, if not otherwise indicated, of type coarse that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
2. Proportion grout in accordance with ASTM C 476.
3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

2.8 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Diedrich Technologies, Inc.
 - b. EaCo Chem, Inc.
 - c. PROSOCO, Inc.
 - d. Or Equal.
- B. Job-Mixed Detergent Solution: Solution of 1/2-cup dry measure tetrasodium poluphosphate and 1/2-cup dry measure laundry detergent dissolved in 1 gal. of water.

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
 - 2. Verify that foundations are within tolerances specified.
 - 3. Verify that reinforcing dowels are properly placed.
 - 4. Verify that substrates are free of substances that would impair mortar bond.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Build chases and recesses to accommodate items specified in this and other Sections.
- B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.
- C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- D. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
- E. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

3.3 TOLERANCES

- A. Dimensions and Locations of Elements:
 - 1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
 - 2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
 - 3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

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B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in bond pattern indicated on Drawings; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

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- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.
- H. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
 - 1. Install compressible filler in joint between top of partition and underside of structure above.
 - 2. Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
 - 3. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 07 84 43 "Joint Firestopping."

3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow CMUs as follows:
 - 1. Bed face shells in mortar and make head joints of depth equal to bed joints.
 - 2. Bed webs in mortar in all courses of piers, columns, and pilasters.
 - 3. Bed webs in mortar, including starting course on footings.
- B. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Rake out mortar joints at pre-faced CMUs to a uniform depth of 1/4 inch and point with epoxy mortar to comply with epoxy-mortar manufacturer's written instructions.
- D. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- E. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.
- F. Cut joints flush where indicated to receive waterproofing unless otherwise indicated.

3.6 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

- A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:

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1. Provide an open space not less than 1/2 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.7 CONTROL AND EXPANSION JOINTS

- A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry as follows:
 1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout, and rake out joints in exposed faces for application of sealant.

3.8 LINTELS

- A. Provide masonry lintels per the structural drawings.
 1. Provide built-in-place masonry lintels. Use specially formed bond beam units with reinforcing bars placed as indicated and filled with coarse grout. Temporarily support built-in-place lintels until cured.

3.9 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
 1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height. For maximum height of lifts see #2 below.

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2. Limit height of vertical grout pours to not more than 48 inches per CBC 2104A.1.3.1.2.2

3.10 FIELD QUALITY CONTROL

- A. Testing and Inspecting: The District will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

3.11 PARGING

- A. Parge exterior faces of below-grade masonry walls, where indicated, in two uniform coats to a total thickness of 3/4 inch. Dampen wall before applying first coat, and scarify first coat to ensure full bond to subsequent coat.
- B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot. Form a wash at top of parging and a cove at bottom.
- C. Damp-cure parging for at least 24 hours and protect parging until cured.

3.12 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain District Construction Manager's approval of sample cleaning before proceeding with cleaning of masonry.
 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.

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4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

3.13 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.
- C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be recycled, and other masonry waste, and legally dispose of off District's property.

END OF SECTION 04 22 00

SPECIFICATIONS

SECTION 07 54 19 POLYVINYL-CHLORIDE (PVC) ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Adhered polyvinyl chloride (PVC) roofing system.
 - 2. Cover board.
 - 3. PVC coated metal (all flashings and closures).

1.3 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D 1079 and glossary in NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to work of this Section.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include roof plans, elevations, sections, details, and attachments to other work, including:
 - 1. Base flashings and membrane terminations.
 - 2. Roof plan showing orientation of steel roof deck and orientation of roof membrane, fastening spacings, and patterns for mechanically fastened roofing system.
- C. Samples for Verification: For the following products:
 - 1. Roofing membrane, of color required.
 - 2. PVC coated metal of color required.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.

SPECIFICATIONS

B. Manufacturer Certificates:

1. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - a. Submit evidence of compliance with performance requirements.
2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.

C. Product Test Reports: For roof membrane and insulation, tests performed by independent qualified testing agency indicating compliance with specified requirements.

D. Field quality-control reports.

E. Sample Warranties: For manufacturer's special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

B. Information Card: Furnish a typewritten card, laminated in plastic. Card shall be 8 1/2 by 11 inches and shall contain the information listed on Form 1 located at end of this section.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is UL listed for roofing system identical to that used for this Project.

B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

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1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.9 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period, without monetary limitation.
 1. Special warranty includes roof membrane, base flashings, roof insulation, fasteners, Cover board, and other components of roofing system.
 2. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain all components of the roof system including roof insulation, fasteners for roofing system from same manufacturer as roof membrane or manufacturer approved by roof membrane manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roof system and flashings shall remain watertight.
 1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
- B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.
- C. Wind Uplift Resistance: Design roofing system to resist the following wind uplift pressures when tested according to FM Approvals 4474, UL 580, or UL 1897:

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1. Zone 1 (Roof Area Field): -20.59lbf/sq. ft.
 2. Zone 2 (Roof Area Perimeter): -34.55lbf/sq. ft.
 3. Zone 3 (Roof Area Corners): -51.99lbf/sq. ft.
- D. Energy Performance: Roofing system shall have a minimum aged solar reflectance of 0.63 and a minimum thermal emittance of 0.75 or a minimum solar reflectance index (SRI) of 75 when tested according to CRRC-1.
- E. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A, for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- F. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.3 PVC ROOFING

- A. PVC Sheet: ASTM D 4434/D 4434M, Type III, fabric reinforced.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Johns Manville; a Berkshire Hathaway company.
 - b. Sika Sarnafil.
 - c. GAF Materials Corporation.
 - d. Or equal.
 2. Thickness: 80 mils nominal on horizontal surfaces.
 3. Plasticizer: Either keytone ethylene ester (KEE) formulated into the membrane composition, or liquid plasticizers coated in the factory to prevent migration.
 4. Exposed Face Color: White.

2.4 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.
1. Adhesives and Sealants: Comply with VOC limits of local air pollution control District.
- B. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, and color as PVC sheet.
- C. Bonding Adhesive: Manufacturer's standard, water based for horizontal applications; solvent based for vertical applications.
- D. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to substrate, and acceptable to roofing system manufacturer.

SPECIFICATIONS

- E. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.5 PVC COATED SHEET METAL

- A. Roof membrane manufacturer's standard .028 inch thick minimum galvanized sheet metal laminated to minimum 20 mil thick non-reinforced PVC membrane. Color to match roofing membrane.

2.6 SUBSTRATE BOARDS

- A. Substrate Board: Glass-mat faced water-resistant gypsum substrate, or high density polyisocyanurate foam core board, 1/4 inch thick. Substrate board must be the product that was used in testing the roof assembly to gain a Class A rating.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate board to roof deck.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction.

3.3 ROOFING INSTALLATION, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions.
- B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when

SPECIFICATIONS

rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

- C. Install roof membrane and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition and to not void warranty for existing roofing system.

3.4 COVER BOARD INSTALLATION

- A. Coordinate installing membrane roofing system components so cover board is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with membrane roofing system manufacturer's written instructions for installing roof cover board.
- C. Install cover board with long joints of cover board in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch (6 mm) with cover board.
 - 1. Cut and fit cover board within 1/4 inch (6 mm) of nailers, projections, and penetrations.
- D. Adhered Cover Board: Adhere cover board to substrate as follows:
 - 1. Install each layer in a two-part urethane adhesive according to roofing system manufacturer's instruction.
 - 2. Install to resist uplift pressure at corners, perimeter, and field of roof.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.5 ADHERED ROOFING INSTALLATION

- A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions. Unroll roof membrane and allow to relax before installing.
- B. Start installation of roofing in presence of roofing system manufacturer's technical personnel.
- C. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- D. Bonding Adhesive: Apply to substrate and underside of roof membrane at rate required by manufacturer, and allow to partially dry before installing roof membrane. Do not apply to splice area of roof membrane.
- E. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeter of roofing.
- F. Apply roof membrane with side laps shingled with slope of roof deck where possible.

SPECIFICATIONS

- G. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roof membrane and sheet flashings according to manufacturer's written instructions, to ensure a watertight seam installation.
 - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roof membrane and sheet flashings.
 - 2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
 - 3. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.
- H. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

3.6 FIELD QUALITY CONTROL

- A. Roofing Inspector: District will engage a qualified roofing inspector to inspect substrate conditions, surface preparation, roof membrane application, flashings, protection, and drainage components.
- B. For testing and inspections not provided by District and as specified herein, provide qualified personnel and furnish reports to Project Inspector.
- C. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of District Construction Manager, and to prepare inspection report.
- D. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

3.7 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing system for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and District Construction Manager.
- B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 54 19

SPECIFICATIONS

FORM 1 – ROOFING SYSTEM DESCRIPTION

1. Location: _____ 2. Bldg. Name: _____
3. Bldg. No.: _____ 4. Roof Area (SF): _____ 5. Contract No.: _____
6. Deck Slope: _____
7. Type of Deck:
- | | |
|---|--|
| <input type="checkbox"/> Metal | <input type="checkbox"/> Wood Plank or Plywood |
| <input type="checkbox"/> Cast-In-Place Concrete | <input type="checkbox"/> Other: _____ |
| <input type="checkbox"/> Precast/Prestressed Concrete | |
8. Type of Insulation Board:
- | | |
|---|---|
| <input type="checkbox"/> Polyisocyanurate/Composite | <input type="checkbox"/> Polyisocyanurate |
| <input type="checkbox"/> Polystyrene/Composite | <input type="checkbox"/> Polystyrene |
| <input type="checkbox"/> Perlite | <input type="checkbox"/> Mineral Fiber |
| <input type="checkbox"/> Other: _____ | |
9. Insulation Manufacturer: _____
10. Insulation Thickness: _____
11. Roofing Type:
- | | |
|---|---|
| <input type="checkbox"/> Built-Up (Asphalt) | <input type="checkbox"/> PVC |
| <input type="checkbox"/> Metal | <input type="checkbox"/> SBS Mod. Bitumen |
| <input type="checkbox"/> Shingles | <input type="checkbox"/> Other: _____ |
12. Roofing Manufacturer: _____
13. Roofing Installer/Warrantor: _____
14. Roofing Application Method:
- | | |
|--|--|
| <input type="checkbox"/> Bitumen | <input type="checkbox"/> Fully Adhered |
| <input type="checkbox"/> Mechanically Fastened | <input type="checkbox"/> Mechanically Fastened/Fully Adhered |
| <input type="checkbox"/> Other: _____ | |
15. Warranty Period: From: _____ To: _____
16. Warranty Serial Number: _____
17. Date Roofing Completed: _____ 18. Inspector: _____
19. Prime Contractor Name/Address: _____
- Signature: _____ Date: _____

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INSTRUCTIONS FOR FORM 1 (Do Not Post)

1. Location: Name of facility as shown on contract.
2. Bldg. Name: As shown on contract or as provided by District Construction Manager.
3. Bldg. Number: As provided by District Construction Manager.
4. Roof Area: Area in square feet of roof for which deck insulation, membrane, etc. are the same. A separate form is required if any part of roof system is different over other areas of the roof.
5. Contract Number: As shown on the contract.
6. Show deck slope.
7. Deck: Check appropriate block.
8. Type of Insulation Board: Check appropriate block.
9. Show manufacturer of insulation.
10. Show minimum thickness of installed insulation.
11. Roofing Type: Check appropriate block.
12. Show roofing manufacturer's name.
13. Roofing Installer's or Contractor's name.
14. Roofing Application Method: Check appropriate block.
15. Warranty Period: Insert start and end dates.
16. Warranty Serial Number: Insert serial number.
17. Show date of Substantial Completion. Warranty period begins on this date.
18. Show Project Inspector's name.
19. Prime Contractor Name/Address/Signature: Must be signed and dated by an official of Contracting firm.

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SECTION 08 71 00 DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:
 - 1. Gate hardware.
- B. Related Sections:
 - 1. Section 32 31 19 "Decorative Metal Fences and Gates" for balance of hardware for decorative metal gates.

1.3 ABBREVIATIONS

- A. The following abbreviations are used to identify manufacturers in Part 3 Door Hardware Schedule Article.
 - 1. B/O (By Others)
 - 2. IVE (Ives, an Allegion brand).
 - 3. LCN (LCN, an Allegion brand).
 - 4. SCE (Schlage Electronics, an Allegion brand).
 - 5. SCH Schlage, an Allegion brand).
 - 6. TBD (Manufacturer To Be Determined)
 - 7. VON (Von Duprin, an Allegion brand).
 - 8. LOC (Locinox)
 - 9. SAR (Sargent)

1.4 COORDINATION

- A. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated

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requirements.

- B. Security: Coordinate installation of door hardware, keying, and access control with District's security consultant.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Inspect and discuss preparatory work performed by other trades.
 - 3. Inspect and discuss electrical roughing-in for electrified door hardware. Confirm all electrified hardware is by the same manufacturer throughout the project, including storefront entrances, and chain link and decorative metal gates.
 - 4. Review sequence of operation for each type of electrified door hardware.
 - 5. Review required testing, inspecting, and certifying procedures.
- B. Keying Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Coordination and Meetings." In addition to District Construction Manager, Contractor, and Architect, conference participants shall also include Supplier's Architectural Hardware Consultant and District's security consultant. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
 - 1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - 2. Preliminary key system schematic diagram.
 - 3. Requirements for key control system.
 - 4. Requirements for access control.
 - 5. Confirm all electrified hardware is by the same manufacturer throughout the project, including storefront entrances, and chain link and decorative metal gates.
 - 6. Address for delivery of keys.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Details of door hardware.
- C. Samples for Verification: For exposed door hardware of each type required, in each finish specified, prepared on Samples of size indicated below. Tag Samples with full description for coordination with the door hardware schedule. Submit Samples before, or concurrent with, submission of door hardware schedule.
 - 1. Sample Size: Full-size units or minimum 2-by-4-inch samples for sheet and 4-inch long Samples for other products.

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- a. Full-size Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.

D. Other Action Submittals:

1. Door Hardware Schedule: Prepared by or under the supervision of Architectural Hardware Consultant, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - a. Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
 - b. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule." Double space entries, and number and date each page.
 - c. Content: Include the following information:
 - 1) Identification number, location, hand, fire rating, size, and material of each door and frame.
 - 2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
 - 3) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
 - 4) Description of electrified door hardware sequences of operation and interfaces with other building control systems.
 - a) Sequence of Operation: Include description of component functions that occur in the following situations: authorized person wants to enter; authorized person wants to exit; unauthorized person wants to enter; unauthorized person wants to exit.
 - 5) Fastenings and other pertinent information.
 - 6) Explanation of abbreviations, symbols, and codes contained in schedule.
 - 7) Mounting locations for door hardware.
 - 8) List of related door devices specified in other Sections for each door and frame.
2. Keying Schedule: Prepared by or under the supervision of Architectural Hardware Consultant, detailing District's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

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1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and Architectural Hardware Consultant.
- B. Product Certificates: For door hardware, from the manufacturer.
 - 1. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
- C. Product Test Reports: For compliance with requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency for locks, latches, panic hardware and closers.
- D. Field quality control test reports.
- E. Warranty: Special warranty specified in this Section.

1.8 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware and keying schedule and wiring diagrams.

1.9 QUALITY ASSURANCE

- A. Supplier Qualifications: Supplier shall be a qualified direct distributor of the manufacturer's products. The Supplier shall have in its regular employment a person who is currently certified by DHI as an Architectural Hardware Consultant (AHC) or a Certified Door Consultant (CDC). The Supplier, and their AHC or CDC, shall be available at reasonable times throughout the Project for consultation with Contractor, Architect, and District Construction Manager. The Supplier shall be available for in-person on-site consultation within 48 hours of first notice.
- B. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers.
 - 1. Warehousing Facilities: In Project's vicinity.
 - 2. Scheduling Responsibility: Preparation of door hardware and keying schedules.
 - 3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- C. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as an Architectural Hardware Consultant.
- D. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware rated for use in assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on

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testing at positive pressure according to NFPA 252 or UL 10C, unless otherwise indicated.

- E. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meet requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
 - 1. Air Leakage Rate: Maximum air leakage of 3.0 cfm/sq. ft. at the tested pressure differential of 0.1-inch wg of water.
- F. Accessibility Requirements: Comply with applicable provisions in the CBC and the DOJ's 2010 ADA Standards for Accessible Design for door hardware on doors in an accessible route.
 - 1. Provide operating devices that are operable with one hand and that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 pounds.
 - 2. Comply with the following maximum opening-force requirements:
 - a. Interior, Non-Fire-Rated Hinged Doors: 5 pounds applied perpendicular to door.
 - b. Sliding or Folding Doors: 5 pounds applied parallel to door at latch.
 - c. Fire Doors: Minimum opening force shall not exceed 15 pounds applied perpendicular to the door.
 - d. Other Operating Parts: For latch bolts and other such devices, 5 pounds.
 - 3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
 - 4. Closers: Adjust door and gate closer sweep periods so that, from an open position of 90 degrees, the time required to move the door to a position of 12 degrees from the latch is 5 seconds minimum.
 - 5. Spring Hinges: Adjust door and gate spring hinges so that, from an open position of 70 degrees, the time required to move the door to the closed position is 1.5 seconds minimum.
 - 6. Door hardware shall not project into the required clear door opening width below 34 inches above finish floor or grade, and shall not project more than 4 inches into the required clear door opening width between 34 inches and 80 inches above finish floor or grade. Door closers and stops shall be located a minimum of 78 inches above finish floor or grade.
 - 7. Operable parts of handles, pulls, locks, latches, and other hardware items shall be located between 34 inches and 44 inches above finish floor or grade.
 - 8. Floor stops shall not be located in the path of travel and shall be a maximum of 4 inches from wall.
 - 9. Pairs of Doors: Limit swing of one leaf to 90 degrees so that a clear floor space is provided beyond the arc of the swing for the wall-mounted sign.
 - 10. Night Latch Function: Door hardware, (including panic hardware) shall not be provided with "Night Latch" (NL) function unless the following conditions are met:
 - a. Such hardware has a 'dogging' feature.
 - b. It is dogged during the time the facility is open.
 - c. Such 'dogging' operation is performed only by employees as part of their job function (non-public use).

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1.10 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
- C. Deliver permanent keys to District by registered mail or overnight package service.

1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Failures include:
 - a. Structural failures including excessive deflection, cracking, or breakage.
 - b. Faulty operation of doors and door hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 - 2. Warranty Period: Two years from date of Substantial Completion, except as follows:
 - a. Mortise Locksets: Three years mechanical and one year electrical from date of Substantial Completion.
 - b. Exit Devices: Three years mechanical and one year electrical from date of Substantial Completion.
 - c. Closers: Ten years mechanical and two years electrical from date of Substantial Completion.

1.12 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for District's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of door hardware from a single manufacturer.

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2.2 PERFORMANCE REQUIREMENTS

- A. Accessibility Requirements: Comply with applicable provisions in the CBC and the DOJ's 2010 ADA Standards for Accessible Design for door hardware on doors in an accessible route.
1. Provide operating devices that are operable with one hand and that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 pounds.
 2. Comply with the following maximum opening-force requirements:
 - a. Interior, Non-Fire-Rated Hinged Doors: 5 pounds applied perpendicular to door.
 - b. Sliding or Folding Doors: 5 pounds applied parallel to door at latch.
 - c. Fire Doors: Minimum opening force shall not exceed 15 pounds applied perpendicular to the door.
 - d. Other Operating Parts: For latch bolts and other such devices, 5 pounds.
 3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
 4. Closers: Adjust door and gate closer sweep periods so that, from an open position of 90 degrees, the time required to move the door to a position of 12 degrees from the latch is 5 seconds minimum.
 5. Spring Hinges: Adjust door and gate spring hinges so that, from an open position of 70 degrees, the time required to move the door to the closed position is 1.5 seconds minimum.
 6. Door hardware shall not project into the required clear door opening width below 34 inches above finish floor or grade, and shall not project more than 4 inches into the required clear door opening width between 34 inches and 80 inches above finish floor or grade. Door closers and stops shall be located a minimum of 78 inches above finish floor or grade.
 7. Operable parts of handles, pulls, locks, latches, and other hardware items shall be located between 34 inches and 44 inches above finish floor or grade.
 8. Floor stops shall not be located in the path of travel and shall be a maximum of 4 inches from wall.
 9. Pairs of Doors: Limit swing of one leaf to 90 degrees so that a clear floor space is provided beyond the arc of the swing for the wall-mounted sign.
 10. Night Latch Function: Door hardware, (including panic hardware) shall not be provided with "Night Latch" (NL) function unless the following conditions are met:
 - a. Such hardware has a 'dogging' feature.
 - b. It is dogged during the time the facility is open.
 - c. Such 'dogging' operation is performed only by employees as part of their job function (non-public use).

2.3 SCHEDULED DOOR HARDWARE

- A. Provide door hardware for each door as scheduled in Part 3 "Door Hardware Schedule" Article to comply with requirements in this Section.
1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and

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- products complying with BHMA designations referenced.
- 2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:
 - 1. Named Manufacturers' Products: Manufacturer and product designations are listed for each door hardware item for the purpose of establishing minimum requirements and level of quality. Provide products complying with these requirements for description, quality, and function.

2.4 HINGES, GENERAL

- A. Quantity: Provide the following, unless otherwise indicated:
 - 1. Two Hinges: For doors with heights up to 60 inches.
 - 2. Three Hinges: For doors with heights 61 to 90 inches.
 - 3. Four Hinges: For doors with heights 91 to 120 inches.
 - 4. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
- B. Template Requirements: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.
- C. Hinge Sizes: Unless otherwise indicated in the Hardware Sets, provide the following:
 - 1. 3-1/2 inch by 3-1/2 inch by .123 inch thick for 1-3/8 inch thick doors.
 - 2. 4-1/2 inch by 4-1/2 inch by .180 inch thick for 1-3/4 inch thick doors, up to 36 inch wide.
 - 3. 5 inch by 4-1/2 inch by .190 inch thick for 1-3/4 inch thick doors, greater than 36 inch to 48 inch wide.
 - 4. Use manufacturers guidelines for all others door thicknesses.
- D. Hinge Weight: Unless otherwise indicated in the Hardware Sets, provide the following:
 - 1. Entrance Doors: Heavy-weight hinges.
 - 2. Doors with Closers: Antifriction-bearing hinges.
 - 3. Interior Doors: Heavy-weight hinges.
- E. Hinge Base Metal: Unless otherwise indicated in the Hardware Sets, provide the following:
 - 1. Exterior Hinges: Stainless steel, with stainless-steel pin.
 - 2. Interior Hinges: Steel, with steel pin except at corrosive areas.
 - 3. Hinges for Fire-Rated Assemblies: Steel, with steel pin at interior locations and stainless steel, with stainless-steel pin at exterior locations.
- F. Hinge Options: Where indicated in door hardware sets or on Drawings:

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1. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for out-swinging exterior doors and out-swinging corridor doors with locks.
2. Corners: Square.

G. Fasteners: Comply with the following:

1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
2. Wood Screws: For wood doors and frames.
3. Threaded-to-the-Head Wood Screws: For fire-rated wood doors.
4. Screws: Phillips flat-head; machine screws (drilled and tapped holes) for metal doors and wood screws for wood doors and frames. Finish screw heads to match surface of hinges.

2.5 HINGES

- A. Butts and Hinges: BHMA A156.1.
- B. Template Hinge Dimensions: BHMA A156.7.
- C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Ives, an Allegion brand.
 2. Hager Companies.
 3. Stanley Commercial Hardware.
 4. Or Equal.

2.6 CONTINUOUS HINGES

- A. Continuous Hinges: BHMA A156.26, Grade 1-600; minimum 0.120-inch-thick, hinge leaves with minimum overall width of 4 inches; fabricated to full height of door and frame and to template screw locations; with components finished after milling and drilling are complete.
- B. Pin-and-Barrel-Type Hinges: Continuous, stainless steel, pin-in-barrel, hinge leaves joined by a continuous channel cap; with concealed, self-lubricating thrust bearings.
1. Fire Pins: Steel pins to hold labeled fire doors in place if required by tested listing.
- C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Ives, an Allegion brand.
 2. Hager Companies.
 3. Zero International, Inc.
 4. Or Equal.

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2.7 MECHANICAL LOCKS AND LATCHES

- A. Lock Functions: As indicated in door hardware schedule.
- B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
 - 1. Mortise Locks: Minimum 3/4-inch latchbolt throw.
 - 2. Deadbolts: Minimum 1-inch bolt throw.
- C. Lock Backset: 2-3/4 inches, unless otherwise indicated.
- D. Lock Trim:
 - 1. Levers: Forged or Cast.
 - 2. Escutcheons: Wrought.
 - 3. Dummy Trim: Match lever lock trim and escutcheons.
 - 4. "Locked" indicator on interior of all classroom locks.
- E. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.
 - 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 - 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 - 3. Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.
 - 4. Strikes for Mortise Locks and Latches: BHMA A156.13.
- F. Mortise Locks: BHMA A156.13; Operational Grade 1, Security Grade 1; cold-rolled steel case with steel or brass parts; Series 1000.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Corbin Russwin, Inc.; an ASSA ABLOY Group company.
 - b. Schlage, an Allegion brand.
 - c. Stanley Commercial Hardware.
 - d. Or Equal.

2.8 ELECTRIC STRIKES

- A. Electric Strikes: BHMA A156.31; Grade 1; with faceplate to suit lock and frame. Use fail-secure electric strikes with fire rated devices.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Folger Adam Security Inc.; an ASSA ABLOY Group company.
 - b. Von Duprin, an Allegion brand.
 - c. Or Equal.

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2.9 ELECTROMECHANICAL LOCKS

- A. Electromechanical Locks: BHMA A156.25; Grade 1; motor or solenoid driven; mortise lock; with strike that suits frame.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Corbin-Russwin Inc.; an ASSA ABLOY Group company.
 - b. Schlage, an Allegion brand.
 - c. SARGENT Manufacturing Company; ASSA ABLOY.
 - d. Or Equal.

2.10 MANUAL FLUSH BOLTS

- A. Manual Flush Bolts: BHMA A156.16, Grade 1; minimum 3/4-inch throw; designed for mortising into door edge.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Door Controls International, Inc.
 - b. Ives, an Allegion brand.
 - c. Trimco.
 - d. Or Equal.

2.11 AUTOMATIC AND SELF-LATCHING FLUSH BOLTS

- A. Automatic and Self-Latching Flush Bolts: BHMA A156.3, Grade 1; minimum 3/4-inch throw; designed for mortising into door edge.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Door Controls International, Inc.
 - b. Ives, an Allegion brand.
 - c. Trimco.
 - d. Or Equal.

2.12 DUSTPROOF STRIKES

- A. BHMA A156.16, Grade 1.

2.13 EXIT DEVICES AND AUXILIARY ITEMS

- A. General: All electrified hardware shall be by the same manufacturer throughout the project, including storefront entrances, and chain link and decorative metal gates.

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- B. Exit Devices and Auxiliary Items: BHMA A156.3, Grade 1, and additionally meeting the following requirements:
1. Mortise type exit devices to be certified by an independent testing lab for a minimum 10,000,000 cycles.
 2. Rim type exit devices to be certified by an independent testing lab for a minimum 5,000,000 cycles.
 3. Surface and Concealed vertical rod type exit devices to be certified by an independent testing lab for a minimum 1,000,000 cycles.
 4. Furnish roller strikes for all rim and surface vertical rod exit devices.
 5. Device rail shall be extruded with reinforced corners.
 6. All internal springs to be coil compression type.
 7. Furnish security dead latching for all active latch bolts with 3/4 inch throw.
 8. Latch bolts to have self-lubricating coating to reduce friction and wear. Plated latch bolts not accepted.
 9. End cap shall be impact-resistant, constructed of cast or forged material and shall not overlap the mechanism case. No raised edges or lips to catch carts or other equipment.
 10. Devices to have no exposed rivets or screws on back of device that would be visible through a glass light.
 11. Non-Fire Rated Devices: Provide cylinder dogging where scheduled.
 - a. Dogging mechanisms containing plastic parts are not acceptable.
 12. Field drill weep holes as per manufacturer's instructions for exit devices used in full exterior applications, highly corrosive environments and where noted in the hardware sets.
- C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Corbin Russwin, Inc.; an ASSA ABLOY Group company.
 2. SARGENT Manufacturing Company; ASSA ABLOY.
 3. Von Duprin, an Allegion brand.
 4. Or Equal.
- D. Exit Devices for Means of Egress Doors: Comply with NFPA 101.
- E. Panic Exit Devices: Listed and labeled by a nationally recognized testing and inspection agency, for panic protection, based on testing according to UL305.
- F. Fire Exit Devices: Devices complying with NFPA 80 that are listed and labeled by a nationally recognized testing and inspecting agency, for fire and panic protection, based on testing according to UL 305 and NFPA 252.
- G. Removable Mullions: Removable with single turn of building key. Securely reinstalled without need for key. Furnish storage brackets for securely stowing the mullion away from the door when removed.
- H. Fire-Exit Removable Mullions: Provide removable mullions for use with fire exit devices complying with NFPA 80 that are listed and labeled by a nationally recognized

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testing and inspecting agency, for fire and panic protection, based on testing according to UL 305 and NFPA 252. Mullions shall be used only with exit devices for which they have been tested.

- I. Outside Trim: Lever, Lever with cylinder, Pull or Pull with cylinder as indicated in the Hardware Sets; material and finish to match locksets, unless otherwise indicated.
 - 1. Where lever trim is specified match lever design for locksets and latchsets, unless otherwise indicated.
 - a. Levers shall be solid forged brass or bronze, complete with coil compression springs with shear pin protection.
 - b. Escutcheons of all lever trim shall be forged brass or bronze with four thru-bolts anchoring trim assembly to exit device chassis.
 - c. Cylinders shall be recessed in trim from face of escutcheon.
 - d. Lever trim shall be designed with breakaway feature to allow trim to freely rotate while remaining secure, preventing damage to internal components from vandalism by excessive force. Lever trim shall match lever trim specified for locksets and latchsets.
 - 2. Pull type trim shall be minimum 11 gauge material, thru bolted to exit device center case.
- J. Through Bolts: Provide for exit devices on all metal doors, non-fire-rated wood doors and fire-rated wood doors.

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2.14 LOCK CYLINDERS

- A. Lock Cylinders: Manufacturer's full size standard tumbler type, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:
 - 1. Number of Pins: Six.
 - 2. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
 - 3. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
- B. Manufacturer: Same manufacturer as for locking devices.
- C. Standard Lock Cylinders: BHMA A156.5; Grade 1; face finished to match lockset.
- D. Construction Keying: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 12 construction master keys.

2.15 KEYING

- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference.
 - 1. Grand Master Key System: Change keys, a master key, and a grand master key operate cylinders.
 - 2. New Keying System:
 - a. Provide a new patented and geographically restricted key system that is registered to the San Diego Unified School District.
 - b. New Cylinders: Construction keyed using a removable insert. Remove insert at Substantial Completion.
- B. Keys: Nickel silver.
 - 1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
 - a. Notation: "DO NOT DUPLICATE."
 - 2. Quantity: In addition to one extra key blank for each lock, provide the following:
 - a. Cylinder Change Keys: Three.
 - b. Master Keys: Five.
 - c. Grand Master Keys: Five.
 - d. Great-Grand Master Keys: Five.

SPECIFICATIONS

2.16 KEY CONTROL SYSTEM

- A. Key Control Cabinet: BHMA A156.5, Grade 1; metal cabinet with baked-enamel finish; containing key-holding hooks, labels, 2 sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers; with key capacity of 150 percent of the number of locks.
 - 1. Wall-Mounted Cabinet: Cabinet with hinged-panel door equipped with key-holding panels and pin-tumbler cylinder door lock.
- B. Key Lock Boxes: Designed for storage of 10 keys.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Knox Company, as required by City of San Diego Fire Department. No substitutions.
- C. Cross-Index System: Multiple-index system for recording key information. Include three receipt forms for each key-holding hook. Set up by Installer.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Key Control Systems, Inc.
 - b. Lund Equipment Co., Inc.
 - c. MMF Industries.
 - d. Or Equal.

2.17 OPERATING TRIM

- A. Operating Trim: BHMA A156.6; brass, bronze, or stainless steel, unless otherwise indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ives, an Allegion brand.
 - b. Rockwood Manufacturing Company; an ASSA ABLOY Group company.
 - c. Trimco.
 - d. Or Equal.

2.18 ACCESSORIES FOR PAIRS OF DOORS

- A. Coordinators: BHMA A156.3; consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release and with internal override.

SPECIFICATIONS

- B. Carry-Open Bars: BHMA A156.3; prevent the inactive leaf from opening before the active leaf; provide polished brass or bronze carry-open bars with strike plate for inactive leaves of pairs of doors unless automatic or self-latching bolts are used.
- C. Astragals: BHMA A156.22.

2.19 SURFACE CLOSERS

- A. Surface Closers: BHMA A156.4 Grade 1. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force. Comply with the following:
 - 1. Full rack-and-pinion type cylinder with removable metal cover and cast iron body. Double heat-treated pinion shaft, single piece forged piston, chrome-silicon steel spring.
 - 2. ISO 2000 certified. Units stamped with date-of-manufacture code.
 - 3. Closers shall exceed 10 million (10,000,000) full load operating cycles, as tested by a nationally recognized independent testing laboratory.
 - 4. Provide type of arm required for closer to be located on non-public side of door, unless otherwise indicated.
 - 5. Provide plates, brackets and special templating when needed for interface with particular header, door and wall conditions and neighboring hardware.
 - 6. Separate adjusting valves for closing speed, latching speed and backcheck, with fourth valve for delayed action where scheduled.
 - 7. Extra-duty arms (EDA) at exterior doors scheduled with parallel arm units.
 - 8. Exterior door closers: tested to 100 hours of ASTM B117 salt spray test. Furnish data on request.
 - 9. Exterior doors: seasonal adjustments not required for temperatures from 120 degrees F to -30 degrees F. Furnish checking fluid data on request.
 - 10. Non-flaming fluid; will not fuel door or floor covering fires.
 - 11. Pressure Relief Valves (PRV) not permitted.
 - 12. Metal Closer Covers shall be secured with TORX style screws to prevent vandalism and cover removal.
 - 13. Provide correct brackets required to mount closers on interior side of room.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Corbin Russwin, Inc.; an ASSA ABLOY Group company.
 - 2. LCN, an Allegion brand.
 - 3. Or Equal.
- C. Through Bolts: Provide for closers on all metal doors, non-fire-rated wood doors and fire-rated wood doors.

SPECIFICATIONS

2.20 POWER ASSIST CLOSERS

- A. As specified in Section 08 71 13 "Automatic Door Operators" for accessible doors and for sound rated doors mounted on cam lift hinges.

2.21 MECHANICAL STOPS AND HOLDERS

- A. Wall- and Floor-Mounted Stops: BHMA A156.16, Grade 1.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ives.
 - b. Rockwood Manufacturing Company; an ASSA ABLOY Group company.
 - c. Trimco.
 - d. Or Equal.

2.22 ELECTROMAGNETIC STOPS AND HOLDERS

- A. Electromagnetic Door Holders: BHMA A156.15, Grade 1; wall-mounted electromagnetic single, floor-mounted electromagnetic single or floor-mounted electromagnetic double unit with strike plate attached to swinging door; coordinated with fire detectors and interface with fire alarm system for labeled fire-rated door assemblies.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. LCN, an Allegion brand.
 - b. SARGENT Manufacturing Company; ASSA ABLOY.
 - c. Stanley Commercial Hardware.
 - d. Or Equal.

2.23 OVERHEAD STOPS AND HOLDERS

- A. Overhead Stops and Holders: BHMA A156.8, Grade 1.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Glynn-Johnson.
 - b. LCN, an Allegion brand.
 - c. SARGENT Manufacturing Company; ASSA ABLOY.
 - d. Or Equal.

SPECIFICATIONS

2.24 DOOR SILENCERS

- A. Silencers for Wood and Metal Door Frames: BHMA A156.16, Grade 1; neoprene or rubber, minimum 1/2 inch diameter; fabricated for drilled-in application to frame.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ives.
 - b. Rockwood Manufacturing Company; an ASSA ABLOY Group company.
 - c. Trimco.
 - d. Or Equal.

2.25 DOOR GASKETING

- A. Door Gasketing: BHMA A156.22; air leakage not to exceed 0.50 cfm per foot of crack length for gasketing other than for smoke control, as tested according to ASTM E 283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.
- B. Smoke- Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a nationally recognized testing and inspecting agency, for smoke-control ratings indicated, based on testing according to UL 1784.
 - 1. Provide smoke-labeled gasketing on 20-minute-rated doors and on smoke-labeled doors.
- C. Fire-Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a nationally recognized testing and inspecting agency, for fire ratings indicated, based on testing according to UL10C (Positive Pressure).
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E1408.
- E. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. National Guard Products, Inc.
 - 2. Reese Enterprises, Inc.
 - 3. Zero International, Inc.
 - 4. Or Equal.

2.26 THRESHOLDS

- A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

SPECIFICATIONS

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. National Guard Products, Inc.
 - b. Reese Enterprises, Inc.
 - c. Zero International, Inc.
 - d. Or Equal.

2.27 METAL PROTECTIVE TRIM UNITS

- A. Metal Protective Trim Units: BHMA A156.6; beveled top and sides; fabricated from material indicated in Hardware Sets; with manufacturer's standard machine or self-tapping screw fasteners with oval heads; sized 1-1/2 inch less than door width on push side of door and 1/2 inch less than door width on pull side of door, by height indicated in Hardware Sets. Plates over 16 inches above finish floor mounted on fire rated doors shall be labeled.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allegion plc.
 - b. Rockwood Manufacturing Company; an ASSA ABLOY Group company.
 - c. Trimco.
 - d. Or Equal.

2.28 MISCELLANEOUS DOOR HARDWARE

- A. Boxed Power Supplies: Modular unit in NEMA ICS 6, Type 4 enclosures; filtered and regulated; voltage rating and type matching requirements of door hardware served; and listed and labeled for use with fire alarm systems.
- B. Concealed Door Switch: Provide each exterior door with two low voltage switches; one switch for intrusion alarm and one switch for HVAC interface on classrooms and administration areas. Mount intrusion alarm switch in header approximately 6 inches from strike side. Mount HVAC interface switch approximately 6 inches to 8 inches from hinge side (dependent on closer mounting hardware).
- C. Dated DoorScore Tags: Include in Hardware Sets for fire and egress doors. Mount on hinge jamb.

2.29 FABRICATION

- A. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18. Do not provide manufacturer's standard materials or forming methods if different from specified standard.

SPECIFICATIONS

- B. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

1. Fire-Rated Applications:

- a. Wood or Machine Screws: For the following:

- 1) Hinges mortised to doors or frames; use threaded-to-the-head wood screws for wood doors and frames.
- 2) Strike plates to frames.
- 3) Closers to doors and frames.

- b. Steel Through Bolts: For the following:

- 1) Surface hinges to doors.
- 2) Closers to doors and frames.
- 3) Surface-mounted exit devices.

2. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
3. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."
4. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.30 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

SPECIFICATIONS

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
- B. Wood Doors: Comply with DHI A115-W Series.

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Custom Steel Doors and Frames: HMMA 831.
 - 3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing. Do not install surface-mounted items until finishes have been completed on substrates involved.
 - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

SPECIFICATIONS

- D. Lock Cylinders: Install construction cores to secure building and areas during construction period.
- E. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- F. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room. Verify location with District Construction Manager.
 - 1. Configuration: Provide one power supply for each door opening with electrified door hardware.
- G. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 07 92 00 "Joint Sealants."
- H. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic or more than 4 inches from wall.
- I. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- J. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- K. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
 - 1. With installer present, test door hardware operation with climate control system and stairwell pressurization system both at rest and while in full operation.
 - 2. With installer and electrical contractor present, test hardware interfaced with fire/life-safety system for proper operation and release.
 - 3. With installer, access control contractor and electrical contractor present, test electrical and electronic hardware systems for proper operation.
- B. District Hardware Specialist: District's hardware specialist and Fire Door Assembly Inspector (FDAI) will perform inspections and prepare inspection reports and to install DoorScore dated tags.
 - 1. District's hardware specialist will inspect doors, frames, and door hardware and fire rated assemblies and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

SPECIFICATIONS

3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
 - 2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
 - 3. Door Closers: Adjust sweep period to comply with accessibility requirements.

3.6 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train District's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Section 01 79 00 "Demonstration and Training."

3.8 DOOR HARDWARE SCHEDULE

SPECIFICATIONS

Hardware Group No. G-01

For use on Door #(s):

G-1, G-2

Provide SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	GATE CLOSER	MAMMOTH 150	630	LOC
1	LEFT LEAF	PANIC HARDWARE	5BL-5CH-8804 x L/TRIM	630	SAR
1	LEFT LEAF	RIM CYLINDER	34	626	TBD
1	LEFT LEAF	DOOR PULL	VR910 NL	630	IVE
1	EA	SURFACE CLOSER	4040XP SHCUSH SRI (FIELD DRILL 3 EACH EQUALLY SPACED 1/8" WEEP HOLES IN BOTTOM OF CLOSER COVER)	689	LCN
1	LEFT LEAF	PA MOUNTING PLATE	4040XP-18PA SRI (IF REQUIRED)	689	LCN
1	EA	CUSH SHOE SUPPORT	4040XP-30 SRI (IF REQUIRED)	689	LCN

BALANCE OF HARDWARE BY GATE MANUFACTURER

ADJUST CLOSER BACK CHECK TO HELP STOP DOOR AT 90 DEGREES

END OF SECTION 08 71 00

DOOR HARDWARE

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SAN DIEGO HIGH SCHOOL WHOLE SITE MONDERNIZATION

SECTION 09 05 61

COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This section applies to all floors identified in the contract documents as to receive the following types of floor coverings:
 - 1. Resilient tile and sheet.
 - 2. Broadloom carpet.
- B. Removal of existing floor coverings.
- C. Preparation of new and existing concrete floor slabs for installation of floor coverings.
- D. Testing of concrete floor slabs for moisture and alkalinity (pH).
- E. Remediation of concrete floor slabs due to unsatisfactory moisture or alkalinity (pH) conditions.
 - 1. Contractor shall provide an allowance to perform all specified remediation of concrete floor slabs. If such remediation is indicated by testing agency's report and is due to a condition not under Contractor's control or could not have been predicted by examination prior to entering into the contract, a contract modification will be issued.
- F. Remedial floor coatings.

1.02 REFERENCES

- A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2013.
- B. ASTM C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete; 1999 (Reapproved 2014).
- C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- D. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2011.
- E. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2011.
- F. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; Resilient Floor Covering Institute; October 2011.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate scheduling of cleaning and testing, so that preliminary cleaning has been completed for at least 24 hours prior to testing.

COMMON WORK RESULTS FOR FLOORING PREPARATION

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DEL ROSA FULL DAY KINDER CLASSROOMS

1.04 SUBMITTALS

- A. Visual Observation Report: For existing floor coverings to be removed.
- B. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
 - 1. Moisture and alkalinity (pH) limits and test methods.
 - 2. Manufacturer's required bond/compatibility test procedure.
- C. Testing Agency's Report:
 - 1. Description of areas tested; include floor plans and photographs if helpful.
 - 2. Summary of conditions encountered.
 - 3. Moisture and alkalinity (pH) test reports.
 - 4. Copies of specified test methods.
 - 5. Recommendations for remediation of unsatisfactory surfaces.
 - 6. Submit report to Architect.
 - 7. Submit report not more than two business days after conclusion of testing.
- D. Adhesive Bond and Compatibility Test Report.
- E. Copy of RFCI (RWP).
- F. Remedial Materials Product Data: Manufacturer's published data on each product to be used for remediation.

1.05 QUALITY ASSURANCE

- A. Moisture and alkalinity (pH) testing shall be performed by an independent testing agency employed and paid by Contractor.
- B. Testing Agency Qualifications: Independent testing agency experienced in the types of testing specified.
 - 1. Submit evidence of experience consisting of at least 3 test reports of the type required, with project Owner's project contact information.
- C. Contractor's Responsibility Relating to Independent Agency Testing:
 - 1. Provide access for and cooperate with testing agency.
 - 2. Confirm date of start of testing at least 10 days prior to actual start.
 - 3. Allow at least 4 business days on site for testing agency activities.
 - 4. Achieve and maintain specified ambient conditions.
 - 5. Notify Architect when specified ambient conditions have been achieved and when testing will start.

1.06 FIELD CONDITIONS

- A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F or more than 85 degrees F.
- B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:
 - 1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.
 - 2. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M or ASTM C472, whichever is appropriate.
- B. Alternate Flooring Adhesive: Floor covering manufacturer's recommended product, suitable for the moisture and pH conditions present; low-VOC. In the absence of any recommendation from flooring manufacturer, provide a product recommended by adhesive manufacturer as suitable for substrate and floor covering and for conditions present.
- C. Remedial Floor Coating: Single- or multi-layer coating or coating/overlay combination intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.
 - 1. Thickness: As required for application and in accordance with manufacturer's installation instructions.
 - 2. Products:
 - a. Koster American Corporation; Koster VAP I 2000 with Koster SL Premium overlay: www.kosterusa.com.
 - b. Or Equal.

PART 3 EXECUTION

3.01 CONCRETE SLAB PREPARATION

- A. Perform following operations in the order indicated:
 - 1. Existing concrete slabs (on-grade and elevated) with existing floor coverings:
 - a. Visual observation of existing floor covering, for adhesion, water damage, alkaline deposits, and other defects.
 - b. Removal of existing floor covering.
 - 2. Preliminary cleaning.
 - 3. Moisture vapor emission tests; 3 tests in the first 1000 square feet and one test in each additional 1000 square feet, unless otherwise indicated or required by flooring manufacturer.
 - 4. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
 - 5. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
 - 6. Specified remediation, if required.
 - 7. Patching, smoothing, and leveling, as required.
 - 8. Other preparation specified.
 - 9. Adhesive bond and compatibility test.

COMMON WORK RESULTS FOR FLOORING PREPARATION

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DEL ROSA FULL DAY KINDER CLASSROOMS

10. Protection.
- B. Remediations:
 1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct this condition before doing any other remediation; re-test after correction.
 2. Excessive Moisture Emission or Relative Humidity: If an adhesive that is resistant to the level of moisture present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply remedial floor coating or remedial sheet membrane over entire suspect floor area.
 3. Excessive Alkalinity (pH): If remedial floor coating is necessary to address excessive moisture, no additional remediation is required; if not, if an adhesive that is resistant to the level present is available and acceptable to the flooring manufacturer, use that adhesive for installation of the flooring; otherwise, apply a skim coat of specified patching compound over entire suspect floor area.

3.02 REMOVAL OF EXISTING FLOOR COVERINGS

- A. Comply with local, State, and federal regulations and recommendations of RFCI Recommended Work Practices for Removal of Resilient Floor Coverings, as applicable to floor covering being removed.
- B. Dispose of removed materials in accordance with local, State, and federal regulations and as specified.

3.03 PRELIMINARY CLEANING

- A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.
- B. Do not use solvents or other chemicals for cleaning.

3.04 MOISTURE VAPOR EMISSION TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F1869 and as follows.
- D. Plastic sheet test and mat bond test may not be substituted for the specified ASTM test method, as those methods do not quantify the moisture content sufficiently.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet per 24 hours.
- F. Report: Report the information required by the test method.

COMMON WORK RESULTS FOR FLOORING PREPARATION

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DEL ROSA FULL DAY KINDER CLASSROOMS

3.05 INTERNAL RELATIVE HUMIDITY TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F2170 Procedure A and as follows.
- D. Testing with electrical impedance or resistance apparatus may not be substituted for the specified ASTM test method, as the values determined are not comparable to the ASTM test values and do not quantify the moisture content sufficiently.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if any test value exceeds 75 percent relative humidity.
- F. Report: Report the information required by the test method.

3.06 ALKALINITY TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. The following procedure is the equivalent of that described in ASTM F710, repeated here for the Contractor's convenience.
- C. Use a wide range alkalinity (pH) test paper, its associated chart, and distilled or deionized water.
- D. Place several drops of water on a clean surface of concrete, forming a puddle approximately 1 inch in diameter. Allow the puddle to set for approximately 60 seconds, then dip the alkalinity (pH) test paper into the water, remove it, and compare immediately to chart to determine alkalinity (pH) reading.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

3.07 PREPARATION

- A. See individual floor covering section(s) for additional requirements.
- B. Comply with requirements and recommendations of floor covering manufacturer.
- C. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.
- D. Do not fill expansion joints, isolation joints, or other moving joints.

3.08 ADHESIVE BOND AND COMPATIBILITY TESTING

- A. Comply with requirements and recommendations of floor covering manufacturer.

COMMON WORK RESULTS FOR FLOORING PREPARATION

09 05 61 - 5

DEL ROSA FULL DAY KINDER CLASSROOMS

3.09 APPLICATION OF REMEDIAL FLOOR COATING

- A. Comply with requirements and recommendations of coating manufacturer.

3.10 PROTECTION

- A. Cover prepared floors with building paper or other durable covering.

END OF SECTION

SPECIFICATIONS

SECTION 09 91 13 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 the following exterior substrates:
 - 1. Galvanized metal.
 - 2. Painted metal.
- B. Related Requirements:
 - 1. Section 02 83 33 "Removal and Disposal of Material Containing Lead".
 - 2. Section 09 91 23 "Interior Painting".

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Apply coats on Samples in steps to show each coat required for system.
 - 3. Label each coat of each Sample.

1.4 QUALITY ASSURANCE

- A. Paint Contractor shall have a minimum of five years documented experience in application of paints and coatings specified. Contractor shall maintain qualified painting crews during entire painting process.
- B. Regardless of selected paint manufacturer, Contractor is to provide exact color and gloss to match Architect's selection at no additional cost.

SPECIFICATIONS

1.5 DELIVERY, STORAGE, AND HANDLING

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

1.6 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints in rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.7 EXTRA MATERIALS

- A. Do not provide any extra materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Dunn-Edwards Paints.
 - 2. Frazee Paint.
 - 3. Sherwin-Williams Company (The).
 - 4. Vista Paint Corporation.
 - 5. Or equal.

2.2 PAINT, GENERAL

- A. Material Compatibility:
 - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- B. Colors: As indicated in a color schedule on Drawings.
- C. Material Quality: Provide manufacturer's best quality paint material of the various types specified that are factory formulated and recommended by manufacturer for application indicated. Use only paint material containers displaying manufacturer's

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product identification.

- D. Regulatory Requirements: Coatings shall comply with the testing and product requirements of local air pollution control district.

2.3 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: District reserves the right to invoke the following procedure:
 - 1. District will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 - 2. Testing agency will perform tests for compliance with product requirements.
 - 3. District may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

2.4 PRIMERS/SEALERS

- A. Acrylic Bonding Primer (for previously painted or glossy surfaces):
 - 1. Dunn-Edwards Paints; UGPR00 Ultra Grip Premium.
 - 2. Frazee Paint; 168 Prime Plus.
 - 3. Sherwin-Williams Company; PrepRite ProBlock B51W8020.
 - 4. Vista Paint Corporation; 4000 Uniprime.
 - 5. Or equal

2.5 EXTERIOR LATEX PAINTS

- A. Exterior Acrylic Latex (Semigloss):
 - 1. Dunn-Edwards Paints; SSHL50 Sparta Shield Semi Gloss.
 - 2. Frazee Paint; 124 Mirroglide Acrylic Semigloss.
 - 3. Sherwin-Williams Company; Sologloss Acrylic Semigloss A 76 Series.
 - 4. Vista Paint Corporation; 8400 Carefree.
 - 5. Or equal.

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.

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- B. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- C. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions.
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Apply paints to meet manufacturer's recommended dry film thickness per coat.
 - 3. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
 - 4. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
 - 5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

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- B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: District 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 EXTERIOR PAINTING SCHEDULE

- A. Galvanized-Metal Substrates (All canopy metals):

Surface Preparation: clean per SSPC-SP1. If the galvanized metal has been passivated with chromates or silicates, these treatments must be mechanically removed. Surface must be clean, dry, dull, and sound. Consult manufacturer's data pages for complete surface preparation guidelines.

Primer: S-W Macropoxy 646-100 Fast Cure Epoxy, B58W620 Series (5-10 mils DFT)

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Finish Coat: S-W Sherloxane 800 Polysiloxane, B80W501 (4-6 mils DFT)

B. Painted metal surfaces (B1 building):

TBD

END OF SECTION 09 91 13

SPECIFICATIONS

SECTION 13 34 23.13

PRE-APPROVED MODULAR BUILDINGS

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. This section includes the following:
 - 1. Manufacture, delivery and installation of Custom Modular Buildings per Silver Creek Drawings or approved equal.
- B. Related Requirements:
 - 1. Section 01 70 00 – Execution and Closeout Requirements: Field Engineering, Surveying and Layout.
 - 2. Section 03 30 00 – Cast-in-Place Concrete: Concrete for foundations
 - 3. Section 12 24 00 – Window Shades: Window coverings
 - 4. Division 26, “Electrical”
 - 5. Division 27, “Communications”
 - 6. Division 28, “Electronic Safety and Security”

1.3 ABBREVIATIONS

- A. DSA Division of the State Architect
- B. CBC California Building Code

1.4 SUBMITTALS

- A. Submit product literature, samples and manufacturer’s written instructions.

1.5 SPECIFICATIONS SHOWN ON DRAWINGS

- A. Provide custom modular buildings as specified on the Silver Creek Industries drawings

1.6 QUALITY ASSURANCE

- A. In-plant DSA construction inspection is required. District will supply a qualified

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DSA inspector and laboratory (as required) for the in-plant inspection. Contractor shall coordinate these inspections with the District, Construction Manager, and Project Inspector. Contractor shall initiate the process no less than two weeks prior to the required inspections.

1.7 SUBSTITUTION OF ALTERNATE MANUFACTURER

- A. A substitute modular building manufacturer may be submitted as an “equal” to the Silver Creek Industries Basis of Design provided the following conditions are met:
 - 1. Applicable edition of CBC
 - 2. Analysis, drawings and details shall be submitted for review and approval of DSA. Revisions to the construction documents necessary to accommodate substituted product for approval shall have costs borne by the contractor with no time extension to construction schedule allowed.
 - 3. All cost, including professional fees and plan check fees shall be borne by the contractor.
 - 4. Construction schedule cannot be adversely affected by substitution. Sufficient time shall be provided to allow for DSA approval process prior to fabrication.

PART 2 - PRODUCTS

2.1 BASIS OF DESIGN

- A. Preapproved Modular Buildings: The Basis of Design will be the Custom Modular Buildings as manufactured by Silver Creek Industries, pre-approved by the Division of the State Architect (DSA). See Silver Creek Industries Modular Building Drawings for number and configuration of buildings.
- B. Options Provided by Modular Building Manufacturer: the following item summary of options occur in all buildings (unless noted otherwise) and includes, but is not limited to, the following (See Silver Creek drawings and documents for complete scope):
 - 1. Base Building, Installation, Delivery and Crane.
 - 2. Single ply TPO Roof with 18” parapet.
 - 3. Light Weight Concrete filled metal deck floor.
 - 4. Flooring – Carpet – Bigelow 26 oz., Standard VCT or ceramic tile where indicated.
 - 5. Interior non-rated walls.
 - 6. Hardi Plank Exterior Siding – Painted at SCI Plant with reglets, drip head flashing and sill pan flashing at windows.
 - 7. Standard Interior Vinyl Tackboard with full panel overlap.
 - 8. Fire Extinguishers.
 - 9. Markerboards.
 - 10. Aluminum Nail-on fixed exterior windows with 2” mullions.
 - 11. 18 ga. Hollow Metal Exterior Doors – in aluminum Frame with glazed transoms and sidelights.
 - 12. Legacy Interior Doors in Hollow Metal frames.
 - 13. Hard lid ceilings in Restrooms, MDF and Storage Rooms.

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DEL ROSA FULL DAY KINDER CLASSROOMS

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14. Fire rated plywood backboards at MDF Rooms.
 15. Fluorescent T8 lamped fixtures.
 16. Staff Sink-with ABS pipe drain and associated plumbing to 18" outside building.
 17. WIC Premium Plywood Core Plastic Laminate Faced Casework.
 18. 4-Ton Roof Mount HVAC York Heat Pump-Equal to Carrier.
 19. Hardware (package per PC).
 20. Upgraded Hardware package where occur.
 21. Electrical per Silver Creek Drawings.
 22. Data outlet boxes and conduit stub above ceiling.
 23. Painting-Vista or Frazee Paint.
 24. Fire Sprinklers.
 25. Interior Rated Walls (where occur).
 26. Acoustical Ceiling – Grid and Tiles 755b at +8'-6".
 27. Restrooms complete-Per Silver Creek drawings with stub drain and water 18" from building. Wall/base finish – Ceramic tile.
 28. Standard Exterior Doorway lights.
 29. Plumbing per Silver Creek drawings.
 30. Scuppers, conductor heads and downspouts.
- C. Additional Work Associated with Modular Buildings (Not provided by modular building manufacturer. Provided by General Contractor):
1. Reinforced Concrete Foundations with minimum 18" clear crawl space.
 2. Weld plates.
 3. Vapor Barrier on grade in crawl space.
 4. Drywells at vents and crawl space access.
 5. Ventilation grates.
 6. Blockouts for P.O.C.s.
 7. Utility and service connections 18" outside modular Buildings.
 - a. Utility valves and fittings (whether shown on civil or plumbing drawings or not provide the following) water and gas pressure reducing valves, water isolation valves – one per building located in yard box, site sewer cleanouts-one per building at point of connection, reducing fittings, etc.
 8. Electrical Grounding.
 9. Waterproofing and flashing at foundation.
 10. Sterilization of water piping.
 11. Digital Addressable Fire Alarm and Voice Evacuation System.
 12. Data system.
 13. Intrusion detection system.
 14. Communication system.
 15. Integrated audio video system.
 16. Television system.
 17. Public Address systems.
 18. Clock and Bell systems.
 19. Access Control system.
 20. Video Surveillance system.
 21. Window Coverings – See Division 12 Furnishings.
 22. Selected toilet accessories – Soap dispensers, toilet seat cover dispensers, surface mounted toilet tissue dispensers & surface mounted sanitary napkin disposal.
 - a. These accessories are Owner Furnished Contractor Installed.
 - b. Backing is provided by Silver Creek.
 - c. Model numbers per Silver Creek Drawings unless otherwise noted

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- 23. Splash blocks at downspouts to softscape areas.
- D. Note: "System" includes all equipment unless noted otherwise.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas and conditions, with Installer present, for compliance with requirements for installation tolerances, including modular building foundations; accurate placement; critical dimensions; and other conditions affecting performance of the Work.
- B. Prepare written report, endorsed by installer, listing conditions detrimental to performance of the Work.
- C. Proceed with Installation only after unsatisfactory conditions have been corrected.

3.2 COORDINATION

- A. Contractor shall directly coordinate building production, delivery, staging and placement with manufacturer.
- B. Contractor shall directly coordinate scheduling and constructing foundations with manufacturer.

3.3 INSTALLATION

- A. Install pre-approved custom modular buildings according to manufacturer's written instructions.
- B. Fasten walkway components securely to columns with fastening indicated.
- C. Attach gutters, downspouts and flashings as indicated.
- D. Paint all unfinished items. Where prefinished items are part of system, submit samples for Architect's selection.
- E. Seal joints with sealant where indicated.

END OF SECTION 13 34 23.13

SPECIFICATIONS

SECTION 22 11 13 FACILITY WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Reference Standards:
 - 1. Standard Specifications for Public Works Construction, current edition, including Regional and City of San Bernardino amendments.

1.2 SUMMARY

- A. This Section includes water-distribution piping and related components outside the building for fire service mains.
- B. Utility-furnished products include water meters that will be furnished to the site, ready for installation.
- C. Related Requirements:
 - 1. See other Division 22 Sections for additional piping installation requirements.
 - 2. Section 31 20 0000 "Earth Moving" for excavating, trenching, and backfilling, and underground warning tapes.
 - 3. Section **33** 05 00 "Common Work Results for Utilities" for piping-system common requirements, commonly used joining materials, basic piping joint construction, joining piping of dissimilar metals, and piping connections to valves and equipment.

1.3 DEFINITIONS

- A. EPDM: Ethylene propylene diene terpolymer rubber.
- B. LLDPE: Linear, low-density polyethylene plastic.
- C. PA: Polyamide (nylon) plastic.
- D. PP: Polypropylene plastic.
- E. PVC: Polyvinyl chloride plastic.

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1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Include rated capacities and shipping, installed and operating weights. Indicate materials, finishes, dimensions, required clearances, and methods of assembly of components and piping and wiring connections for the following:
 - 1. Backflow preventors and water regulators.
 - 2. Drain valves, hose bibs, hydrants, and hose stations.
- C. Shop Drawings: Detail precast concrete vault assemblies. Indicate dimensions, method of field assembly, and components.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: For piping and specialties including relation to other services in same area, drawn to scale. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.
- B. Field quality-control test reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For water valves and specialties to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
 - 2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
 - 3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.
- B. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.
- E. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.

SPECIFICATIONS

- F. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.
- G. NSF Compliance:
 - 1. Comply with NSF 14 for plastic potable-water-service piping. Include marking "NSF-pw" on piping.
 - 2. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:
 - 1. Ensure that valves are dry and internally protected against rust and corrosion.
 - 2. Protect valves against damage to threaded ends and flange faces.
 - 3. Set valves in best position for handling. Set valves closed to prevent rattling.
- B. During Storage: Use precautions for valves, including fire hydrants, according to the following:
 - 1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
 - 2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
- C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.
- D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
- E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
- F. Protect flanges, fittings, and specialties from moisture and dirt.
- G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.9 PROJECT CONDITIONS

- A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by District or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:

SPECIFICATIONS

1. Notify District Construction Manager no fewer than five days in advance of proposed interruption of service.
2. Do not proceed with interruption of water-distribution service without District Construction Manager's written permission.

1.10 COORDINATION

- A. Coordinate connection to water main with utility company.

PART 2 - PRODUCTS

2.1 DUCTILE-IRON PIPE AND FITTINGS

- A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
 1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
- B. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.
 1. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 2. Gaskets: AWWA C111, rubber.
- C. Flanges: ASME 16.1, Class 125, cast iron.

2.2 PVC PIPE AND FITTINGS

- A. PVC, AWWA Pipe: AWWA C900 Class 200, with bell end with gasket, and with spigot end.
 1. Comply with UL 1285 for fire-service mains if indicated.
 2. PVC Fabricated Fittings: AWWA C900, Class 200, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
 3. PVC Molded Fittings: AWWA C907, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
 4. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 - a. Gaskets: AWWA C111, rubber.
 5. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

SPECIFICATIONS

- a. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

2.3 JOINING MATERIALS

- A. Brazing Filler Metals: AWS A5.8, BCuP Series.
- B. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

2.4 PIPING SPECIALTIES

- A. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
- B. Tubular-Sleeve Pipe Couplings:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ford Meter Box Company, Inc. (The).
 - b. JCM Industries, Inc.
 - c. Smith-Blair, Inc.
 - d. Or Equal.
 - 2. Description: Metal, bolted, sleeve-type, reducing or transition coupling, with center sleeve, gaskets, end rings, and bolt fasteners and with ends of same sizes as piping to be joined.
 - a. Standard: AWWA C219.
 - b. Center-Sleeve Material: Carbon steel.
 - c. Gasket Material: Natural or synthetic rubber.
 - d. Pressure Rating: 200 psig minimum.
 - e. Metal Component Finish: Corrosion-resistant coating or material.
- C. Split-Sleeve Pipe Couplings:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Victaulic Company.
 - b. Or Equal.
 - 2. Description: Metal, bolted, split-sleeve-type, reducing or transition coupling with sealing pad and closure plates, O-ring gaskets, and bolt fasteners.
 - a. Standard: AWWA C219.
 - b. Sleeve Material: Carbon steel.
 - c. Sleeve Dimensions: Of thickness and width required to provide pressure rating.

SPECIFICATIONS

- d. Gasket Material: O-rings made of EPDM rubber, unless otherwise indicated.
- e. Pressure Rating: 200 psig minimum.
- f. Metal Component Finish: Corrosion-resistant coating or material.

D. Flexible Connectors:

- 1. Nonferrous-Metal Piping: Bronze hose covered with bronze wire braid; with copper-tube, pressure-type, solder-joint ends or bronze flanged ends brazed to hose.
- 2. Ferrous-Metal Piping: Stainless-steel hose covered with stainless-steel wire braid; with ASME B1.20.1, threaded steel pipe nipples or ASME B16.5, steel pipe flanges welded to hose.

E. Dielectric Fittings:

- 1. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
- 2. Dielectric Unions:
 - a. Description:
 - 1) Standard: ASSE 1079.
 - 2) Pressure Rating: 250 psig.
 - 3) End Connections: Solder-joint copper alloy and threaded ferrous.
- 3. Dielectric Flanges:
 - a. Description:
 - 1) Standard: ASSE 1079.
 - 2) Factory-fabricated, bolted, companion-flange assembly.
 - 3) Pressure Rating: 150 psig or 300 psig.
 - 4) End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.
- 4. Dielectric-Flange Insulating Kits:
 - a. Description:
 - 1) Field-assembled companion-flange assembly, full face or ring type.
 - 2) Non-conducting materials for field assembly of companion flanges.
 - 3) Pressure Rating: 150 psig or 300 psig.
 - 4) Gasket: Neoprene or phenolic.
 - 5) Bolt Sleeves: Phenolic or polyethylene.
 - 6) Washers: Phenolic with steel backing washers.
- 5. Dielectric Couplings:
 - a. Description:

SPECIFICATIONS

- 1) Galvanized steel couplings with inert and noncorrosive thermoplastic lining, with threaded ends.
 - 2) Pressure Rating: 300 psig.
6. Dielectric Nipples:
 - a. Description:
 - 1) Standard: IAPMO PS 66.
 - 2) Electroplated steel nipple complying with ASTM F 1545.
 - 3) Pressure Rating: 300 psig at 225 deg F minimum.
 - 4) End Connections: Male threaded or grooved.
 - 5) Lining: Inert and noncorrosive, propylene.

2.5 CORROSION-PROTECTION PIPING ENCASEMENT

A. Encasement for Underground Metal Piping:

1. Standards: ASTM A 674 or AWWA C105.
2. Form: Sheet or tube.
3. Material: LLDPE film of 0.008-inch minimum thickness, or high-density, cross-laminated PE film of 0.004-inch minimum thickness.

2.6 GATE VALVES

A. Ball Valves

1. All ball valves $\frac{3}{4}$ " to 2 $\frac{1}{2}$ " shall be full-port valves.

B. AWWA, Cast-Iron Gate Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. McWane, Inc.
 - b. Mueller Co.
 - c. NIBCO INC.
 - d. Or Equal.
2. OS&Y, Rising-Stem, Resilient-Seated Gate Valves:
 - a. Description: Cast- or ductile-iron body and bonnet, with bronze or gray- or ductile-iron gate, resilient seats, and bronze stem.
 - 1) Standard: AWWA C509.
 - 2) Minimum Pressure Rating: 200 psig.
 - 3) End Connections: Flanged.

SPECIFICATIONS

2.7 GATE VALVE ACCESSORIES AND SPECIALTIES

A. Tapping-Sleeve Assemblies:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Cast Iron Pipe Company.
 - b. East Jordan Iron Works, Inc.
 - c. Flowserve Corporation.
 - d. Or Equal.
2. Description: Sleeve and valve compatible with drilling machine.
 - a. Standard: MSS SP-60.
 - b. Tapping Sleeve: Cast- or ductile-iron or stainless-steel, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve.
 - c. Valve: AWWA, cast-iron, nonrising-stem, resilient-seated gate valve with one raised face flange mating tapping-sleeve flange.

B. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over valve and with a barrel approximately 5 inches in diameter.

1. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.

C. Indicator Posts: UL 789, FMG-approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve.

2.8 CHECK VALVES

A. AWWA Check Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Cast Iron Pipe Company.
 - b. APCO Willamette Valve and Primer Corporation.
 - c. Crane; Crane Energy Flow Solutions.
 - d. Or Equal.
2. Description: Swing-check type with resilient seat. Include interior coating according to AWWA C550 and ends to match piping.
 - a. Standard: AWWA C508.

SPECIFICATIONS

- b. Pressure Rating: 175 psig.

2.9 PRESSURE-REDUCING VALVES

A. Water Regulators:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Cash Acme.
 - b. Conbraco Industries, Inc.
 - c. Honeywell Water Controls.
 - d. Or Equal.
2. Standard: ASSE 1003.
3. Pressure Rating: Initial pressure of 150 psig.
4. Size: As indicated in the drawings.
5. Design Flow Rate: As indicated in the drawings.
6. Design Inlet Pressure: To be determined by the utility company.
7. Design Outlet Pressure Setting: To be determined by the utility company.
8. Body: Bronze with chrome-plated finish for NPS 2 and smaller; cast iron **with** interior lining complying with AWWA C550 or that is FDA approved for NPS 2-1/2 and NPS 3.
9. Valves for Booster Heater Water Supply: Include integral bypass.
10. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and NPS 3.

2.10 BACKFLOW PREVENTERS

A. Reduced-Pressure-Principle Backflow Preventers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Flowmatic Corporation.
 - b. Watts; a Watts Water Technologies company.
 - c. Zurn Industries, LLC.
 - d. Or Equal.
2. Standard: ASSE 1013.
3. Operation: Continuous-pressure applications.
4. Pressure Loss: 12 psig maximum, through middle 1/3 of flow range.
5. Size: As indicated in the drawings.
6. Body: Bronze for NPS 2 and smaller; stainless steel for NPS 2-1/2 and larger.
7. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
8. Configuration: Designed for flanged horizontal, straight through flow.
9. Accessories:

SPECIFICATIONS

- a. Valves: Ball type with threaded ends on inlet and outlet of NPS 2 and smaller; OS&Y gate type with flanged ends on inlet and outlet of NPS 2-1/2 and larger.
- b. Air-Gap Fitting: ASME A112.1.2, matching backflow preventer connection.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

- A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.
- B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.
- C. Do not use flanges or unions for underground piping.
- D. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.
- E. Underground water-service piping NPS 3/4 to NPS 3 shall be the following:
 1. Hard copper tube, ASTM B 88, Type L; wrought-copper, solder-joint fittings; and brazed joints.
- F. Underground water-service piping NPS 4 to NPS 8 shall be the following:
 1. AWWA C900 PVC, class as indicated on drawings, but not less than 200, with bell and spigot ends, using mechanical joint fittings.
- G. Aboveground water-service piping NPS 3/4 to NPS 3 shall be the following:
 1. Hard copper tube, ASTM B 88, Type L with soldered joints.
- H. Aboveground water-service piping NPS 4 to NPS 8 shall be the following:
 1. AWWA C151 Ductile Iron Pipe.

3.2 VALVE APPLICATIONS

- A. General Application: Use mechanical-joint-end valves for NPS 3 and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FMG, nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 and smaller installation.
- B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

SPECIFICATIONS

1. Underground Valves, NPS 4 and Larger, for Indicator Posts: UL/FMG, cast-iron, nonrising-stem gate valves with indicator post.
2. Pressure-Reducing Valves: Use for water-service piping in vaults and aboveground to control water pressure.
3. Relief Valves: Use for water-service piping in vaults and aboveground.
 - a. Air-Release Valves: To release accumulated air.
 - b. Air/Vacuum Valves: To release or admit large volume of air during filling of piping.
 - c. Combination Air Valves: To release or admit air.

3.3 PIPING INSTALLATION

- A. Water-Main Connection: Tap water main according to requirements of water utility company and of size and in location indicated.
- B. Make connections larger than NPS 2 with tapping machine according to the following:
 1. Install tapping sleeve and tapping valve according to MSS SP-60.
 2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
 3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
 4. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.
- C. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.
- D. Install PVC, AWWA pipe according to ASTM F 645 and AWWA M23.
- E. Bury piping with depth of cover over top at least 30 inches, with top at least 12 inches below level of maximum frost penetration, and according to the following:
 1. Under Driveways: With at least 36 inches cover over top.
 2. Under Railroad Tracks: With at least 48 inches cover over top.
 3. In Loose Gravelly Soil and Rock: With at least 12 inches additional cover.
- F. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.
- G. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.
 1. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.
- H. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

SPECIFICATIONS

3.4 JOINT CONSTRUCTION

- A. Make pipe joints according to the following:
 - 1. Copper-Tubing, Pressure-Sealed Joints: Use proprietary crimping tool and procedure recommended by copper, pressure-seal-fitting manufacturer.
 - 2. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
 - 3. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.
 - 4. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with OD, and with system working pressure. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

3.5 ANCHORAGE INSTALLATION

- A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:
 - 1. Concrete thrust blocks.
 - 2. Locking mechanical joints.
 - 3. Set-screw mechanical retainer glands.
 - 4. Bolted flanged joints.
 - 5. Heat-fused joints.
 - 6. Pipe clamps and tie rods.
- B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:
 - 1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.
 - 2. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.
- C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.6 VALVE INSTALLATION

- A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.
- B. AWWA Valves Other Than Gate Valves: Comply with AWWA C600 and AWWA M44.
- C. Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with service box.

SPECIFICATIONS

3.7 BACKFLOW PREVENTER INSTALLATION

- A. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.
- B. Do not install backflow preventers that have relief drain in vault or in other spaces subject to flooding.
- C. Do not install bypass piping around backflow preventers.

3.8 CONCRETE VAULT INSTALLATION

- A. Install precast concrete vaults according to ASTM C 891.

3.9 CONNECTIONS

- A. Drawings indicate general arrangement of piping, equipment, fittings, and specialties.
- B. Connect water-distribution piping to interior fire-suppression piping.
- C. Provide grounding for equipment.
- D. Connect low voltage wiring.

3.10 FIELD QUALITY CONTROL

- A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
- B. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours.
 - 1. Increase pressure in 50-psig increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig. Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.
- C. Prepare reports of testing activities.

3.11 IDENTIFICATION

- A. Install continuous underground detectable warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping.

SPECIFICATIONS

- B. Permanently attach equipment nameplate or marker indicating plastic water-service piping, on main electrical meter panel.

3.12 CLEANING

- A. Clean and disinfect water-distribution piping as follows:
 - 1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
 - 2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:
 - a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
 - b. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
 - c. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.
- B. Prepare reports of purging and disinfecting activities.

END OF SECTION 22 11 13

SPECIFICATIONS

SECTION 22 13 13 FACILITY SANITARY SEWERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Reference Standards:
 - 1. City of San Bernardino Standard Drawings for Public Works Construction, current edition.

1.2 SUMMARY

- A. Section Includes:
 - 1. Pipe and fittings.
 - 2. Nonpressure and pressure couplings.
 - 3. Expansion joints and deflection fittings.
 - 4. Backwater valves.
 - 5. Cleanouts.
 - 6. Encasement for piping.
 - 7. Manholes.
 - 8. Concrete for ballast and pipe supports.
- B. Related Requirements:
 - 1. Section 22 13 16 " Sanitary Waste and Vent Piping " for connecting nonpressure, gravity-flow drainage piping to building's sanitary building drains.
 - 2. Section 31 20 0000 "Earth Moving" for excavating, trenching, and backfilling, underground warning tapes, and underground utility identification devices.

1.3 DEFINITIONS

- A. FRP: Fiberglass-reinforced plastic.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Expansion joints and deflection fittings.

SPECIFICATIONS

2. Transition couplings.
3. Cleanouts.

- B. Shop Drawings: For manholes. Include plans, elevations, sections, details, and frames and covers.

1.5 INFORMATIONAL SUBMITTALS

- A. Profile Drawings: Show system piping in elevation. Draw profiles to horizontal scale of not less than 1 inch equals 50 feet and to vertical scale of not less than 1 inch equals 5 feet. Indicate manholes and piping. Show types, sizes, materials, and elevations of other utilities crossing system piping.
- B. Product Certificates: For each type of cast-iron soil pipe and fitting, from manufacturer.
- C. Field quality-control reports.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic manholes, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle manholes according to manufacturer's written rigging instructions.

1.7 PROJECT CONDITIONS

- A. Interruption of Existing Sanitary Sewerage Service: Do not interrupt service to facilities occupied by District or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 1. Notify District Construction Manager no fewer than seven days in advance of proposed interruption of service.
 2. Do not proceed with interruption of service without District Construction Manager's written permission.

PART 2 - PRODUCTS

2.1 PVC PIPE AND FITTINGS

- A. PVC Type PSM Sewer Piping:
 1. Pipe: ASTM D 3034, SDR 35, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.
 2. Fittings: ASTM D 3034, PVC with bell ends.
 3. Gaskets: ASTM F 477, elastomeric seals.

SPECIFICATIONS

B. PVC Pressure Piping:

1. Pipe: AWWA C900, Class 150 and Class 200 PVC pipe with bell-and-spigot ends for gasketed joints.
2. Fittings: AWWA C900, Class 150 and Class 200 PVC pipe with bell ends.
3. Gaskets: ASTM F 477, elastomeric seals.

2.2 NONPRESSURE-TYPE TRANSITION COUPLINGS

A. Shielded, Flexible Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Cascade Waterworks Mfg. Co.
 - b. Dallas Specialty & Mfg. Co.
 - c. Mission Rubber Company, LLC; a division of MCP Industries.
 - d. Or Equal.
2. Description: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Ring-Type, Flexible Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fernco Inc.
 - b. Logan Clay Pipe.
 - c. Mission Rubber Company, LLC; a division of MCP Industries.
 - d. Or Equal.
2. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

2.3 PRESSURE-TYPE PIPE COUPLINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cascade Waterworks Mfg. Co.
2. Ford Meter Box Company, Inc. (The).
3. JCM Industries, Inc.
4. Or Equal.

B. Tubular-Sleeve Couplings: AWWA C219, with center sleeve, gaskets, end rings, and bolt fasteners.

SPECIFICATIONS

- C. Metal, bolted, sleeve-type, reducing or transition coupling, for joining underground pressure piping. Include 150-psig minimum pressure rating and ends of same sizes as piping to be joined.
- D. Gasket Material: Natural or synthetic rubber.
- E. Metal Component Finish: Corrosion-resistant coating or material.

2.4 CLEANOUTS

- A. PVC Cleanouts:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. NDS Inc.
 - b. Sioux Chief Manufacturing Company, Inc.
 - c. Zurn Industries, LLC.
 - d. Or Equal.
 - 2. Description: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

2.5 ENCASEMENT FOR PIPING

- A. Standard: ASTM A 674 or AWWA C105.
- B. Material: High-density, cross-laminated polyethylene film of 0.004-inch minimum thickness.
- C. Form: Tube.
- D. Color: Natural.

2.6 MANHOLES

- A. Standard Precast Concrete Manholes:
 - 1. Manholes shall be according to City of San Bernardino standards.
- B. Manhole Frames and Covers:
 - 1. Manhole frames and covers shall be according to City of San Bernardino standards.
- C. Manhole-Cover Inserts:
 - 1. Manhole inserts shall be according to City of San Bernardino standards.

SPECIFICATIONS

2.7 CONCRETE

- A. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.
 - 1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
 - 2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewer piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.
- C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
- F. Install gravity-flow, nonpressure, drainage piping according to the following:
 - 1. Install piping pitched down in direction of flow, at minimum slope of 2 percent, unless otherwise indicated.
 - 2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
 - 3. Install piping with 36-inch minimum cover, unless otherwise indicated.
 - 4. Install hub-and-spigot, cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook."
 - 5. Install hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook."
 - 6. Install PVC cellular-core sewer piping according to ASTM D 2321 and ASTM F 1668.
 - 7. Install PVC profile sewer piping according to ASTM D 2321 and ASTM F 1668.
 - 8. Install PVC gravity sewer piping according to ASTM D 2321 and ASTM F 1668.

SPECIFICATIONS

- G. Install force-main, pressure piping according to the following:
 - 1. Install piping with restrained joints at tee fittings and at horizontal and vertical changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
 - 2. Install piping with 36-inch minimum cover.
 - 3. Install ductile-iron pressure piping according to AWWA C600 or AWWA M41.
 - 4. Install ductile-iron special fittings according to AWWA C600.
 - 5. Install PVC pressure piping according to AWWA M23 or to ASTM D 2774 and ASTM F 1668.
 - 6. Install PVC water-service piping according to ASTM D 2774 and ASTM F 1668.
- H. Install corrosion-protection piping encasement over the following underground metal piping according to ASTM A 674 or AWWA C105:
 - 1. Hub-and-spigot, cast-iron soil pipe.
 - 2. Hubless cast-iron soil pipe and fittings.
 - 3. Ductile-iron pipe and fittings.
 - 4. Expansion joints and deflection fittings.
- I. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

3.2 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, nonpressure, drainage piping according to the following:
 - 1. Join PVC cellular-core sewer piping according to ASTM D 2321 and ASTM F 891 for solvent-cemented joints.
 - 2. Join PVC profile sewer piping according to ASTM D 2321 for elastomeric-seal joints or ASTM F 794 for gasketed joints.
 - 3. Join dissimilar pipe materials with nonpressure-type, flexible couplings.
- B. Join force-main, pressure piping according to the following:
 - 1. Join PVC pressure piping according to AWWA M23 for gasketed joints.
 - 2. Join PVC water-service piping according to ASTM D 2855.
 - 3. Join dissimilar pipe materials with pressure-type couplings.
- C. Pipe couplings, expansion joints, and deflection fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
 - 1. Use nonpressure flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.
 - a. Shielded flexible couplings for pipes of same or slightly different OD.
 - b. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.
 - 2. Use pressure pipe couplings for force-main joints.

SPECIFICATIONS

3.3 MANHOLE INSTALLATION

- A. General: Install manholes complete with appurtenances and accessories indicated.
- B. Install precast concrete manhole sections with sealants according to ASTM C 891.
- C. Install FRP manholes according to manufacturer's written instructions.
- D. Form continuous concrete channels and benches between inlets and outlet.
- E. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere unless otherwise indicated.
- F. Install manhole-cover inserts in frame and immediately below cover.

3.4 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318.

3.5 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts, and use cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
 - 1. Use Medium-Duty, top-loading classification cleanouts in unpaved and paved foot-traffic areas.
 - 2. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.
 - 3. Use Extra-Heavy-Duty, top-loading classification cleanouts in roads.
- B. Set cleanout frames and covers in earth in cast-in-place-concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding grade.
- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.6 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping to building's sanitary building drains.
- B. Connect force-main piping to building's sanitary force mains. Terminate piping where indicated.
- C. Make connections to existing piping and underground manholes.

SPECIFICATIONS

1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch overlap with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes by cutting opening into existing unit large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe or manhole wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
 - a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
 - b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
4. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.7 IDENTIFICATION

- A. Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.
 1. Use detectable warning tape over ferrous piping.
 2. Use detectable warning tape over nonferrous piping and over edges of underground manholes.

3.8 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
 1. Submit separate report for each system inspection.
 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.

SPECIFICATIONS

- d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
- 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
- 4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
 - 1. Do not enclose, cover, or put into service before inspection and approval.
 - 2. Test completed piping systems according to requirements of authorities having jurisdiction.
 - 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
 - 4. Submit separate report for each test.
 - 5. Hydrostatic Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction and the following:
 - a. Fill sewer piping with water. Test with pressure of at least 10-foot head of water, and maintain such pressure without leakage for at least 15 minutes.
 - b. Purge air and refill with water.
 - c. Disconnect water supply.
 - d. Test and inspect joints for leaks.
 - 6. Force Main: Perform hydrostatic test after thrust blocks, supports, and anchors have hardened. Test at pressure not less than 1-1/2 times the maximum system operating pressure, but not less than 150 psig.
 - a. PVC Piping: Test according to AWWA M23, "Testing and Maintenance" Chapter.
 - 7. Manholes: Perform hydraulic test according to ASTM C 969.
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.9 CLEANING

- A. Clean dirt and superfluous material from interior of piping. Flush with potable water.

END OF SECTION 22 13 13

SECTION 22 47 13
DRINKING FOUNTAINS

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 drinking fountains and related components.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of drinking fountain.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 2. Include operating characteristics, and furnished specialties and accessories.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For drinking fountains to include in maintenance manuals.

1.5 PLUMBING FIXTURES

- A. Plumbing fixtures and accessories provided in a toilet room or bathing room required to comply with CBC Section 11B-213.2 shall comply with CBC Sections 11B-213.3.
- B. Accessible plumbing fixtures shall comply with all the requirements in CBC Division 6.
- C. Heights and location of all accessible fixtures shall be mounted according to CBC Section 11B-602 through 11B-612.
- D. Accessible fixture controls shall comply with CBC Sections 11B-602.3 for drinking fountains, 11B-604.6 for water closets, 11B-604.9.5 for children's water closets, 11B-605.4 for urinals, 11B-604.4 for lavatories and sinks, 11B-607.5 for bathtubs, 11B-608.5 for showers, and 11B-611.3 for washing machines and clothes dryers.
- E. Accessible lavatories and sinks shall be mounted with the front of the higher of the rim or counter surface 34" maximum above the finish floor or ground. Depth of lavatories or sinks shall not interfere with knee and toe clearance provided in accordance with CBC

Section 11B-306 when a forward approach is required. CBC Sections 11B-606.3 and 11B-606.7

- F. Water supply and drainpipes under accessible lavatories and sinks shall be insulated or otherwise configured to protect against contact. There shall be no sharp or abrasive surfaces under accessible lavatories and sinks. CBC Section 11B-606.5

PART 2 - PRODUCTS

2.1 DRINKING FOUNTAINS DF-1: Stainless Steel, wall mounted.

1. Enameled Iron Drinking Fountains:
 - a. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1) Haws – (Basis of Design) 1501 Barrier-free Hi-Lo
 - 2) Or equal.
2. Standards:
 - a. Comply with ICC A117.1
 - b. Comply with NSF 61.
3. Type Receptor: Slab.
4. Receptor Shape: Rectangular.
5. Back Panel: Stainless steel with powder coated finish behind drinking fountain.
6. Bubblers: Two, with adjustable stream regulator, located on deck.
7. Control: Push button.
8. Drain: Grid type with NPS 1-1/4 (DN 32) tailpiece.
9. Supply: NPS 3/8 (DN 10) with shutoff valve.
10. Waste Fitting: ASME A112.18.2/CSA B125.2, NPS 1-1/4 (DN 32) chrome-plated brass P-trap and waste.
11. Support: ASME A112.6.1M, Concealed support carrier.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in for water-supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before fixture installation.
- B. Examine walls and floors for suitable conditions where fixtures will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install fixtures level and plumb according to roughing-in drawings. For fixtures indicated for children, install at height required by authorities having jurisdiction.
- B. Install off-the-floor carrier supports, affixed to building substrate, for wall-mounted fixtures.
- C. Install water-supply piping with shutoff valve on supply to each fixture to be connected to domestic-water distribution piping. Use ball or gate valve. Install valves in locations where they can be easily reached for operation.
- D. Install trap and waste piping on drain outlet of each fixture to be connected to sanitary drainage system.
- E. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons where required to conceal protruding fittings.
- F. Seal joints between fixtures and walls using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 07 92 00 "Joint Sealants."

3.3 CONNECTIONS

- A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- B. Install ball or gate shutoff valve on water supply to each fixture.

3.4 ADJUSTING

- A. Adjust fixture flow regulators for proper flow and stream height.

3.5 CLEANING

- A. After installing fixtures, inspect unit. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.

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- B. Clean fixtures, on completion of installation, according to manufacturer's written instructions.
- C. Provide protective covering for installed fixtures.
- D. Do not allow use of fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 22 47 13

SPECIFICATIONS

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.
- B. Related Requirements:
 - 1. Series 27 15 00 "Communications Horizontal Cabling" for cabling used for voice and data circuits.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent company, with the experience and capability to conduct the testing indicated, that is a member company of the National Electrical Testing Association (NETA) or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
 - 1. Testing Agency's Field Supervisor: Person currently certified by the National Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

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PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cerro Wire LLC.
 - 2. General Cable; General Cable Corporation.
 - 3. Southwire Company.
 - 4. Or Equal.
- B. Copper Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.
- C. Conductor Insulation:
 - 1. Type TC-ER: Comply with NEMA WC 70/ICEA S-95-658 and UL 1277.
 - 2. Type THHN and Type THWN-2: Comply with UL 83.
 - 3. Type XHHW-2: Comply with UL 44.

2.2 CONNECTORS AND SPLICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. 3M.
 - 2. Ideal Industries, Inc.
 - 3. O-Z/Gedney; a brand of Emerson Industrial Automation.
 - 4. Or Equal.
- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in CEC, by a qualified testing agency, and marked for intended location and application.
- B. Comply with CEC.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

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- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND WIRING METHODS

- A. Service Entrance: Type XHHW-2, single conductors in raceway.
- B. Exposed Feeders: Type XHHW-2, single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type XHHW-2, single conductors in raceway.
- D. Feeders Installed below Raised Flooring: Type XHHW-2, single conductors in raceway.
- E. Exposed Branch Circuits, Including in Crawlspace: Type THHN/THWN-2, single conductors in raceway.
- F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.
- G. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type XHHW-2, single conductors in raceway.
- H. Branch Circuits Installed below Raised Flooring: Type THHN/THWN-2, single conductors in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 26 05 33 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, which will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Support cables according to Section 26 05 29 "Hangers and Supports for Electrical Systems."

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3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform the following tests and inspections.
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors and conductors feeding critical equipment and services for compliance with requirements.
 - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
 - b. Test bolted connections for high resistance using one of the following:
 - 1) A low-resistance ohmmeter.
 - 2) Calibrated torque wrench.
 - 3) Thermographic survey.
 - c. Inspect compression applied connectors for correct cable match and indentation.
 - d. Inspect for correct identification.
 - e. Inspect cable jacket and condition.
 - f. Insulation-resistance test on each conductor with respect to ground and adjacent conductors. Apply a potential of 1000-V dc for 600-V rated cable for a one-minute duration.
 - g. Continuity test on each conductor and cable.
 - h. Uniform resistance of parallel conductors.
 - 3. Initial Infrared Scanning: After Substantial Completion, but before Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.
 - a. Instrument: Use an infrared scanning device designed to measure the temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - b. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of

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deficiencies detected, remedial action taken, and observations after remedial action.

- B. Cables will be considered defective if they do not pass tests and inspections.
- C. Test and Inspection Reports: Prepare a written report to record the following:
 - 1. Procedures used.
 - 2. Results that comply with requirements.
 - 3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

END OF SECTION 26 05 19

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SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes grounding and bonding systems and equipment.
- B. Section includes grounding and bonding systems and equipment, plus the following special applications:
 - 1. Relocatable buildings.
 - 2. Ramps, landings, stairs, and handrails not attached to permanent building structural steel.

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. As-Built Data: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:
 - 1. Test wells.
 - 2. Ground rods.
- B. Qualification Data: For testing agency and testing agency's field supervisor.
- C. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Certified by NETA.
 - 1. Testing Agency's Field Supervisor: Certified by NETA.

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PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Burndy; Part of Hubbell Electrical Systems.
 - 2. ILSCO.
 - 3. O-Z/Gedney; a brand of Emerson Industrial Automation.
 - 4. Or Equal.

2.2 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in CEC, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

2.3 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
 - 4. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 - 5. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
- C. Bare Grounding Conductor and Conductor Protector for Wood Poles:
 - 1. No.4 AWG minimum, soft-drawn copper (minimum)
 - 2. Conductor Protector: Half-round PVC or wood molding. If wood, use pressure-treated fir or cypress or cedar.

2.4 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.

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- C. Cable-to-Cable Connectors: Compression type, copper or copper alloy.
- D. Cable Tray Ground Clamp: Mechanical type, zinc-plated malleable iron.
- E. Conduit Hubs: Mechanical type, terminal with threaded hub.
- F. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hexagon head bolt.
- G. Straps: Solid copper, copper lugs. Rated for 600 A.
- H. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.
- I. Water Pipe Clamps:
 - 1. Mechanical type, two pieces with zinc-plated bolts.
 - a. Material: Die-cast zinc alloy.
 - b. Listed for direct burial.
 - 2. U-bolt type with malleable-iron clamp and [copper ground connector] [copper ground connector rated for direct burial].

2.5 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel, sectional type; 3/4 inch by 10 feet.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
 - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 - 4. Connections to Structural Steel: Welded connectors.
 - 5. Connections to Metallic Ramps: Point of connection shall be on the ramp legs under the ramps.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.

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- B. Install insulated equipment grounding conductors with the following items, in addition to those required by CEC:
 - 1. Feeders and branch circuits.
 - 2. Lighting circuits.
 - 3. Receptacle circuits.
 - 4. Single-phase motor and appliance branch circuits.
 - 5. Three-phase motor and appliance branch circuits.
 - 6. Flexible raceway runs.

3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.
 - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
 - 2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- C. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes shall be at least 12 inches deep, with cover.
 - 1. Test Wells: Install at least one test well for each service unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.
- D. Grounding and Bonding for Piping:
 - 1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
 - 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
 - 3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.
- E. Grounding for Relocatable Buildings: Provide ground rods and grounding conductor to effectively ground the relocatable building.

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3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform the following tests and inspections.
 - 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 - 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 - 3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells, and at individual ground rods. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81.
- B. Grounding system will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.
- D. Report measured ground resistances that exceed the following values:
 - 1. Power and Lighting Equipment or System with Capacity of 500 kVA and less: 25 ohms.
- E. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify District Construction Manager promptly and include recommendations to reduce ground resistance.

END OF SECTION 26 05 26

SPECIFICATIONS

SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Steel slotted support systems.
 - 2. Conduit and cable support devices.
 - 3. Support for conductors in vertical conduit.
 - 4. Fabricated metal equipment support assemblies.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
 - a. Slotted support systems, hardware, and accessories.
 - b. Clamps.
 - c. Hangers.
 - d. Sockets.
 - e. Eye nuts.
 - f. Fasteners.
 - g. Anchors.
 - h. Saddles.
 - i. Brackets.
 - 2. Include rated capacities and furnished specialties and accessories.

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PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch-diameter holes at a maximum of 8 inches on center in at least one surface.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit; a part of Atkore International.
 - b. G-Strut.
 - c. Unistrut; Part of Atkore International.
 - d. Or Equal
 - 2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
 - 3. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 - 4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 - 5. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.
- D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.
- E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 - 1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened Portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Hilti, Inc.
 - 2) ITW Ramset/Red Head; Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.
 - 4) Or Equal.

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2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened Portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Hilti, Inc.
 - 2) ITW Ramset/Red Head; Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.
 - 4) Or Equal.
3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Section 05 50 00 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:
 1. NECA 1.
- B. Comply with requirements in Section 07 84 13 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.
- C. Comply with requirements for raceways and boxes specified in Section 26 05 33 "Raceways and Boxes for Electrical Systems."
- D. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, and RMC as CEC. Minimum rod size shall be 1/4 inch in diameter.

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- E. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings, and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT and RMC may be supported by openings through structure members, according to CEC.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.
 - 5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Section 05 50 00 "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

END OF SECTION 26 05 29

SPECIFICATIONS

SECTION 26 05 33

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Metal conduits, tubing, and fittings.
 - 2. Metal wireways and auxiliary gutters.
 - 3. Boxes, enclosures, and cabinets.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. FMC: Flexible metal conduit.
- C. GRC: Galvanized rigid steel conduit.
- D. LFMC: Liquid-tight flexible metal conduit.
- E. RNC: Rigid non-metallic conduit.

1.4 ACTION SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

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DEL ROSA FULL DAY KINDER CLASSROOMS

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1. Allied Tube & Conduit; a part of Atkore International.
 2. Western Tube and Conduit Corporation.
 3. Wheatland Tube Company.
 4. Or Equal.
- B. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in CEC, by a qualified testing agency, and marked for intended location and application.
- C. GRC: Comply with ANSI C80.1 and UL 6.
- D. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
1. Comply with NEMA RN 1.
 2. Coating Thickness: 0.040 inch, minimum.
- E. EMT: Comply with ANSI C80.3 and UL 797.
- F. FMC: Comply with UL 1; zinc-coated steel.
- G. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- H. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and CEC.
 2. Fittings for EMT:
 - a. Material: Steel.
 - b. Type: Compression.
 3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.

2.2 METAL WIREWAYS AND AUXILIARY GUTTERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. B-line, an Eaton business.
 2. Hoffman; a brand of Pentair Equipment Protection.
 3. Square D.
 4. Or Equal.
- B. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- C. Wireway Covers: Screw-cover type unless otherwise indicated.

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- D. Finish: Manufacturer's standard enamel finish.

2.3 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Hoffman; a brand of Pentair Equipment Protection.
 - 2. Hubbell Incorporated.
 - 3. RACO; Hubbell.
 - 4. Or Equal.
- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
 - 1. Listing and Labeling: Paddle fan outlet boxes shall be listed and labeled as defined in CEC, by a qualified testing agency, and marked for intended location and application.
- D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- E. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.
- F. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- G. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.
- H. Gangable boxes are allowed.
- I. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - 2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- J. Cabinets:
 - 1. NEMA 250, Type 1 or Type 3R galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 - 2. Hinged door in front cover with flush latch and concealed hinge.
 - 3. Key latch to match panelboards.
 - 4. Metal barriers to separate wiring of different systems and voltage.
 - 5. Accessory feet where required for freestanding equipment.

SPECIFICATIONS

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
 - 1. Exposed Conduit: GRC.
 - 2. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 - 3. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated:
 - 1. Exposed, Above 8'-0", Not Subject to Physical Damage: EMT.
 - 2. Exposed, At 8'-0" or Below, Not Subject to Severe Physical Damage: GRC.
 - 3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 - 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
 - 5. Damp or Wet Locations: GRC.
- C. Minimum Raceway Size: 3/4-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
 - 1. Rigid Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 - 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
 - 3. EMT: Use compression, steel fittings. Comply with NEMA FB 2.10.
 - 4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- E. Install surface raceways only where indicated on Drawings.
- F. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with CEC limitations for types of raceways allowed in specific occupancies and number of floors.
- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

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- C. Complete raceway installation before starting conductor installation.
- D. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for hangers and supports.
- E. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.
- F. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- G. Support conduit within 12 inches of enclosures to which attached.
- H. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- I. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.
- J. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- K. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- L. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- M. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- N. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- O. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- P. Install raceway sealing fittings at accessible locations according to CEC and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to CEC.

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- Q. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 2. Where an underground service raceway enters a building or structure.
 3. Where otherwise required by CEC.
- R. Comply with manufacturer's written instructions for solvent welding RNC and fittings.
- S. Expansion-Joint Fittings:
1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet. Install in each run of aboveground GRC and EMT conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.
 2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
 - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
 - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
 - c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
 - d. Attics: 135 deg F temperature change.
 3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
 4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
 5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
- T. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed and semi-recessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
1. Use LFMC in damp or wet locations.
- U. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to top of box for control devices and to the bottom of box for receptacles and convenience devices, unless otherwise indicated.

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- V. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- W. Locate boxes so that cover or plate will not span different building finishes.
- X. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- Y. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- Z. Set metal floor boxes level and flush with finished floor surface.

3.3 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 26 05 33

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SECTION 26 05 43

UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Rigid nonmetallic duct.
 - 2. Duct accessories.
 - 3. Precast concrete handholes.

1.3 DEFINITIONS

- A. Direct Buried: Duct or a duct bank that is buried in the ground, without any additional casing materials such as concrete.
- B. Duct: A single duct or multiple ducts. Duct may be either installed singly or as component of a duct bank.
- C. Duct Bank:
 - 1. Two or more ducts installed in parallel, with or without additional casing materials.
 - 2. Multiple duct banks.
- D. Trafficways: Locations where vehicular or pedestrian traffic is a normal course of events.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include duct-bank materials, including spacers and miscellaneous components.

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2. Include duct, conduits, and their accessories, including elbows, end bells, bends, fittings, and solvent cement.
3. Include accessories for handholes and boxes.
4. Include underground-line warning tape.

B. Shop Drawings:

1. Precast or Factory-Fabricated Underground Utility Structures:
 - a. Include plans, elevations, sections, details, attachments to other work, and accessories.
 - b. Include duct entry provisions, including locations and duct sizes.
 - c. Include reinforcement details.
 - d. Include frame and cover design and manhole chimneys.
 - e. Include grounding details.
 - f. Include dimensioned locations of cable rack inserts, pulling-in and lifting irons, and sumps.
 - g. Include joint details.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer and testing agency responsible for testing nonconcrete handholes and boxes.
- B. Product Certificates: For concrete and steel used in precast concrete handholes, as required by ASTM C 858.
- C. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

1.7 FIELD CONDITIONS

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions, and then only after arranging to provide temporary electrical service according to requirements indicated:
 1. Notify District Construction Manager no fewer than five days in advance of proposed interruption of electrical service.
 2. Do not proceed with interruption of electrical service without District Construction Manager's written permission.
- B. Ground Water: Assume ground-water level is at grade level unless a lower water table is noted on Drawings.

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- C. Ground Water: Assume ground-water level is 36 inches below ground surface unless a higher water table is noted on Drawings.

PART 2 - PRODUCTS

2.1 RIGID NONMETALLIC DUCT

- A. Underground Plastic Utilities Duct: Type EPC-80-PVC and Type EPC-40-PVC RNC, complying with NEMA TC 2 and UL 651, with matching fittings complying with NEMA TC 3 by same manufacturer as duct.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. CANTEX INC.
 - 2. Condux International, Inc.
 - 3. Crown Line Plastics.
 - 4. Or Equal.
- C. Listed and labeled as defined in NFPA 70, by a nationally recognized testing laboratory, and marked for intended location and application.
- D. Solvents and Adhesives: As recommended by conduit manufacturer.
 - 1. Solvents and adhesives shall comply with the testing and product requirements of San Diego Air Pollution Control District Rule 67.0 "Architectural Coatings" and Rule 67.21 "Adhesive Material Application Operations."

2.2 DUCT ACCESSORIES

- A. Duct Spacers: Factory-fabricated, rigid, PVC interlocking spacers; sized for type and size of duct with which used, and selected to provide minimum duct spacing indicated while supporting duct during concreting or backfilling.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit; a part of Atkore International.
 - b. CANTEX INC.
 - c. IPEX USA LLC.
 - d. Or Equal
- B. Underground-Line Warning Tape: Comply with requirements for underground-line warning tape specified in Section 26 05 53 "Identification for Electrical Systems."

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2.3 PRECAST CONCRETE HANDHOLES AND BOXES

- A. Description: Factory-fabricated, reinforced-concrete, monolithically poured walls and bottom unless open-bottom enclosures are indicated. Frame and cover shall form top of enclosure and shall have load rating consistent with that of handhole or box.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Oldcastle Precast, Inc.
 - 2. Utility Concrete Products, LLC.
 - 3. Utility Vault Co.
 - 4. Or Equal.
- C. Comply with ASTM C 858 for design and manufacturing processes.
- D. Frame and Cover: Weatherproof cast-iron frame, with cast-iron cover with recessed cover hook eyes and tamper-resistant, captive, cover-securing bolts.
- E. Frame and Cover: Weatherproof steel frame, with steel cover with recessed cover hook eyes and tamper-resistant, captive, cover-securing bolts.
- F. Frame and Cover: Weatherproof steel frame, with hinged steel access door assembly with tamper-resistant, captive, cover-securing bolts.
 - 1. Cover Hinges: Concealed, with hold-open ratchet assembly.
 - 2. Cover Handle: Recessed.
- G. Frame and Cover: Weatherproof aluminum frame with hinged aluminum access door assembly with tamper-resistant, captive, cover-securing bolts.
 - 1. Cover Hinges: Concealed, with hold-open ratchet assembly.
 - 2. Cover Handle: Recessed.
- H. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
- I. Cover Legend: Molded lettering, "ELECTRIC."
- J. Configuration: Units shall be designed for flush burial and have integral closed bottom unless otherwise indicated.
- K. Extensions and Slabs: Designed to mate with bottom of enclosure. Same material as enclosure.
 - 1. Extension shall provide increased depth of 12 inches.
 - 2. Slab: Same dimensions as bottom of enclosure, and arranged to provide closure.
- L. Joint Sealant: Asphaltic-butyl material with adhesion, cohesion, flexibility, and durability properties necessary to withstand maximum hydrostatic pressures at the installation location with the ground-water level at grade.

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- M. Knockout Panels: Precast openings in walls, arranged to match dimensions and elevations of approaching duct, plus an additional 12 inches vertically and horizontally to accommodate alignment variations.
 - 1. Splayed location.
 - 2. Knockout panels shall be located no less than 6 inches from interior surfaces of walls, floors, or frames and covers of handholes, but close enough to corners to facilitate racking of cables on walls.
 - 3. Knockout panel opening shall have cast-in-place, welded-wire fabric reinforcement for field cutting and bending to tie in to concrete envelopes of duct.
 - 4. Knockout panels shall be framed with at least two additional No. 3 steel reinforcing bars in concrete around each opening.
 - 5. Knockout panels shall be 1-1/2 to 2 inches thick.
- N. Duct Entrances in Handhole Walls: Cast end-bell or duct-terminating fitting in wall for each entering duct.
 - 1. Type and size shall match fittings to duct to be terminated.
 - 2. Fittings shall align with elevations of approaching duct and be located near interior corners of handholes to facilitate racking of cable.

2.4 SOURCE QUALITY CONTROL

- A. Test and inspect precast concrete utility structures according to ASTM C 1037.
- B. Nonconcrete Handhole and Pull-Box Prototype Test: Test prototypes of manholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.
 - 1. Tests of materials shall be performed by an independent testing agency.
 - 2. Strength tests of complete boxes and covers shall be by an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
 - 3. Testing machine pressure gages shall have current calibration certification, complying with ISO 9000 and ISO 10012, and traceable to NIST standards.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Coordinate layout and installation of duct, duct bank, manholes, handholes, and boxes with final arrangement of other utilities, site grading, and surface features as determined in the field. Notify Architect if there is a conflict between areas of excavation and existing structures or archaeological sites to remain.
- B. Coordinate elevations of duct and duct-bank entrances into manholes, handholes, and boxes with final locations and profiles of duct and duct banks, as determined by coordination with other utilities, underground obstructions, and surface features. Revise

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locations and elevations as required to suit field conditions and to ensure that duct and duct bank will drain to manholes and handholes, and as approved by Architect.

- C. Clear and grub vegetation to be removed, and protect vegetation to remain according to Section 31 10 00 "Site Clearing." Remove and stockpile topsoil for reapplication according to Section 31 10 00 "Site Clearing."

3.2 UNDERGROUND DUCT APPLICATION

- A. Duct for Electrical Feeders 600 V and Less: Type EPC-80-PVC or Type EPC-40-PVC RNC, direct-buried unless otherwise indicated.
 - 1. Concrete encasement shall be two sack slurry with red dye and is required for all 600 V and less feeders under driveways and pathways designed for vehicular traffic, excluding emergency vehicles. Asphalt surfaced playgrounds and vehicle entry gates are not considered a path or driveway. Concrete encasement shall be a minimum of 3 inches of cover on all sides.
 - 2. All other duct banks operating at less than 600 V shall have 3 inches of sand base and 6 inches of sand cover and compacted native soil on top.
- B. Duct for Electrical Branch Circuits: Type EPC-40-PVC RNC, direct-buried unless otherwise indicated.
 - 1. All ducts for branch circuits shall have 2 inches of sand base and 3 inches of sand cover and compacted native soil on top.

3.3 UNDERGROUND ENCLOSURE APPLICATION

- A. Handholes and Boxes for 600 V and Less:
 - 1. Units in Roadways and Other Deliberate Traffic Paths: Precast concrete, AASHTO HB 17, H-10 structural load rating.
 - 2. Units in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: Precast concrete, AASHTO HB 17, H-20 structural load rating.
 - 3. Units in Sidewalk and Similar Applications with a Safety Factor for Nondeliberate Loading by Vehicles: Precast concrete, AASHTO HB 17, H-10 structural load rating.
 - 4. Units Subject to Light-Duty Pedestrian Traffic Only: Polymer Concrete, structurally tested according to SCTE 77 with 3000-lbf vertical loading.
 - 5. Cover design load shall not exceed the design load of the handhole or box.

3.4 EARTHWORK

- A. Excavation and Backfill: Comply with Section 31 20 00 "Earth Moving," but do not use heavy-duty, hydraulic-operated, compaction equipment.

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- B. Restoration: Replace area immediately after backfilling is completed.
- C. Restore surface features at areas disturbed by excavation, and re-establish original grades unless otherwise indicated. Replace removed sod immediately after backfilling is completed.
- D. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching. Comply with Section 32 92 00 "Turf and Grasses" and Section 32 93 00 "Plants."
- E. Cut and patch existing pavement in the path of underground duct, duct bank, and underground structures according to "Cutting and Patching" Article in Section 01 73 00 "Execution."

3.5 DUCT AND DUCT-BANK INSTALLATION

- A. Where indicated on Drawings, install duct, spacers, and accessories into the duct-bank configuration shown. Duct installation requirements in this Section also apply to duct bank.
- B. Install duct according to NEMA TCB 2.
- C. Slope: Pitch duct a minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope duct from a high point between two manholes, to drain in both directions.
- D. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with a minimum radius of 48 inches, both horizontally and vertically, at other locations unless otherwise indicated.
 - 1. Duct shall have maximum of two 90 degree bends or the total of all bends shall be no more 180 degrees between pull points.
- E. Joints: Use solvent-cemented joints in duct and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent duct do not lie in same plane.
- F. Building Wall Penetrations: Make a transition from underground duct to GRC flush with grade or flush with finished floor. RNC shall not extend more than 4 inches above finished floor or grade to the transition to GRC. Install GRC penetrations of building walls as specified in Section 26 05 44 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."
- G. Sealing: Provide temporary closure at terminations of duct with pulled cables. Seal spare duct at terminations. Use sealing compound and plugs to withstand at least 15-psig hydrostatic pressure.
- H. Pulling Cord: Install 200-lbf-test nylon cord in empty ducts.

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I. Concrete-Encased Ducts and Duct Bank:

1. Excavate trench bottom to provide firm and uniform support for duct. Prepare trench bottoms as specified in Section 31 20 00 "Earth Moving" for pipes less than 6 inches in nominal diameter.
2. Width: Excavate trench 12 inches wider than duct on each side.
3. Width: Excavate trench 3 inches wider than duct on each side.
4. Depth: Install so top of duct envelope is at least 24 inches below finished grade in areas not subject to deliberate traffic, and at least 30 inches below finished grade in deliberate traffic paths for vehicles unless otherwise indicated.
5. Support duct on duct spacers coordinated with duct size, duct spacing, and outdoor temperature.
6. Spacer Installation: Place spacers close enough to prevent sagging and deforming of duct, with not less than four spacers per 20 feet of duct. Place spacers within 24 inches of duct ends. Stagger spacers approximately 6 inches between tiers. Secure spacers to earth and to duct to prevent floating during concreting. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.
7. Minimum Space between Duct: 3 inches between edge of duct and exterior envelope wall, 2 inches between ducts for like services, and 4 inches between power and communications ducts.
8. Elbows: Use manufactured duct elbows for stub-ups, at building entrances, and at changes of direction in duct unless otherwise indicated. Extend encasement throughout length of elbow.
9. Forms: Use walls of trench to form side walls of duct bank where soil is self-supporting and concrete envelope can be poured without soil inclusions; otherwise, use forms.
10. Concrete Cover: Install a minimum of 3 inches of concrete cover between edge of duct to exterior envelope wall, 2 inches between duct of like services, and 12 inches between power and communications ducts.
11. Concreting Sequence: Pour each run of envelope between manholes or other terminations in one continuous operation.
 - a. Start at one end and finish at the other, allowing for expansion and contraction of duct as its temperature changes during and after the pour. Use expansion fittings installed according to manufacturer's written instructions, or use other specific measures to prevent expansion-contraction damage.
 - b. If more than one pour is necessary, terminate each pour in a vertical plane and install 3/4-inch reinforcing-rod dowels extending a minimum of 18 inches into concrete on both sides of joint near corners of envelope.
12. Pouring Concrete: Comply with requirements in "Concrete Placement" Article in Section 03 30 00 "Cast-in-Place Concrete." Place concrete carefully during pours to prevent voids under and between duct and at exterior surface of envelope. Do not allow a heavy mass of concrete to fall directly onto ducts. Allow concrete to flow around duct and rise up in middle, uniformly filling all open spaces. Do not use power-driven agitating equipment unless specifically designed for duct-installation application.

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- J. Underground-Line Warning Tape: Bury conducting underground line specified in Section 26 05 53 "Identification for Electrical Systems" no less than 12 inches above all concrete-encased duct and duct banks and approximately 12 inches below grade. Align tape parallel to and within 3 inches of centerline of duct bank. Provide an additional warning tape for each 12-inch increment of duct-bank width over a nominal 18 inches. Space additional tapes 12 inches apart, horizontally.

3.6 INSTALLATION OF CONCRETE HANDHOLES, AND BOXES

- A. Precast Concrete Handhole and Manhole Installation:
 - 1. Comply with ASTM C 891 unless otherwise indicated.
 - 2. Install units level and plumb and with orientation and depth coordinated with connecting duct, to minimize bends and deflections required for proper entrances.
 - 3. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
- B. Elevations:
 - 1. Handhole Covers: In paved areas and trafficways, set surface flush with finished grade. Set covers of other handholes 1 inch above finished grade.
 - 2. Where indicated, cast handhole cover frame integrally with handhole structure.
- C. Drainage: Install drains in bottom of manholes where indicated. Coordinate with drainage provisions indicated.
- D. Hardware: Install removable hardware, including pulling eyes, cable stanchions, and cable arms, as required for installation and support of cables and conductors and as indicated.
- E. Fixed Manhole Ladders: Arrange to provide for safe entry with maximum clearance from cables and other items in manholes.
- F. Field-Installed Bolting Anchors in Manholes and Concrete Handholes: Do not drill deeper than 3-7/8 inches for manholes and 2 inches for handholes, for anchor bolts installed in the field. Use a minimum of two anchors for each cable stanchion.

3.7 GROUNDING

- A. Ground underground ducts and utility structures according to Section 26 05 26 "Grounding and Bonding for Electrical Systems."

3.8 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Demonstrate capability and compliance with requirements on completion of installation of underground duct, duct bank, and utility structures.

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2. Pull solid aluminum or wood test mandrel through duct to prove joint integrity and adequate bend radii, and test for out-of-round duct. Provide a minimum 12-inch-long mandrel equal to duct size minus 1/4 inch. If obstructions are indicated, remove obstructions and retest.
 3. Test handhole grounding to ensure electrical continuity of grounding and bonding connections. Measure and report ground resistance as specified in Section 26 05 26 "Grounding and Bonding for Electrical Systems."
- B. Correct deficiencies and retest as specified above to demonstrate compliance.
- C. Prepare test and inspection reports.

3.9 CLEANING

- A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of duct until duct cleaner indicates that duct is clear of dirt and debris. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.
- B. Clean internal surfaces of manholes, including sump.
1. Sweep floor, removing dirt and debris.
 2. Remove foreign material.

END OF SECTION 26 05 43

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SECTION 26 24 16

PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Distribution panelboards.
 - 2. Lighting and appliance branch-circuit panelboards.
 - 3. Electronic-grade panelboards.

1.3 DEFINITIONS

- A. ATS: Acceptance testing specification.
- B. GFCI: Ground-fault circuit interrupter.
- C. GFEP: Ground-fault equipment protection.
- D. HID: High-intensity discharge.
- E. MCCB: Molded-case circuit breaker.
- F. SPD: Surge protective device.
- G. VPR: Voltage protection rating.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of panelboard.
 - 1. Include materials, switching and overcurrent protective devices, SPDs, accessories, and components indicated.
 - 2. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment.

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1. Include dimensioned plans, elevations, sections, and details.
2. Show tabulations of installed devices with nameplates, conductor termination sizes, equipment features, and ratings.
3. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
4. Detail bus configuration, current, and voltage ratings.
5. Short-circuit current rating of panelboards and overcurrent protective devices.
6. Include evidence of NRTL listing for SPD as installed in panelboard.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Panelboard Schedules: For installation in panelboards.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: ISO 9001 or 9002 certified.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Remove loose packing and flammable materials from inside panelboards.
- B. Handle and prepare panelboards for installation according to NEMA PB 1.

1.8 FIELD CONDITIONS

- A. Environmental Limitations:
 1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
 2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - a. Ambient Temperature: Not exceeding 23 deg F to plus 104 deg F.
 - b. Altitude: Not exceeding 6600 feet.
- B. Service Conditions: NEMA PB 1, usual service conditions, as follows:
 1. Ambient temperatures within limits specified.
 2. Altitude not exceeding 6600 feet.
- C. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by District or others unless permitted under the following conditions and then

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only after arranging to provide temporary electric service according to requirements indicated:

1. Notify District Construction Manager no fewer than seven days in advance of proposed interruption of electric service.
2. Do not proceed with interruption of electric service without District Construction Manager's written permission.
3. Comply with NFPA 70E.

1.9 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.
 1. Panelboard Warranty Period: 18 months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANELBOARDS COMMON REQUIREMENTS

- A. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in CEC, by a qualified testing agency, and marked for intended location and application.
- C. Comply with NEMA PB 1.
- D. Comply with CEC.
- E. Enclosures: Surface-mounted, dead-front cabinets.
 1. Rated for environmental conditions at installed location.
 - a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
 - b. Outdoor Locations: NEMA 250, Type 3R.
 2. Height: 84 inches maximum.
 3. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box. Trims shall cover all live parts and shall have no exposed hardware.
 4. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.
 5. Finishes:

SPECIFICATIONS

- a. Panels and Trim: Galvanized steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
 - b. Back Boxes: Galvanized steel.
- F. Incoming Mains:
 - 1. Location: Top.
 - 2. Main Breaker: All panelboards shall have main breakers regardless of ampere rating.
 - 3. Where panelboards are protected up stream with a 250 ampere frame or larger electronic trip breaker in series with the panelboard main breaker, the main breaker in the panelboard shall be either electronic or a thermal magnetic trip breaker of the frame and trip size as noted.
- G. Phase, Neutral, and Ground Buses:
 - 1. Material: Hard-drawn copper, 98 percent conductivity and shall have an ampacity rating of 1000 amperes per square inch.
 - a. Plating shall run entire length of bus.
 - b. Bus shall be fully rated the entire length.
 - 2. Interiors shall be factory assembled into a unit. Replacing switching and protective devices shall not disturb adjacent units or require removing the main bus connectors.
 - 3. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
 - 4. Full-Sized Neutral: Equipped with full-capacity bonding strap for service entrance applications. Mount electrically isolated from enclosure. Do not mount neutral bus in gutter.
- H. Conductor Connectors: Suitable for use with conductor material and sizes.
 - 1. Material: Hard-drawn copper, 98 percent conductivity.
 - 2. Terminations shall allow use of 75 deg C rated conductors without derating.
 - 3. Size: Lugs suitable for indicated conductor sizes, with additional gutter space, if required, for larger conductors.
 - 4. Main and Neutral Lugs: Mechanical type, with a lug on the neutral bar for each pole in the panelboard.
 - 5. Ground Lugs and Bus-Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panelboard.
- A. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity. Series rated overcurrent devices are not acceptable or permitted.
 - 1. Panelboards and overcurrent protective devices rated 240 V or less shall have short-circuit ratings as shown on Drawings, but not less than 10,000 A rms symmetrical.

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2.2 POWER PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton.
 - 2. Siemens Energy.
 - 3. Square D; by Schneider Electric.
 - 4. Or Equal.
- B. Panelboards: NEMA PB 1, distribution type.
- C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
 - 1. For doors more than 36 inches high, provide two latches, keyed alike.
- D. Mains: Circuit breaker.
- E. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.
- F. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers.

2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton.
 - 2. Siemens Energy.
 - 3. Square D; by Schneider Electric.
 - 4. Or Equal.
- B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
- C. Mains: Circuit breaker.
- D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- E. Contactors in Main Bus: NEMA ICS 2, Class A, electrically held, general-purpose controller, with same short-circuit interrupting rating as panelboard.
 - 1. Internal Control-Power Source: Control-power transformer, with fused primary and secondary terminals, connected to main bus ahead of contactor connection.
 - 2. External Control-Power Source: 120-V branch circuit.
- F. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

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- G. Doors: Door-in-door construction with concealed hinges; secured with multipoint latch with tumbler lock; keyed alike. Outer door shall permit full access to the panel interior. Inner door shall permit access to breaker operating handles and labeling, but current carrying terminals and bus shall remain concealed.

2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- 1. Eaton.
- 2. Siemens Energy.
- 3. Square D; by Schneider Electric.
- 4. Or Equal.

- B. MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents.

- 1. Thermal-Magnetic Circuit Breakers:

- a. Inverse time-current element for low-level overloads.
- b. Instantaneous magnetic trip element for short circuits.
- c. Adjustable magnetic trip setting for circuit-breaker frame through sizes 125 A to 225 A.

- 2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

- 3. Electronic Trip Circuit Breakers: 250 A frame sizes and larger.

- a. RMS sensing.
- b. Field-replaceable rating plug or electronic trip.
- c. Digital display of settings, trip targets, and indicated metering displays.
- d. Multi-button keypad to access programmable functions and monitored data.
- e. Ten-event, trip-history log. Each trip event shall be recorded with type, phase, and magnitude of fault that caused the trip.
- f. Integral test jack for connection to portable test set or laptop computer.
- g. Field-Adjustable Settings:

- 1) Instantaneous trip.
- 2) Long- and short-time pickup levels.
- 3) Long and short time adjustments.
- 4) Ground-fault pickup level, time delay, and I squared T response. Ground fault function shall be provided on breakers required only where indicated on the drawings or required by code.

- 4. The requirement for electronic trip shall be based on the circuit breaker frame size indicated on the drawings. If the breaker frame size is voluntarily increased above what is indicated on the drawings, from a frame size less than 250 amperes to a frame size 250 amperes or greater for the purpose of terminating oversized feeder conductors due to voltage drop, electronic trip breakers shall not be required but

SPECIFICATIONS

shall meet the requirements for thermal magnetic breakers for frame sizes 125 A to 225 A.

5. MCCB Features and Accessories:

- a. Standard frame sizes, trip ratings, and number of poles.
- b. Breaker handle indicates tripped status.
- c. UL listed for reverse connection without restrictive line or load ratings.
- d. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
- e. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and HID lighting circuits.
- f. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
- g. Multipole units enclosed in a single housing with a single handle.
- h. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in off position.
- i. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.

2.5 IDENTIFICATION

- A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.
- B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.
- C. Circuit Directory: Directory card inside panelboard door, mounted in metal frame with transparent protective cover.
 1. Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.
- D. Circuit Directory: Computer-generated circuit directory mounted inside panelboard door with transparent plastic protective cover.
 1. Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify actual conditions with field measurements prior to ordering panelboards to verify that equipment fits in allocated space in, and comply with, minimum required clearances specified in CEC.

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- B. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.
- C. Examine panelboards before installation. Reject panelboards that are damaged, rusted, or have been subjected to water saturation.
- D. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Comply with NECA 1.
- C. Install panelboards and accessories according to NEMA PB 1.1.
- D. Equipment Mounting:
 - 1. Attach panelboard to the vertical finished or structural surface behind the panelboard.
- E. Mount top of trim 90 inches above finished floor unless otherwise indicated.
- F. Mount panelboard cabinet plumb and rigid without distortion of box.
- G. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- H. Mounting panelboards with space behind is recommended for damp, wet, or dirty locations. The steel slotted supports in the following paragraph provide an even mounting surface and the recommended space behind to prevent moisture or dirt collection.
- I. Mount surface-mounted panelboards to steel slotted supports 1 1/4 inch in depth. Orient steel slotted supports vertically.
- J. Install overcurrent protective devices and controllers not already factory installed.
 - 1. Tighten bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written instructions.
- K. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.

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- L. Install filler plates in unused spaces.
- M. Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future.
- N. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

3.3 IDENTIFICATION

- A. Create a directory to indicate installed circuit loads; incorporate District's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.
- B. Install warning signs complying with requirements in Section 26 05 53 "Identification for Electrical Systems" identifying source of remote circuit.

3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- C. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers and low-voltage surge arrestors stated in NETA ATS, Paragraph 7.6 Circuit Breakers. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- D. Panelboards will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results, with comparisons of the two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

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3.6 PROTECTION

- A. Temporary Heating: Prior to energizing panelboards, apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION 26 24 16

SPECIFICATIONS

SECTION 26 27 26

WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Standard-grade receptacles 125 V, 20 A.
 - 2. GFCI receptacles 125 V, 20 A.

1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- D. RFI: Radio-frequency interference.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in CEC, by a qualified testing agency, and marked for intended location and application.
- B. Comply with CEC.

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- C. Comply with NEMA WD 1.
- D. Device Color:
 - 1. Wiring Devices Connected to Normal Power System: Ivory unless otherwise indicated or required by CEC or device listing.
- E. Source Limitation: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.
- F. Occupancy Control Receptacles: Provide identification as required by CCR Title 24 Part 6.

2.2 STRAIGHT-BLADE RECEPTACLES

- A. Duplex Receptacles, 125 V, 20 A:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hubbell Incorporated; Wiring Device-Kellems.
 - b. Leviton Manufacturing Co., Inc.
 - c. Pass & Seymour/Legrand (Pass & Seymour).
 - d. Or Equal.
 - 2. Description: Two pole, three wire, and self-grounding.
 - 3. Configuration: NEMA WD 6, Configuration 5-20R.
 - 4. Standards: Comply with UL 498 and FS W-C-596.
 - 5. Grade: Heavy duty.

2.3 FINISHES

- A. Device Color:
 - 1. Wiring Devices Connected to Normal Power System: Ivory unless otherwise indicated or required by CEC or device listing.
- B. Wall Plate Color: 0.035-inch-thick, satin-finished, Type 302 stainless steel.
- C. Receptacle Cover Plates: For all receptacle plates, the plates shall be engraved or silk screened with the panel and circuit number identified for each device

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard or per the CEC unless otherwise noted on Drawings.

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B. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of CEC, Article 300, without pigtails.
4. Existing Conductors:
 - a. Cut back and pigtail, or replace all damaged conductors.
 - b. Straighten conductors that remain and remove corrosion and foreign matter.
 - c. Pig-tailing existing conductors is permitted, provided the outlet box is large enough.

C. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

D. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the left.

E. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

F. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.

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- G. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.
- H. Do not install vacancy sensors in any path of egress. Install occupancy/vacancy sensors in areas per the latest edition of CEC Title 24

3.2 FIELD QUALITY CONTROL

- A. Test Instruments: Use instruments that comply with UL 1426.
- B. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- C. Tests for Receptacles:
 - 1. Line Voltage: Acceptable range is 105 to 132 V.
 - 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
 - 3. Ground Impedance: Values of up to 2 ohms are acceptable.
 - 4. Using the test plug, verify that the device and its outlet box are securely mounted.
 - 5. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.
- D. Wiring device will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

END OF SECTION 26 27 26

SPECIFICATIONS

SECTION 27 05 26

GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Grounding and bonding conductors.
 - 2. Grounding and bonding connectors.
 - 3. Grounding and bonding busbars.
 - 4. Grounding and bonding labeling.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. GE: Grounding Equalizer.
- C. IBT: Intersystem Bonding Termination.
- D. IDF: Intermediate Distribution Frame.
- E. PBB: Primary Bonding Busbar.
- F. RBB: Rack Bonding Busbar.
- G. RCDD: Registered Communications Distribution Designer.
- H. SBB: Secondary Bonding Busbar.
- I. TBB: Telecommunications Bonding Backbone.
- J. TBC: Telecommunications Bonding Conductor.
- K. TEBC: Telecommunications Equipment Bonding Conductor.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

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DEL ROSA FULL DAY KINDER CLASSROOMS

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- B. Shop Drawings: For communications equipment room signal reference grid. Include plans, elevations, sections, details, and attachments to other work.

1.5 INFORMATIONAL SUBMITTALS

- A. As-Built Data: Plans showing as-built locations of grounding and bonding infrastructure, including the following:
 - 1. GEs, IBTs, PBBs, RBBs, SBBs, TBBs, TBCs, and routing of their bonding conductors.
- B. Qualification Data: For Installer, installation supervisor, and field inspector.
- C. Qualification Data: For testing agency and testing agency's field supervisor.
- D. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For grounding and bonding to include in emergency, operation, and maintenance manuals.
 - 1. In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," include the following:
 - a. Result of the bonding-resistance test at each SBB, RBB, and its nearest grounding electrode.
 - b. Include recommended testing intervals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
 - 1. Installation Supervision: Installation shall be under the direct supervision of ITS Installer 2, who shall be present at all times when Work of this Section is performed at Project site.
 - 2. Field Inspector: Currently registered by BICSI as RCDD to perform the on-site inspection.

PART 2 - PRODUCTS

2.1 SYSTEM COMPONENTS

- A. Comply with ANSI/TIA-607-D.

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2.2 CONDUCTORS

- A. Comply with UL 486A-486B.
- B. Insulated Conductors: Stranded copper wire, green or green with yellow stripe insulation, insulated for 600 V, and complying with UL 83.
 - 1. Conductor Insulation:
 - a. Type THHN and Type THWN-2: Comply with UL 83.
 - b. Type XHHW-2: Comply with UL 44.
 - 2. Conductors for custom-length equipment bonding jumpers shall be No. 6 AWG, 19-strand, UL-listed, Type THHN wire.
 - 3. Cable Runway Ladder Rack” Bonding Conductor: No. 6 AWG.
 - 4. Underground conductors shall be Type THWN-2 or XHHW-2.

2.3 CONNECTORS

- A. Irreversible connectors listed for the purpose. Listed by an NRTL as complying with CEC for specific types, sizes, and combinations of conductors and other items connected. Comply with UL 486A-486B.
- B. Compression Wire Connectors: Crimp-and-compress connectors that bond to the conductor when the connector is compressed around the conductor. Comply with UL 467.
 - 1. Electroplated tinned copper, C and H shaped.
- C. Busbar Connectors: Cast silicon bronze, solderless compression-type, mechanical connector; with a long barrel and two holes spaced on 5/8- or 1-inch centers for a two-bolt connection to the busbar.
- D. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.4 GROUNDING AND BONDING BUSBARS

- A. SBB: Predrilled rectangular bars of hard-drawn solid copper, 1/4 by 4 inches in cross section, length as indicated on Drawings. The busbar shall be for wall mounting, shall be NRTL listed as complying with UL 467, and shall comply with ANSI/TIA-607-D.
 - 1. Predrilling shall be with holes for use with lugs specified in this Section.
 - 2. Mounting Hardware: Stand-off brackets that provide a minimum 2-inch separation from the wall.
 - 3. Stand-off insulators for mounting shall be Lexan or PVC. Comply with UL 891 for use in 600-V switchboards, impulse tested at 5000 V.
- B. RBB: Rack and Cabinet Grounding Busbars: Rectangular bars of hard-drawn solid copper, accepting conductors ranging from No. 14 to No. 2/0 AWG, NRTL listed as complying with UL 467, and complying with ANSI/TIA-607-D. Predrilling shall be with

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holes for use with lugs specified in this Section.

1. Rack-Mounted Horizontal Busbar: Designed for mounting in 19-inch equipment racks. Include a copper splice bar for transitioning to an adjoining rack, and stainless-steel or copper-plated hardware for attachment to the rack.
2. Rack-Mounted Vertical Busbar: 72 inch stainless-steel or copper-plated hardware for attachment to the rack.

2.5 IDENTIFICATION

- A. Comply with requirements for identification products in Section 27 05 53 "Identification for Communications Systems."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the ac grounding electrode system and equipment grounding for compliance with requirements for maximum ground-resistance level and other conditions affecting performance of grounding and bonding of the electrical system.
- B. Inspect the test results of the ac grounding system measured at the point of TBC connection.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with connection of the TBC only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with NECA 1.
- B. Comply with ANSI/TIA-607-D.

3.3 APPLICATION

- A. Conductors: Install solid conductor for No. 8 AWG and smaller and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
 1. The bonding conductors between the SBB and structural steel of steel-frame buildings shall not be smaller than No. 6 AWG.
- B. Grounding and Bonding Conductors: Green-colored insulation with continuous yellow stripe. Where green insulation is not available due to AWG size, Identify grounding and

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bonding conductor where visible to normal inspection with minimum three bands of green tape, and wrap last three feet of sheath on both ends with green tape.

C. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

D. Conductor Support:

1. Secure grounding and bonding conductors at intervals of not less than 36 inches

E. Grounding and Bonding Conductors:

1. Install in the straightest and shortest route between the origination and termination point, and no longer than required. The bend radius shall not be smaller than eight times the diameter of the conductor. No one bend may exceed 90 degrees.
2. Install without splices.
3. Support at not more than 36-inch intervals.
4. The grounding and bonding conductor pathway through a plenum shall be in EMT. Conductors shall not be installed in EMT unless otherwise indicated.
 - a. If a grounding and bonding conductor is installed in ferrous metallic conduit, bond the conductor to the conduit using a grounding bushing that complies with requirements in Section 27 05 28 "Pathways for Communications Systems," and bond both ends of the conduit.

3.4 GROUNDING AND BONDING BUSBARS

- A. Indicate locations of grounding and bonding busbars on Drawings. Install busbars horizontally, on insulated spacers 2 inches minimum from wall, 12 inches above finished floor unless otherwise indicated.

3.5 CONNECTIONS

- A. Bond metallic equipment in a intermediate distribution frame (IDF) room to the grounding busbar in that room, using equipment grounding conductors not smaller than No. 6 AWG.
- B. Stacking of conductors under a single bolt is not permitted when connecting to busbars.
- C. Assemble the wire connector to the conductor, complying with manufacturer's written instructions and as follows:
 1. Use crimping tool and the die specific to the connector.

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2. Pretwist the conductor.
 3. Apply an antioxidant compound to all bolted and compression connections.
- D. Telecommunications Enclosures and Equipment Racks: Bond metallic components of enclosures to the telecommunications grounding and bonding system. Install top-mounted or vertically mounted rack grounding and bonding busbar unless the enclosure and rack are manufactured with the busbar. Bond the equipment grounding and bonding busbar to the SBB No. 6 AWG bonding conductors.
- E. Electrical Power Panelboards: Where an electrical panelboard for telecommunications equipment is located in the same room or space, bond each SBB to the ground bar of the panelboard.
- F. Rack- and Cabinet-Mounted Equipment: Bond powered equipment chassis to the cabinet or rack grounding and bonding busbar. Power connection shall comply with CEC; the equipment grounding conductor in the power cord of cord- and plug-connected equipment shall be considered as a supplement to bonding requirements in this Section.
- 3.6 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS
- A. Duct-Bank Grounding Conductor: Bury 12 inches above duct bank when indicated as part of duct-bank installation.
- B. Comply with IEEE C2 grounding requirements.
- 3.7 IDENTIFICATION
- A. Labels shall be preprinted or computer-printed type.
1. Label PBB(s) with "fs-PBB," where "fs" is the telecommunications space identifier for the space containing the PBB.
 2. Label SBB(s) with "fs-SBB," where "fs" is the telecommunications space identifier for the space containing the SBB.
 3. Label the BCT and each telecommunications backbone conductor at its attachment point: "WARNING! TELECOMMUNICATIONS BONDING CONDUCTOR. DO NOT REMOVE OR DISCONNECT!"
- 3.8 FIELD QUALITY CONTROL
- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Tests and Inspections:
1. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 2. Test the bonding connections of the system using an ac earth ground-resistance tester, taking two-point bonding measurements in each telecommunications

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equipment room containing a SBB and using the process recommended by BICSI TDMM. Conduct tests with the facility in operation.

- a. Measure the resistance between the busbar and the nearest available grounding electrode. The maximum acceptable value of this bonding resistance is 100 milliohms.
3. Test for ground loop currents using a digital clamp-on ammeter, with a full-scale of not more than 10 A, displaying current in increments of 0.01 A at an accuracy of plus/minus 2.0 percent.
 - a. With the grounding and bonding infrastructure completed and the communications system electronics operating, measure the current in every conductor connected to each SBB. Maximum acceptable ac current level is 1 A.
- C. Excessive Ground Resistance: If resistance to ground at the TBC exceeds 5 ohms, notify the District Construction Manager promptly and include recommendations to reduce ground resistance.
 - D. Grounding and bonding system will be considered defective if it does not pass tests and inspections.
 - E. Prepare test and inspection reports.

END OF SECTION 27 05 26

SPECIFICATIONS

SECTION 27 05 28 PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Metal conduits and fittings.
 - 2. Nonmetallic conduits and fittings.
 - 3. Optical-fiber-cable pathways and fittings.
 - 4. Nonmetallic surface pathways.
 - 5. Hooks.
 - 6. Boxes, enclosures, and cabinets.
- B. Related Requirements:
 - 1. Section 26 05 43 "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks, manholes, and underground utility construction.
 - 2. Section 26 05 33 "Raceways and Boxes for Electrical Systems" for conduits, wireways, surface raceways, boxes, enclosures, cabinets, handholes, and faceplate adapters serving electrical systems.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. GRC: Galvanized rigid steel conduit.
- C. RNC: Rigid non-metallic conduit.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Surface pathways
 - 2. Wireways and fittings.
 - 3. Boxes, enclosures, and cabinets.

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- B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Pathway routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
 - 1. Structural members in paths of pathway groups with common supports.
 - 2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.
- B. Seismic Qualification Certificates: For pathway racks, enclosures, cabinets, equipment racks and their mounting provisions, including those for internal components, from manufacturer.
- C. Source quality-control reports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Allied Tube & Conduit, a part of Atkore International.
 - 2. Western Tube and Conduit Corporation.
 - 3. Wheatland Tube Company.
 - 4. Or Equal.
- B. General Requirements for Metal Conduits and Fittings:
 - 1. Listed and labeled as defined in CEC, by a qualified testing agency, and marked for intended location and application.
 - 2. Comply with TIA-569-B.
- C. GRC: Comply with ANSI C80.1 and UL 6.
- D. PVC-Coated Steel Conduit: PVC-coated GRC.
 - 1. Comply with NEMA RN 1.
 - 2. Coating Thickness: 0.040 inch, minimum.
- E. EMT: Comply with ANSI C80.3 and UL 797.
- F. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
 - 1. Fittings for EMT:

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- a. Material: Steel.
 - b. Type: Compression.
- 2. Expansion Fittings: PVC or steel to match conduit type, complying with UL-467, rated for environmental conditions where installed, and including flexible external bonding jumper.
- 3. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040-inch, with overlapping sleeves protecting threaded joints.
- G. Joint Compound for GRC: Approved, as defined in CEC, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. CANTEX, INC.
 - 2. Carlon; a brand of Thomas & Betts Corporation.
 - 3. Kraloy.
 - 4. Or Equal.
- B. General Requirements for Nonmetallic Conduits and Fittings:
 - 1. Listed and labeled as defined in CEC, by a qualified testing agency, and marked for intended location and application.
 - 2. Comply with TIA-569-C.
- C. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
- D. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
- E. Solvent cements and adhesive primers shall comply with the testing and product requirements of San Diego Air Pollution Control District Rule 67.0 "Architectural Coatings" and Rule 67.21 "Adhesive Material Application Operations."

2.3 OPTICAL-FIBER-CABLE PATHWAYS AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Carlon; a brand of Thomas & Betts Corporation.
 - 2. Dura-Line.
 - 3. Endot Industries Inc.
 - 4. Or Equal.

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- B. Description: Comply with UL 2024; flexible-type innerduct pathway, approved for plenum, riser, or general-use installation unless otherwise indicated.
 - 1. Listed and labeled as defined in CEC, by a qualified testing agency, and marked for intended location and application.
 - 2. Comply with TIA-569-C.

2.4 HOOKS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. MonoSystems, Inc.
 - 2. Panduit Corp.
 - 3. Wiremold / Legrand.
 - 4. Or Equal
- B. General Requirements for Hooks:
 - 1. Listed and labeled as defined in CEC, by an NRTL, and marked for intended location and application.
 - 2. Comply with TIA-569-C.
 - 3. Galvanized steel.
 - 4. J shape.

2.5 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Hoffman; a brand of Pentair Equipment Protection.
 - 2. Quazite: Hubbell Power Systems, Inc.
 - 3. RACO; Hubbell.
 - 4. Or Equal.
- B. General Requirements for Boxes, Enclosures, and Cabinets:
 - 1. Comply with TIA-569-C.
 - 2. Boxes, enclosures and cabinets installed in wet locations shall be listed and labeled as defined in CEC, by an NRTL, and marked for use in wet locations.
 - 3. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
 - 4. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.
 - 5. Gangable boxes are prohibited.
- C. Sheet-Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

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- E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- F. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 3R or Type 4 with continuous-hinge cover with flush latch unless otherwise indicated.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - 2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- G. Terminal Cabinets:
 - 1. NEMA 250, Type 3R, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 - 2. Hinged door in front cover with flush latch and concealed hinge.
 - 3. Key latch to match panelboards.
 - 4. Metal barriers to separate wiring of different systems and voltage.
 - 5. Accessory feet where required for freestanding equipment.
 - 6. Nonmetallic cabinets shall be listed and labeled as defined in CEC, by a qualified testing agency, and marked for intended location and application.

PART 3 - EXECUTION

3.1 PATHWAY APPLICATION

- A. Outdoors: Apply pathway products as specified below unless otherwise indicated:
 - 1. Exposed Conduit: GRC.
 - 2. Concealed Conduit, Aboveground in masonry or concrete: RNC, Type EPC-40-PVC.
 - 3. Underground Conduit: RNC, Type EPC-80-PVC.
 - 4. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R or Type 4.
 - 5. Provide flexible-type innerduct pathways within conduits for all fiber optic cabling runs.
- B. Indoors: Apply pathway products as specified below unless otherwise indicated:
 - 1. Exposed, Greater Than 8 Feet Above Floor, Not Subject to Physical Damage: EMT.
 - 2. Exposed, Less Than 8 Feet Above Floor, Not Subject to Physical Damage: GRC.
 - 3. Exposed and Subject to Severe Physical Damage: GRC. Pathway locations include the following:
 - a. Utility type spaces.
 - 4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 - 5. Damp or Wet Locations: GRC.
 - 6. Pathways for Optical-Fiber or Communications Cable in Spaces Used for Environmental Air: EMT with flexible-type innerduct pathway.

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7. Pathways for Concealed General-Purpose Distribution of Optical-Fiber or Communications Cable: EMT with flexible-type innerduct pathway.
 8. Boxes and Enclosures: NEMA 250 Type 1, except use NEMA 250 Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.
- C. Minimum Pathway Size: 1-inch.
- D. Pathway Fittings: Compatible with pathways and suitable for use and location.
1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
 3. EMT: Use compression, steel fittings. Comply with NEMA FB 2.10.
- E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.
- F. Install surface pathways only where indicated on Drawings.
- G. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 INSTALLATION

- A. Comply with the following standards for installation requirements except where requirements on Drawings or in this Section are stricter:
1. NECA 1.
 2. NECA/BICSI 568.
 3. TIA-569-C.
 4. NECA 101
 5. NECA 102.
 6. NECA 105
- B. Comply with CEC limitations for types of pathways allowed in specific occupancies and number of floors.
- C. Comply with requirements in Section 07 84 13 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.
- D. Comply with requirements in Section 27 05 44 "Sleeves and Sleeve Seals for Communications Pathways and Cabling" for sleeves and sleeve seals for communications.

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- E. Keep pathways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal pathway runs above water and steam piping.
- F. Complete pathway installation before starting conductor installation.
- G. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for hangers and supports.
- H. Arrange stub-ups so curved portions of bends are not visible above finished floor or slab.
- I. Install no more than the equivalent of two 90-degree bends in any pathway run. Support within 12 inches of changes in direction. Utilize long radius ells for all optical-fiber cables.
- J. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- K. Support conduit within 12 inches of enclosures to which attached.
- L. Stub-ups to Above Recessed Ceilings:
 - 1. Use EMT or RMC for pathways.
 - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- M. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of pathway and fittings before making up joints. Follow compound manufacturer's written instructions.
- N. Coat field-cut threads on PVC-coated pathway with a corrosion-preventing conductive compound prior to assembly.
- O. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install insulated bushings on conduits terminated with locknuts.
- P. Install pathways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- Q. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- R. Cut conduit perpendicular to the length. For conduits of 2-inch trade size and larger, use roll cutter or a guide to ensure cut is straight and perpendicular to the length.
- S. Install pull ropes in empty pathways. Use polypropylene or monofilament plastic line with not less than 200-lbtensile strength. Leave at least 12 inches of slack at each end of pull rope. Cap underground pathways designated as spare above grade alongside pathways in use.

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- T. Pathways for Optical-Fiber and Communications Cable: Install pathways, metal and nonmetallic, rigid and flexible, as follows:
 - 1. 1-Inch Trade Size and Larger: Install pathways in maximum lengths of 75 feet.
 - 2. Install with a maximum of two 90-degree bends or equivalent for each length of pathway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.
- U. Install pathway sealing fittings at accessible locations according to CEC and fill them with listed sealing compound. For concealed pathways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install pathway sealing fittings according to CEC.
- V. Install devices to seal pathway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all pathways at the following points:
 - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 - 2. Where an underground service pathway enters a building or structure.
 - 3. Where otherwise required by CEC.
- W. Comply with manufacturer's written instructions for solvent welding PVC conduit and fittings.
 - 1. Install fitting(s) that provide expansion and contraction for at least 0.00041-inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078-inch per foot of length of straight run per deg F of temperature change for metal conduits.
 - 2. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
 - 3. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
- X. Cable Hooks:
 - 1. Size to allow a minimum of 25 percent future capacity without exceeding design capacity limits.
 - 2. Shall be supported by dedicated support wires. Do not use ceiling grid support wire or support rods.
 - 3. Hook spacing shall allow no more than 6 inches of slack. The lowest point of the cables shall be no less than 6 inches adjacent to ceilings, mechanical ductwork and fittings, luminaires, power conduits, power and telecommunications outlets, and other electrical and communications equipment.
 - 4. Space hooks no more than 5 feet on center.
 - 5. Provide a hook at each change in direction.

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- Y. Mount boxes at heights indicated on Drawings.
- Z. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- AA. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- BB. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

3.3 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage or deterioration.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 27 05 28

SPECIFICATIONS

SECTION 27 05 53

IDENTIFICATION FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Color and legend requirements for labels and signs.
 - 2. Labels.
 - 3. Bands and tubes.
 - 4. Tapes.
 - 5. Signs.
 - 6. Cable ties.
 - 7. Fasteners for labels and signs.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for communications identification products.
- B. Samples: For each type of label and sign to illustrate composition, size, colors, lettering style, mounting provisions, and graphic features of identification products.
- C. Identification Schedule:
 - 1. Outlets: Scaled drawings indicating location and proposed designation.
 - 2. Backbone Cabling: Riser diagram showing each communications room, backbone cable, and proposed backbone cable designation.
 - 3. Racks: Scaled drawings indicating location and proposed designation.
 - 4. Patch Panels: Enlarged scaled drawings showing rack row, number, and proposed designations.

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PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with CEC and TIA 606-B.
- B. Comply with ANSI Z535.4 for safety signs and labels.
- C. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 COLOR AND LEGEND REQUIREMENTS

- A. Equipment Identification Labels:
 - 1. Black letters on a white field.

2.3 LABELS

- A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Brady Corporation.
 - b. Grafoplast Wire Markers.
 - c. Ideal Industries, Inc.
 - d. Or equal.
- B. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters of raceway or cable they identify, that stay in place by gripping action.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Brady Corporation.
 - b. Grafoplast Wire Markers.
 - c. Ideal Industries, Inc.
 - d. Or equal.

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- C. Self-Adhesive Wraparound Labels: Preprinted, 3-mil-thick, polyester flexible labels with acrylic pressure-sensitive adhesive.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Brady Corporation.
 - b. Grafoplast Wire Markers.
 - c. Ideal Industries, Inc.
 - d. Or equal.
 - 2. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating protective shields over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
 - 3. Marker for Labels: Permanent, waterproof black ink marker recommended by tag manufacturer.
 - 4. Marker for Labels: Machine-printed, permanent, waterproof black ink recommended by printer manufacturer.
- D. Self-Adhesive Labels: Polyester, thermal, transfer-printed, 3-mil-thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Brady Corporation.
 - b. Grafoplast Wire Markers.
 - c. Ideal Industries, Inc.
 - d. Or equal.
 - 2. Minimum Nominal Size:
 - a. 1-1/2 by 6 inches for raceway and conductors.
 - b. 3-1/2 by 5 inches for equipment.
 - c. As required by authorities having jurisdiction.

2.4 BANDS AND TUBES

- A. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches long, with diameters sized to suit diameters of raceway or cable they identify, that stay in place by gripping action.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Brady Corporation.
 - b. Grafoplast Wire Markers.
 - c. Ideal Industries, Inc.
 - d. Or equal.

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2.5 SIGNS

A. Baked-Enamel Signs:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Carlton Industries, LP.
 - b. Or equal.
2. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
3. 1/4-inch grommets in corners for mounting.
4. Nominal Size: 7 by 10 inches.

B. Metal-Backed Butyrate Signs:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Carlton Industries, LP.
 - b. Or equal.
2. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs, with 0.0396-inch galvanized-steel backing, punched and drilled for fasteners, and with colors, legend, and size required for application.
3. 1/4-inch grommets in corners for mounting.
4. Nominal Size: 10 by 14 inches.

C. Laminated-Acrylic or Melamine-Plastic Signs:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Carlton Industries, LP.
 - b. Or equal.
2. Engraved legend.
3. Thickness:
 - a. For signs up to 20 sq. in., minimum 1/16 inch thick.
 - b. For signs larger than 20 sq. in., 1/8 inch thick.
 - c. Engraved legend with black letters on white face.
 - d. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.6 CABLE TIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

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1. HellermannTyton.
 2. Or equal.
- B. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
1. Minimum Width: 3/16 inch.
 2. Tensile Strength at 73 deg F according to ASTM D 638: 12,000 psi.
 3. Temperature Range: Minus 40 to plus 185 deg F.
 4. Color: Black, except where used for color-coding.
- C. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
1. Minimum Width: 3/16 inch.
 2. Tensile Strength at 73 deg F according to ASTM D 638: 12,000 psi.
 3. Temperature Range: Minus 40 to plus 185 deg F.
 4. Color: Black.
- D. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.
1. Minimum Width: 3/16 inch.
 2. Tensile Strength at 73 deg F according to ASTM D 638: 7000 psi.
 3. UL 94 Flame Rating: 94V-0.
 4. Temperature Range: Minus 50 to plus 284 deg F.
 5. Color: Black.

2.7 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Self-Adhesive Identification Products: Before applying communications identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

SPECIFICATIONS

3.2 INSTALLATION

- A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.
- B. Install identifying devices before installing acoustical ceilings and similar concealment.
- C. Verify identity of each item before installing identification products.
- D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.
- E. Apply identification devices to surfaces that require finish after completing finish work.
- F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of communications systems and connected items.
- G. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.
- H. Polyester Wraparound Labels:
 - 1. Secure tight to surface of raceway or cable at a location with high visibility and accessibility.
 - 2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.
 - 3. Provide label 6 inches from cable end.
- I. Snap-Around Labels:
 - 1. Secure tight to surface at a location with high visibility and accessibility.
 - 2. Provide label 6 inches from cable end.
- J. Self-Adhesive Wraparound Labels:
 - 1. Secure tight to surface at a location with high visibility and accessibility.
 - 2. Provide label 6 inches from cable end.
- K. Self-Adhesive Labels:
 - 1. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
 - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high label; where two lines of text are required, use labels 2 inches high.
- L. Snap-Around, Color-Coding Bands: Secure tight to surface at a location with high visibility and accessibility.
- M. Cable Ties: General purpose, except as listed below:

SPECIFICATIONS

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

3.3 IDENTIFICATION SCHEDULE

- A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.
- B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations with high visibility. Identify by system and circuit designation.
- C. Accessible Fittings for Raceways and Cables within Buildings: Identify covers of each junction and pull box with self-adhesive labels containing wiring system legend.
 1. System legends shall be as follows:
 - a. Telecommunications.
- D. Faceplates: Label individual faceplates with self-adhesive labels. Place label at top of faceplate. Each faceplate shall be labeled with its individual, sequential designation, composed of the following, in the order listed:
 1. Wiring closet designation.
 2. Colon.
 3. Faceplate number.
- E. Equipment Room Labeling:
 1. Racks, Frames, and Enclosures: Identify front and rear of each with self-adhesive labels containing equipment designation.
 2. Patch Panels: Label individual rows in each rack, starting at top and working down, with self-adhesive labels.
 3. Data Outlets: Label each outlet with a self-adhesive label indicating the following, in the order listed:
 - a. Room number being served.
 - b. Faceplate number.
- F. Backbone Cables: Label each cable with a snap-around label indicating the location of the far or other end of the backbone cable. Patch panel or punch down block where cable is terminated should be labeled identically.
- G. Horizontal Cables: Label each cable with a polyester-wraparound label indicating the following, in the order listed:
 1. Room number.
 2. Colon.
 3. Faceplate number.
- H. Instructional Signs: Self-adhesive labels.

SPECIFICATIONS

- I. Warning Labels for Indoor Cabinets, Boxes, and Enclosures: Metal-backed, butyrate warning signs.
 - 1. Apply to exterior of door, cover, or other access.
- J. Equipment Identification Labels:
 - 1. Indoor Equipment: Metal-backed butyrate signs.
 - 2. Outdoor Equipment: Laminated-acrylic or melamine-plastic sign.
 - 3. Equipment to Be Labeled:
 - a. Communications cabinets.
 - b. Uninterruptible power supplies.
 - c. Computer room air conditioners.
 - d. Fire-alarm and suppression equipment.
 - e. Egress points.
 - f. Power distribution components.

END OF SECTION 27 05 53

SPECIFICATIONS

SECTION 27 13 13 COMMUNICATIONS COPPER BACKBONE CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. High-count Category 6A twisted pair cable.
 - 2. Twisted pair cable hardware, including plugs, jacks, patch panels, and cross-connects.
 - 3. Cabling identification.
- B. Related Requirements:
 - 1. Section 27 13 23 "Communications Optical Fiber Backbone Cabling" for optical fiber data cabling associated with system panels and devices.

1.3 DEFINITIONS

- A. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
- B. EMI: Electromagnetic interference.
- C. F/FTP: Overall foil screened cable with foil screened twisted pair.
- D. FTP: Shielded twisted pair.
- E. F/UTP: Overall foil screened cable with unscreened twisted pair.
- F. IDC: Insulation displacement connector.
- G. Jack: Also commonly called an "outlet," it is the fixed, female connector.
- H. LAN: Local area network.
- I. Plug: Also commonly called a "connector," it is the removable, male telecommunications connector.

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- J. RCDD: Registered Communications Distribution Designer.
- K. Screen: A metallic layer, either a foil or braid, placed around a pair or group of conductors.
- L. S/FTP: Overall braid screened cable with foil screened twisted pair.
- M. Shield: A metallic layer, either a foil or braid, placed around a pair or group of conductors.
- N. S/UTP: Overall braid screened cable with unscreened twisted pairs.
- O. UTP: Unscreened (unshielded) twisted pair.

1.4 COPPER BACKBONE CABLING DESCRIPTION

- A. Copper backbone cabling system shall provide interconnections between communications equipment rooms, main terminal space, and entrance facilities in the telecommunications cabling system structure. Cabling system consists of backbone cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for backbone-to-backbone cross-connection.
- B. Backbone cabling cross-connects may be located in communications equipment rooms or at entrance facilities. Bridged taps and splitters shall not be used as part of backbone cabling.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Reviewed and stamped by RCDD.
 - 1. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by District.
 - 2. System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software.
 - 3. Cabling administration Drawings and printouts.
 - 4. Wiring diagrams to show typical wiring schematics, including the following:
 - a. Telecommunications rooms plans and elevations.
 - b. Telecommunications pathways.
 - c. Telecommunications system access points.
 - d. Telecommunications grounding and bonding system
 - e. Cross-connects.
 - f. Patch panels.
 - g. Patch cords.
 - 5. Cross-Connects and Patch Panels: Detail mounting assemblies, and show elevations and physical relationship between the installed components.

SPECIFICATIONS

- C. Twisted pair cable testing plan.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For RCDD, Installer, installation supervisor, and field inspector.
- B. Source quality-control reports.
- C. Product Certificates: For each type of product.
- D. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For splices and connectors to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
 - 1. Layout Responsibility: Preparation of Shop Drawings, cabling administration Drawings, and field testing program development by an RCDD.
 - 2. Installation Supervision: Installation shall be under the direct supervision of Level 2 Installer, who shall be present at all times when Work of this Section is performed at Project site.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site.
 - 1. Test each pair of twisted pair cable for open and short circuits.

1.10 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.11 COORDINATION

- A. Coordinate layout and installation of telecommunications pathways and cabling with District's telecommunications and LAN equipment and service suppliers.

SPECIFICATIONS

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Backbone cabling system shall comply with transmission standards in TIA-568-C.1, when tested according to test procedures of this standard.
- B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 50 or less.
- C. Telecommunications Pathways and Spaces: Comply with TIA-569-D.
- D. Grounding and Bonding: Comply with TIA-607-D.

2.2 HIGH-COUNT CATEGORY 5E TWISTED PAIR CABLE

- A. Description: 25-pair, balanced-twisted pair cable, certified to meet transmission characteristics of Category 5e cable at frequencies up to 100 MHz.
- B. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Panduit
- C. Standard: Comply with ICEA S-90-661, NEMA WC 63.1, and TIA-568-C.2 for Category 6A cables.
- D. Conductors: 100-ohm, 24 AWG solid copper.
- E. Shielding/Screening: Unshielded balanced twisted pairs (UTP).
- F. Cable Rating: Indoor/Outdoor, Sunlight Resistant.
- G. Jacket: Black thermoplastic.

2.3 TWISTED PAIR CABLE HARDWARE

- A. Description: Hardware designed to connect, splice, and terminate twisted pair copper communications cable.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Panduit
 - 2. Or equal.

SPECIFICATIONS

C. General Requirements for Cable Connecting Hardware:

1. Twisted pair cable hardware shall meet the performance requirements of Category 5e.
2. Comply with TIA-568-C.2, IDC type, with modules designed for punch-down caps or tools.
3. Cables shall be terminated with connecting hardware of same category or higher.
4. Source Limitations: Obtain twisted pair cable hardware from single source from single manufacturer.

D. Patch Panel: Modular panels housing numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.

1. Features:
 - a. Universal T568A and T568B wiring labels.
 - b. Labeling areas adjacent to conductors.
 - c. 24 ports.
2. Construction: 16-gauge steel and mountable on 19-inch equipment racks.
3. Number of Jacks per Field: One for each four-pair conductor group of indicated cables, plus spares and blank positions adequate to suit specified expansion criteria.

E. Jacks and Jack Assemblies:

1. Female; eight position; modular; fixed telecommunications connector designed for termination of a single four-pair 100-ohm unshielded or shielded twisted pair cable.
2. Designed to snap-in to a patch panel or faceplate.
3. Standard: Comply with TIA-568-C.2.

F. Patch Cords: Factory-made, four-pair cables in 36-inch and 48-inch lengths; terminated with an eight-position modular plug at each end. Quantity shall match port terminations with a suitable length to accommodate interconnections at each end.

1. Patch cords shall have color-coded boots for circuit identification.

2.4 CABLING IDENTIFICATION

- A. Comply with TIA-606-B and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

2.5 GROUNDING AND BONDING

- A. Comply with requirements in Section 27 05 26 "Grounding and Bonding for Communications Systems" for grounding and bonding conductors and connectors.
- B. Comply with TIA-607-D.

SPECIFICATIONS

2.6 SOURCE QUALITY CONTROL

- A. Factory test cables on reels according to TIA-568-C.1.
- B. Factory test cables according to TIA-568-C.2.
- C. Cable will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 WIRING METHODS

- A. Wiring Method: Install cables in raceways and cable trays, except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces, attics, and gypsum board partitions where unenclosed wiring method may be used. Conceal raceway and cables, except in unfinished spaces.
 - 1. Install plenum cable in environmental air spaces, including plenum ceilings.
 - 2. Comply with requirements for raceways and boxes specified in Section 27 05 28 "Pathways for Communications Systems."
- B. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools. Install cables parallel with or at right angles to sides and back of enclosure.

3.2 INSTALLATION OF PATHWAYS

- A. Comply with requirements for demarcation point, cabinets, and racks specified in Section 27 11 00 "Communications Equipment Room Fittings."
- B. Comply with Section 27 05 28 "Pathways for Communications Systems."
- C. Drawings indicate general arrangement of pathways and fittings.

3.3 INSTALLATION OF COPPER BACKBONE CABLES

- A. Comply with NECA 1 and NECA/BICSI 568.
- B. General Requirements for Cabling:
 - 1. Comply with TIA-568-C.0, TIA-568-C.1, and TIA-568-C.2.
 - 2. Comply with BICSI's "Information Transport Systems Installation Methods Manual (ITSIMM)," Ch. 5, "Copper Structured Cabling Systems," "Cable Termination Practices" Section.
 - 3. Install 110-style IDC termination hardware unless otherwise indicated.

SPECIFICATIONS

4. Do not untwist twisted pair cables more than 1/2 inch from the point of termination to maintain cable geometry.
5. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
6. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
7. Install lacing bars to restrain cables, prevent straining connections, and prevent bending cables to smaller radii than minimums recommended by manufacturer.
8. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems," "Cable Termination Practices" Section Use lacing bars and distribution spools.
9. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation, and replace it with new cable.
10. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
11. In the communications equipment room, install a 10-foot-long service loop on each end of cable.
12. Pulling Cable: Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems," "Pulling and Installing Cable" Section. Monitor cable pull tensions.

C. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend twisted pair cabling, not in a wireway or pathway, a minimum of 8 inches above ceilings by cable supports not more than 60 inches apart.
3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

D. Group connecting hardware for cables into separate logical fields.

E. Separation from EMI Sources:

1. Comply with recommendations from BICSI's "Telecommunications Distribution Methods Manual" and TIA-569-D for separating unshielded copper communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches.

SPECIFICATIONS

3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches.
4. Separation between communications cables in grounded metallic raceways, power lines, and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches.
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches.
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches.

3.4 FIRESTOPPING

- A. Comply with requirements in Section 07 84 13 "Penetration Firestopping."
- B. Comply with TIA-569-D, Annex A, "Firestopping."
- C. Comply with "Firestopping Systems" Article in BICSI's "Telecommunications Distribution Methods Manual."

3.5 GROUNDING AND BONDING

- A. Install grounding according to the "Grounding, Bonding, and Electrical Protection" chapter in BICSI's "Telecommunications Distribution Methods Manual."
- B. Comply with TIA-607-D and NECA/BICSI-607.
- C. Locate grounding and bonding busbar to minimize the length of grounding and bonding conductors. Fasten to wall, allowing at least a 2-inch clearance behind the grounding and bonding busbar. Connect grounding and bonding busbar to suitable electrical building ground, using a minimum No. 4 AWG grounding electrode conductor.
- D. Bond metallic equipment to the grounding bus bar, using not smaller than a No. 6 AWG equipment grounding conductor.

3.6 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA-606-B. Comply with requirements for identification specified in Section 27 05 53 "Identification for Communications Systems."

SPECIFICATIONS

1. Administration Class: 3.
 2. Color-code cross-connect fields and apply colors to voice and data service backboards, connections, covers, and labels.
- B. Paint and label colors for equipment identification shall comply with TIA-606-B for Class 3 level of administration, including optional identification requirements of this standard.
- C. Comply with requirements in Section 27 15 13 "Communications Copper Horizontal Cabling" for cable and asset management software.
- D. Cable Schedule: Install in a prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.
- E. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, entrance pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding and bonding conductors.
- F. Cable and Wire Identification:
1. Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
 2. Each wire connected to building-mounted devices is not required to be numbered at the device if wire color is consistent with associated wire connected and numbered within panel or cabinet.
 3. Exposed Cables and Cables: Label each cable at intervals not exceeding 15 feet.
 4. Label each terminal strip, and screw terminal in each cabinet, rack, or panel.
 - a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group, extended from a panel or cabinet to a building-mounted device, with the name and number of a particular device.
 - b. Label each unit and field within distribution racks and frames.
 5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and -connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.
- G. Labels shall be preprinted or computer-printed type, with a printing area and font color that contrast with cable jacket color but still comply with TIA-606-B requirements for the following:
1. Cables use flexible vinyl or polyester that flexes as cables are bent.

SPECIFICATIONS

3.7 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. Visually inspect jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA-568-C.1.
 - 2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
 - 3. Test cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.
 - a. Test instruments shall meet or exceed applicable requirements in TIA-568-C.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
- C. Data for each measurement shall be documented. Data for submittals shall be printed in a summary report that is formatted similarly to Table 10.1 in BICSI's "Telecommunications Distribution Methods Manual," or shall be transferred from the instrument to the computer, saved as text files, printed, and submitted.
- D. Remove and replace cabling where test results indicate that they do not comply with specified requirements.
- E. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

END OF SECTION 27 13 13

SPECIFICATIONS

SECTION 27 13 23

COMMUNICATIONS OPTICAL FIBER BACKBONE CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. 850 nanometer laser-optimized OM4 50/125 micrometer multimode optical fiber cable.
 - 2. Optical fiber cable connecting hardware, patch panels, and cross-connects.
 - 3. Cabling identification products.
- B. Related Requirements:
 - 1. Section 27 13 13 "Communications Copper Backbone Cabling" for copper data cabling associated with system panels and devices.

1.3 DEFINITIONS

- A. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
- B. RCDD: Registered Communications Distribution Designer.

1.4 OPTICAL FIBER BACKBONE CABLING DESCRIPTION

- A. Optical fiber backbone cabling system shall provide interconnections between communications equipment rooms, main terminal space, and entrance facilities in the telecommunications cabling system structure. Cabling system consists of backbone cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for backbone-to-backbone cross-connection.
- B. Backbone cabling cross-connects may be located in communications equipment rooms or at entrance facilities. Bridged taps and splitters shall not be used as part of backbone cabling.

SPECIFICATIONS

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Reviewed and stamped by RCDD.
 - 1. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by District.
 - 2. System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software.
 - 3. Cabling administration drawings and printouts.
 - 4. Wiring diagrams to show typical wiring schematics including the following:
 - a. Telecommunications rooms plans and elevations.
 - b. Telecommunications pathways.
 - c. Telecommunications system access points.
 - d. Telecommunications grounding and bonding system.
 - e. Cross-connects.
 - f. Patch panels.
 - g. Patch cords.
 - 5. Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.
- C. Optical fiber cable testing plan.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For RCDD, Installer, installation supervisor, and field inspector.
- B. Source quality-control reports.
- C. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For optical fiber cable, splices, and connectors to include in maintenance manuals.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Patch-Panel Units: One of each type.
 - 2. Plugs: Ten of each type.
 - 3. Jacks: Ten of each type.

SPECIFICATIONS

1.9 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
 - 1. Layout Responsibility: Preparation of Shop Drawings, Cabling Administration Drawings, and field testing program development by an RCDD.
 - 2. Installation Supervision: Installation shall be under the direct supervision of Level 2 Installer, who shall be present at all times when Work of this Section is performed at Project site.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site.
 - 1. Test optical fiber cable to determine the continuity of the strand end to end. Use optical loss test set.
 - 2. Test optical fiber cable while on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector, including the loss value of each. Retain test data and include the record in maintenance data.

1.11 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.12 COORDINATION

- A. Coordinate layout and installation of telecommunications pathways and cabling with District's telecommunications and LAN equipment and service suppliers.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Backbone cabling system shall comply with transmission standards in TIA-568-C.1, when tested according to test procedures of this standard.
- B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 50 or less.
- C. Telecommunications Pathways and Spaces: Comply with TIA-569-D.

SPECIFICATIONS

- D. Grounding and Bonding: Comply with TIA-607-D.

2.2 850 NANOMETER LASER-OPTIMIZED, 50/125 MICROMETER, MULTIMODE OPTICAL FIBER CABLE (OM4)

- A. Description: Indoor/outdoor, Multimode, 50/125-micrometer, 12-fiber, nonconductive, tight buffer, optical fiber cable.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Panduit
 - 2. Or equal.
- C. Standards:
 - 1. Comply with ICEA S-83-596 for mechanical properties.
 - 2. Comply with TIA-568-C.3 for performance specifications.
 - 3. Comply with TIA-492AAAD for detailed specifications.
- D. Maximum Attenuation: 3.50 dB/km at 850 nm; 1.5 dB/km at 1300 nm.
- E. Minimum Overfilled Modal Bandwidth-length Product: 3500 MHz-km at 850 nm; 500 MHz-km at 1300 nm.
- F. Minimum Effective Modal Bandwidth-length Product: 4700 MHz-km at 850 nm.
- G. Jacket:
 - 1. Jacket Color: Black.
 - 2. Cable cordage jacket, fiber, unit, and group color shall be according to TIA-598-D.
 - 3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches.
- H. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and CEC.
- I. Provide with overall armored cable to maximize rodent protection.

2.3 OPTICAL FIBER CABLE HARDWARE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Panduit
 - 2. Or equal.
- B. Standards:
 - 1. Comply with Fiber Optic Connector Intermateability Standard (FOCIS) specifications of the TIA-604 series.
 - 2. Comply with TIA-568-C.3.
- C. Cross-Connects and Patch Panels: Modular panels housing multiple-numbered, duplex cable connectors.

SPECIFICATIONS

1. Number of Connectors per Field: One for each fiber of cable or cables assigned to field, plus spares and blank positions adequate to suit specified expansion criteria.
- D. Patch Cords: Factory-made, dual-fiber cables in 36-inch lengths.
- E. Connector Type: Type LC complying with TIA-604-3-B, connectors.
- F. Plugs and Plug Assemblies:
 1. Male; color-coded modular telecommunications connector designed for termination of a single optical fiber cable.
 2. Insertion loss not more than 0.75 dB.
- G. Jacks and Jack Assemblies:
 1. Female; quick-connect, simplex and duplex; fixed telecommunications connector designed for termination of a single optical fiber cable.
 2. Insertion loss not more than 0.75 dB.
 3. Designed to snap-in to a patch panel or faceplate.

2.4 GROUNDING AND BONDING

- A. Comply with requirements in Section 27 05 26 "Grounding and Bonding for Communications Systems" for grounding and bonding conductors and connectors.
- B. Comply with TIA-607-D.

2.5 IDENTIFICATION PRODUCTS

- A. Comply with TIA-606-B and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

2.6 SOURCE QUALITY CONTROL

- A. Factory test multimode optical fiber cables according to TIA-526-14-B and TIA-568-C.3.
- B. Factory test pre-terminated optical fiber cable assemblies according to TIA-526-14-B and TIA-568-C.3.
- C. Cable will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

SPECIFICATIONS

PART 3 - EXECUTION

3.1 WIRING METHODS

- A. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters. Conceal raceway and cables except in unfinished spaces.
 - 1. Install plenum cable in environmental air spaces, including plenum ceilings.
 - 2. Comply with requirements for pathways specified in Section 27 05 28 "Pathways for Communications Systems."
- B. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- C. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.2 INSTALLATION OF OPTICAL FIBER BACKBONE CABLES

- A. Comply with NECA 1, NECA 301, and NECA/BICSI 568.
- B. General Requirements for Optical Fiber Cabling Installation:
 - 1. Comply with TIA-568-C.1 and TIA-568-C.3.
 - 2. Comply with BICSI ITSIMM, Ch. 6, "Cable Termination Practices."
 - 3. Terminate all cables; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
 - 4. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
 - 5. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
 - 6. Bundle, lace, and train cable to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, "Cabling Termination Practices" Chapter. Use lacing bars and distribution spools.
 - 7. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
 - 8. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
 - 9. In the communications equipment room, provide a 10-foot-long service loop on each end of cable.
 - 10. Pulling Cable: Comply with BICSI ITSIMM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.
 - 11. Cable may be terminated on connecting hardware that is rack or cabinet mounted.
- C. Open-Cable Installation:

SPECIFICATIONS

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
 2. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.
- D. Group connecting hardware for cables into separate logical fields.

3.3 GROUNDING AND BONDING

- A. Install grounding and bonding according to BICSI ITSIMM, "Grounding (Earthing), Bonding, and Electrical Protection" Chapter.
- B. Comply with TIA-607-D and NECA/BICSI-607.
- C. Locate grounding and bonding busbar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch clearance behind the grounding and bonding busbar. Connect grounding and bonding busbar with a minimum No. 4 AWG grounding electrode conductor from grounding busbar to suitable electrical building ground.
- D. Bond metallic equipment to the grounding and bonding busbar, using not smaller than No. 6 AWG equipment grounding conductor.

3.4 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA-606-B. Comply with requirements for identification specified in Section 27 05 53 "Identification for Communications Systems."
1. Administration Class: Class 3.
 2. Color-code cross-connect fields and apply colors to voice and data service backboards, connections, covers, and labels.
- B. Paint and label colors for equipment identification shall comply with TIA-606-B for Class 3 level of administration including optional identification requirements of this standard.
- C. Cable Schedule: Install in a prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.
- D. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding and bonding conductors.
- E. Cable and Wire Identification:
1. Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.

SPECIFICATIONS

2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
 3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet.
 4. Label each unit and field within distribution racks and frames.
 5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.
- F. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA 606-B, for the following:
1. Flexible vinyl or polyester that flexes as cables are bent.

3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
1. Visually inspect optical fiber jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA-568-C.1.
 2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
 3. Optical Fiber Cable Tests:
 - a. Test instruments shall meet or exceed applicable requirements in TIA-568-C.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
 - b. Link End-to-End Attenuation Tests:
 - 1) Horizontal and multimode backbone link measurements: Test at 850 or 1300 nm in one direction according to TIA-526-14-B, Method B, One Reference Jumper.
 - 2) Attenuation test results for backbone links shall be less than 2.0 dB. Attenuation test results shall be less than those calculated according to equation in TIA-568-C.1.
- C. Data for each measurement shall be documented. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.
- D. Remove and replace cabling where test results indicate that it does not comply with specified requirements.

SPECIFICATIONS

- E. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

END OF SECTION 27 13 23

SPECIFICATIONS

SECTION 27 15 13 COMMUNICATIONS COPPER HORIZONTAL CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Category 6 twisted pair cable.
 - 2. Twisted pair cable hardware, including plugs and jacks.
 - 3. Cable management system.
 - 4. Cabling identification products.

1.3 DEFINITIONS

- A. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
- B. EMI: Electromagnetic interference.
- C. FTP: Shielded twisted pair.
- D. F/FTP: Overall foil screened cable with foil screened twisted pair.
- E. F/UTP: Overall foil screened cable with unscreened twisted pair.
- F. IDC: Insulation displacement connector.
- G. LAN: Local area network.
- H. Jack: Also commonly called an "outlet," it is the fixed, female connector.
- I. Plug: Also commonly called a "connector," it is the removable, male telecommunications connector.
- J. RCDD: Registered Communications Distribution Designer.
- K. Screen: A metallic layer, either a foil or braid, placed around a pair or group of conductors.

SPECIFICATIONS

- L. Shield: A metallic layer, either a foil or braid, placed around a pair or group of conductors.
- M. S/FTP: Overall braid screened cable with foil screened twisted pair.
- N. S/UTP: Overall braid screened cable with unscreened twisted pairs.
- O. UTP: Unscreened (unshielded) twisted pair.

1.4 COPPER HORIZONTAL CABLING DESCRIPTION

- A. Horizontal cable cabling system shall provide interconnections between each IDF and respective Telecommunications outlet. Cabling system consists of horizontal cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for horizontal-to-horizontal cross-connection.
 - 1. TIA-568-C.1 requires that a minimum of two equipment outlets be installed for each work area.
 - 2. Horizontal cabling shall contain no more than one transition point or consolidation point between the horizontal cross-connect and the telecommunications equipment outlet.
 - 3. Bridged taps and splices shall not be installed in the horizontal cabling.
- B. A work area is approximately 100 sq. ft. and includes the components that extend from the equipment outlets to the station equipment.
- C. The maximum allowable horizontal cable length is 295 feet. This maximum allowable length does not include an allowance for the length of 16 feet to the workstation equipment or in the horizontal cross-connect.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Reviewed and stamped by RCDD.
 - 1. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by District.
 - 2. Cabling administration Drawings and printouts.
 - 3. Wiring diagrams and installation details of telecommunications equipment, to show location and layout of telecommunications equipment, including the following:
 - a. Telecommunications rooms plans and elevations.
 - b. Telecommunications pathways.
 - c. Telecommunications system access points.
 - d. Telecommunications grounding and bonding system.
 - e. Telecommunications conductor drop locations.
 - f. Typical telecommunications details.
- C. Twisted pair cable testing plan.

SPECIFICATIONS

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For RCDD, Installer, installation supervisor, and field inspector.
- B. Product Certificates: For each type of product.
- C. Source quality-control reports.
- D. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For splices and connectors to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
 - 1. Layout Responsibility: Preparation of Shop Drawings, cabling administration Drawings, and field testing program development by an RCDD.
 - 2. Installation Supervision: Installation shall be under the direct supervision of Level 2 Installer, who shall be present at all times when Work of this Section is performed at Project site.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site.
 - 1. Test each pair of twisted pair cable for open and short circuits.

1.10 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.11 COORDINATION

- A. Coordinate layout and installation of telecommunications pathways and cabling with District's telecommunications and LAN equipment and service suppliers.
- B. Coordinate telecommunications outlet/connector locations with location of power receptacles at each work area.

SPECIFICATIONS

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA-568-C.1, when tested according to test procedures of this standard.
- B. Telecommunications Pathways and Spaces: Comply with TIA-569-D.
- C. Grounding and Bonding: Comply with TIA-607-D.

2.2 GENERAL CABLE CHARACTERISTICS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with the applicable standard and CEC for the following types:
 - 1. Communications, Plenum Rated: Type CMP complying with UL 1685.
- B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 50 or less.
- C. RoHS compliant.

2.3 CATEGORY 6A TWISTED PAIR CABLE

- A. Description: Four-pair, balanced-twisted pair cable, with internal spline, certified to meet transmission characteristics of Category 6A cable at frequencies up to 250MHz.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Panduit
 - 2. Or equal.
- C. Standard: Comply with NEMA WC 66/ICEA S-116-732 and TIA-568-C.2 for Category 6A cables.
- D. Conductors: 100-ohm, 23 AWG solid copper.
- E. Cable Rating: Plenum.
- F. Jacket: Blue thermoplastic.

2.4 TWISTED PAIR CABLE HARDWARE

- A. Description: Hardware designed to connect, splice, and terminate twisted pair copper communications cable.

SPECIFICATIONS

- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Panduit
 - 2. Or equal.
- C. General Requirements for Twisted Pair Cable Hardware:
 - 1. Comply with the performance requirements of Category 6A.
 - 2. Comply with TIA-568-C.2, IDC type, with modules designed for punch-down caps or tools.
 - 3. Cables shall be terminated with connecting hardware of same category or higher.
- D. Source Limitations: Obtain twisted pair cable hardware from same manufacturer as twisted pair cable, from single source.
- E. Patch Panel: Modular panels housing numbered jack units with IDC-type connectors at each jack location for permanent termination of pair groups of installed cables.
 - 1. Features:
 - a. Universal T568A and T568B wiring labels.
 - b. Labeling areas adjacent to conductors.
 - c. 24 ports.
 - 2. Construction: 16-gauge steel and mountable on 19-inch equipment racks.
 - 3. Number of Jacks per Field: One for each four-pair conductor group of indicated cables, plus spares and blank positions adequate to suit specified expansion criteria.
- F. Patch Cords: Factory-made, four-pair cables in 36-inch and 48-inch lengths; terminated with an eight-position modular plug at each end. Quantity shall match IP endpoint terminations with a suitable length to accommodate interconnections at each end.
 - 1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure performance. Patch cords shall have latch guards to protect against snagging.
- G. Plugs and Plug Assemblies:
 - 1. Male; eight position; color-coded modular telecommunications connector designed for termination of a single four-pair, 100-ohm, unshielded or shielded twisted pair cable.
 - 2. Standard: Comply with TIA-568-C.2.
- H. Jacks and Jack Assemblies:
 - 1. Female; eight position; modular; fixed telecommunications connector designed for termination of a single four-pair, 100-ohm, unshielded or shielded twisted pair cable.
 - 2. Designed to snap-in to a patch panel or faceplate.
 - 3. Standard: Comply with TIA-568-C.2.
- I. Faceplate:
 - 1. Metal Faceplate: Stainless steel, complying with requirements in Section 26 27 26 "Wiring Devices."
 - 2. For use with snap-in jacks accommodating any combination of twisted pair, optical fiber, and coaxial work area cords.

SPECIFICATIONS

- a. Flush mounting jacks.
- J. Legend:
 - 1. Machine printed, in the field, using adhesive-tape label.
 - 2. Snap-in, clear-label covers and machine-printed paper inserts.

2.5 IDENTIFICATION PRODUCTS

- A. Comply with TIA-606-B and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

2.6 SOURCE QUALITY CONTROL

- A. Factory test cables on reels according to TIA-568-C.1.
- B. Factory test twisted pair cables according to TIA-568-C.2.
- C. Cable will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 WIRING METHODS

- A. Wiring Method: Install cables in raceways and cable trays, except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces, attics, and gypsum board partitions where unenclosed wiring method may be used. Conceal raceway and cables, except in unfinished spaces.
 - 1. Install plenum cable in environmental air spaces, including plenum ceilings.
 - 2. Comply with requirements for raceways and boxes specified in Section 27 05 28 "Pathways for Communications Systems."
- B. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- C. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools. Install conductors parallel with or at right angles to sides and back of enclosure.

3.2 INSTALLATION OF PATHWAYS

- A. Comply with requirements for demarcation point, cabinets, and racks specified in Section 27 11 00 "Communications Equipment Room Fittings."
- B. Comply with Section 27 05 28 "Pathways for Communications Systems."

SPECIFICATIONS

- C. Comply with Section 27 05 29 "Hangers and Supports for Communications Systems."
- D. Comply with Section 27 05 36 "Cable Trays for Communications Systems."
- E. Drawings indicate general arrangement of pathways and fittings.

3.3 INSTALLATION OF TWISTED-PAIR HORIZONTAL CABLES

- A. Comply with NECA 1 and NECA/BICSI 568.
- B. General Requirements for Cabling:
 - 1. Comply with TIA-568-C.0, TIA-568-C.1, and TIA-568-C.2.
 - 2. Comply with BICSI's "Information Transport Systems Installation Methods Manual (ITSIMM), Ch. 5, "Copper Structured Cabling Systems," "Cable Termination Practices" Section.
 - 3. Install 110-style IDC termination hardware unless otherwise indicated.
 - 4. Do not untwist twisted pair cables more than 1/2 inch from the point of termination to maintain cable geometry.
 - 5. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
 - 6. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
 - 7. Install lacing bars to restrain cables, prevent straining connections, and prevent bending cables to smaller radii than minimums recommended by manufacturer.
 - 8. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI Information Transport Systems Installation Methods Manual , Ch. 5, "Copper Structured Cabling Systems," "Cable Termination Practices" Section. Use lacing bars and distribution spools.
 - 9. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation, and replace it with new cable.
 - 10. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
 - 11. In the communications equipment room, install a 10-foot-long service loop on each end of cable.
 - 12. Pulling Cable: Comply with BICSI Information Transport Systems Installation Methods Manual, Ch. 5, "Copper Structured Cabling Systems," "Pulling and Installing Cable" Section. Monitor cable pull tensions.
- C. Open-Cable Installation:
 - 1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
 - 2. Suspend twisted pair cabling, not in a wireway or pathway, a minimum of 8 inches above ceilings by cable supports not more than 60 inches apart.
 - 3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

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- D. Group connecting hardware for cables into separate logical fields.
- E. Separation from EMI Sources:
 - 1. Comply with recommendations from BICSI's "Telecommunications Distribution Methods Manual" and TIA-569-D for separating unshielded copper communication cable from potential EMI sources, including electrical power lines and equipment.
 - 2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches.
 - 3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches.
 - 4. Separation between communications cables in grounded metallic raceways, power lines, and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches.
 - 5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches.
 - 6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches.

3.4 FIRESTOPPING

- A. Comply with requirements in Section 07 84 13 "Penetration Firestopping."
- B. Comply with TIA-569-D, Annex A, "Firestopping."
- C. Comply with "Firestopping Systems" Article in BICSI's "Telecommunications Distribution Methods Manual."

3.5 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA-606-B. Comply with requirements for identification specified in Section 27 05 53 "Identification for Communications Systems."
 - 1. Administration Class: Class 3.
 - 2. Color-code cross-connect fields and apply colors to voice and data service backboards, connections, covers, and labels.

SPECIFICATIONS

- B. Paint and label colors for equipment identification shall comply with TIA-606-B for Class 3 level of administration, including optional identification requirements of this standard.
- C. Cable Schedule: Install in a prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.
- D. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding and bonding conductors.
- E. Cable and Wire Identification:
 - 1. Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
 - 2. Each wire connected to building-mounted devices is not required to be numbered at the device if wire color is consistent with associated wire connected and numbered within panel or cabinet.
 - 3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet.
 - 4. Label each terminal strip, and screw terminal in each cabinet, rack, or panel.
 - a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group, extended from a panel or cabinet to a building-mounted device, with the name and number of a particular device.
 - b. Label each unit and field within distribution racks and frames.
 - 5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and -connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.
- F. Labels shall be preprinted or computer-printed type, with a printing area and font color that contrast with cable jacket color but still comply with TIA-606-B requirements for the following:
 - 1. Cables use flexible vinyl or polyester that flexes as cables are bent.

3.6 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. Visually inspect jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA-568-C.1.
 - 2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.

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3. Test twisted pair cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.
 - a. Test instruments shall meet or exceed applicable requirements in TIA-568-C.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
- C. Data for each measurement shall be documented. Data for submittals shall be printed in a summary report that is formatted similarly to Table 10.1 in BICSI's "Telecommunications Distribution Methods Manual," or shall be transferred from the instrument to the computer, saved as text files, printed, and submitted.
- D. Remove and replace cabling where test results indicate that they do not comply with specified requirements.
- E. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

END OF SECTION 27 15 13

SPECIFICATIONS

SECTION 27 51 26 ASSISTIVE LISTENING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes assistive listening systems.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include material descriptions, dimensions of individual components and profiles.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Sample Warranty: For manufacturer's warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For Assistive Listening System to include operation and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
 - 1. Personnel certified by NICET as Audio Systems Level III Technician or by a Certified Technology Specialist Design "CTS-D".

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1.7 WARRANTY

- A. Manufacturer's Warranty: Manufacturer and/or Installer agree to repair or replace components of the Assistive Listening System that fail(s) in materials or workmanship within specified warranty period.

- 1. Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- 1. Bosch.
 - 2. Telex.
 - 3. Listen Technologies.
 - 4. Or Equal.

2.2 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in CEC, by a qualified testing agency, and marked for intended location and application.

- B. The hearing assist system shall be FM type and deployed to provide noise free coverage of the Cafeteria/auditorium/multi-purpose room seating area. The system shall include the following features:

- 1. Field Strength: Maximum 8000 micro-volts per meter at 30 meters.
 - 2. Transmitter Input: Balanced bridging with a nominal level of 0.03 to 1.0 volt RMS.
 - 3. An automatic gain control shall minimize overload and distortion due to excess-signal input.
 - 4. Antenna Type: 75-ohm, half-wave, coaxial. Coordinate antenna location with District Construction Manager.
 - 5. Receiver Type: 72-76 MHz band and include earphone and belt clip-carrying case. Receiver shall be battery powered and have approximately a 15-hour life when used with alkaline batteries.

- C. Assistive-listening systems code compliance

- 1. Assistive-listening systems shall be provided in accordance with CBC Section 11B-219 and shall comply with CBC Section 11B-706.
 - 2. The minimum number of receivers to be provided shall be equal to 4% of the total number of seats, but in no case less than two. 25 % minimum of receivers

ASSISTIVE LISTENING SYSTEMS

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DEL ROSA FULL DAY KINDER CLASSROOMS

SPECIFICATIONS

provided, but no fewer than two, shall be hearing-aid compatible in accordance with CBC Section 11B-706.3.

3. If the system provided is limited to specific areas or seats, then such areas or seats shall be within a 50-foot viewing distance of, and have a complete view of, the stage or playing area. CBC Section 11B-219.4.

2.3 PORTABLE FM ASSISTIVE LISTENING SYSTEMS

- A. The portable FM Assistive Listening Systems shall be packaged in portable cases complete with all the component of the Assistive Listening System.
- B. The transmitter shall be portable complete with power supply, antenna, connectors for balanced and un-balanced inputs, 17 channels and volume adjustment. The transmitter shall have the following performance characteristics:

- | | | |
|----|-----------------------|-------------------|
| 1. | RF Frequency Range | 72 to 76 MHz |
| 2. | Number of Channels | 17 |
| 3. | Frequency Accuracy | +/- .005% |
| 4. | Transmission Range | up to 400 Feet |
| 5. | Frequency Response | 50 Hz to 15 kHz |
| 6. | Signal to Noise Ratio | 70 db. |
| 7. | Sound Pressure Level: | 110 db to 118 db. |
| 8. | Peak Clipping Level: | 18 db min. |

- C. Receivers shall be portable and compatible with the transmitter and shall have the following characteristics and or features:

- | | | |
|----|-----------------------|------------------|
| 1. | RF Frequency Range | 72 to 76 MHz |
| 2. | Number of Channels | 17 |
| 3. | Frequency Response | 50 Hz to 15 kHz |
| 4. | Headset Jacks | Mono and Stereo |
| 5. | Display | LCD |
| 6. | Signal to Noise Ratio | 79 db. |
| 7. | Power | Two AA batteries |
| 8. | Headphones | Stereo Ear Bud |
| 9. | Hearing Aid Capable | 25% |

D. ACCESSORIES

1. Furnish transmitter and receiver carrying case with capabilities for charging of the receiver units. The carrying case shall be capable of storing and charging 4 head phones.
2. Furnish all interconnection cables as required.
3. Furnish four (4) spare ear bud covers with each carrying case.

ASSISTIVE LISTENING SYSTEMS

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DEL ROSA FULL DAY KINDER CLASSROOMS

SPECIFICATIONS

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1.

3.2 STORAGE AND SIGNAGE

- A. Coordinate ALS system storage location(s) and signage with Architect and District representative prior to procurement.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
 - 1. Perform Sound System tests and adjustments in the presence of the Project Inspector and District's operating personnel.
- B. Prepare test and inspection reports.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train District's maintenance personnel to adjust, operate, and maintain assistive listening system components

END OF SECTION 27 51 26

SPECIFICATIONS

SECTION 28 31 11 DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Fire-alarm control unit.
 - 2. Manual fire-alarm boxes.
 - 3. System smoke detectors.
 - 4. Heat detectors.
 - 5. Notification appliances.
 - 6. Remote annunciator.

1.3 DEFINITIONS

- A. CBC: California Building Code.
- B. CEC: California Electrical Code.
- C. CFC: California Fire Code.
- D. CSFM: California State Fire Marshal.
- E. EMT: Electrical Metallic Tubing.
- F. FACP: Fire Alarm Control Panel.
- G. HLI: High Level Interface.
- H. IDC: Initiating Device Circuit.
- I. ILI: Intelligent Loop Interface.
- J. INCC: Intelligent Network Command Center.
- K. INX: Intelligent Network Transponder.

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- L. LCD: Liquid Crystal Display
- M. NAC: Notification Appliance Circuits.
- N. NICET: National Institute for Certification in Engineering Technologies.
- O. PC: Personal computer.
- P. PIV: Post Indicator Valve.
- Q. SLC: Signal Line Circuits.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product, including furnished options and accessories.
 - 1. Include construction details, material descriptions, dimensions, profiles, and finishes.
 - 2. Include rated capacities, operating characteristics, and electrical characteristics.
 - 3. Include CSFM listings.
 - 4. Include text of all voice messages.
 - 5. Include Bill of Materials for each component of the system to include quantity, model number, and description.
- B. Shop Drawings: For fire-alarm system.
 - 1. As an exception to the requirements of Section 01 30 00 "Submittal Procedures" submit shop drawings as .dwg files, drawn using AutoCAD® 2010 or later. Drawings must comply with the District's AutoCAD® standards, available from the District Construction Manager.
 - 2. Include separate floor plans for each building and each floor.
 - 3. Include Symbol and Wire Legends.
 - 4. Include Riser Diagram. Detail assembly and support requirements.
 - 5. Include battery-size calculations.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and Distributer.
- B. Seismic Qualification Certificates: For fire-alarm control unit, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Field quality-control reports.

SPECIFICATIONS

- D. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.
 - 1. In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," include the following:
 - a. Comply with the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - b. Provide "Fire Alarm and Emergency Communications System Record of Completion Documents" according to the "Completion Documents" Article in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - c. Complete wiring diagrams showing connections between all devices and equipment. Each conductor shall be numbered at every junction point with indication of origination and termination points.
 - d. Riser diagram.
 - e. Device addresses.
 - f. Record copy of site-specific software.
 - g. Provide "Inspection and Testing Form" according to the "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:
 - 1) Equipment tested.
 - 2) Frequency of testing of installed components.
 - 3) Frequency of inspection of installed components.
 - 4) Requirements and recommendations related to results of maintenance.
 - 5) Manufacturer's user training manuals.
 - h. Manufacturer's required maintenance related to system warranty requirements.
 - i. Abbreviated operating instructions for mounting at fire-alarm control unit and each annunciator unit.
- B. Software and Firmware Operational Documentation:
 - 1. Software operating and upgrade manuals.
 - 2. Program Software Backup: On magnetic media or compact disk, or solid state device, complete with data files.
 - 3. Device address list.
 - 4. Printout of software application and graphic screens.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

SPECIFICATIONS

1. Smoke Detectors, Fire Detectors: Quantity equal to 10 percent of amount of each type installed, but no less than one unit of each type.
2. Detector Bases: Quantity equal to two percent of amount of each type installed, but no less than one unit of each type.
3. Keys and Tools: One extra set for access to locked or tamperproofed components.
4. Audible and Visual Notification Appliances: One of each type installed.
5. Fuses: Two of each type installed in the system. Provide in a box or cabinet with compartments marked with fuse types and sizes.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.
- B. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm Level II technician.
- C. Installer Qualifications: Installer must have an office within San Diego County. That office must include a 24/7 service department, and must maintain spare inventory for all equipment used on this project.
- D. Distributer Qualifications: Must be an authorized representative of the equipment manufacturer.
- E. NFPA Certification: Obtain certification according to NFPA 72 by a UL-listed alarm company.

1.9 PROJECT CONDITIONS

- A. Perform a full test of the existing system prior to starting work. Document any equipment or components not functioning as designed.
- B. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by the District or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:
 1. Notify District Construction Manager no fewer than seven days in advance of proposed interruption of fire-alarm service.
 2. Do not proceed with interruption of fire-alarm service without District Construction Manager's written permission.
- C. Use of Devices during Construction: Protect devices during construction unless devices are placed in service to protect the facility during construction.

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1.10 SEQUENCING AND SCHEDULING

- A. Existing Fire-Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service, and label existing fire-alarm equipment "NOT IN SERVICE" until removed from the building.
- B. Equipment Removal: After acceptance of new fire-alarm system, remove existing disconnected fire-alarm equipment and wiring.

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Extent: All equipment and components not covered in the Maintenance Service Agreement.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

- 2.1 Manufacturers: Subject to compliance with requirements, provide products by the following. No substitutions will be allowed.

- 1. Edwards

2.2 FIRE ALARM VOICE EVACUATION SYSTEM DESCRIPTION

- A. Distributed Networked Fire Alarm System.

- 1. Edwards

2.3 FIRE ALARM SYSTEM DESCRIPTION

- A. Intelligent reporting, networked, fully peer-to-peer, microprocessor-controlled fire detection and emergency voice alarm communication system.
- B. Each SLC and NAC: Limited to 75 percent of its total capacity during initial installation.
- C. Basic Performance:
 - 1. Network Communications Circuit Serving Network Nodes: Wired using single twisted non-shielded 2-conductor cable or connected using approved fiber optic

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- cable between nodes in a modified Class B configuration with #16 AWG minimum conductors.
 - 2. SLCs Serving Addressable Devices: Wired modified Class B with #16 AWG minimum conductors.
 - 3. IDC's Serving Non-addressable Devices Connected to Addressable Monitor Modules: Wired modified Class B with the EOL resistor at the terminal cabinet. Conductors shall be #16 AWG minimum a separate return (redundant) circuit conductor.
 - 4. NACs Serving Strobes and Speakers: Wired modified Class B with a separate return (redundant) circuit conductor with the EOL resistor at the terminal cabinet. Conductors shall be #14 AWG minimum for Strobes and #18 AWG minimum for Speakers.
 - 5. Alarm Signals Arriving at FACP: Not be lost following primary power failure until alarm signal is processed and recorded.
 - 6. Network Node Communications, Audio Evacuation Channels and Fire Phone Communications:
 - a. Communicated between panels and transponders on single pair of copper wires or fiber optic cables.
 - b. To enhance system survivability, ability to operate on loss of INCC Command Center or Simplex Safelinc system, short or open of entire RS485 network at INCC Command Center shall be demonstrated at time of system acceptance testing.
 - 7. Signaling Line Circuits:
 - a. Reside in remote transponders with associated audio zones.
 - b. SLC modules shall operate in peer-to-peer fashion with all other panels and transponders in system.
 - c. On loss of FACP, each transponder shall continue to communicate with remainder of system, including all SLC functions and audio messages located in all transponders.
 - d. Systems that provide a "Degraded" mode of operation upon loss of FACP shall not be acceptable.
 - 8. Audio Amplifiers and Tone-Generating Equipment: Electrically supervised for normal and abnormal conditions.
 - 9. Amplifiers: Located in transponder cabinets or in main panel.
- D. All components provided shall be listed for use with the selected system.
- E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in CEC, by a qualified testing agency, and marked for intended location and application.
- F. All components shall be listed by the California State Fire Marshal (CSFM).

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2.4 FIRE ALARM SYSTEMS OPERATIONAL DESCRIPTION

- A. When fire alarm condition is detected and reported by one of the system alarm initiating devices, the following functions shall immediately occur:
 - 1. System Alarm LEDs: Flash.
 - 2. Local Piezoelectric Signal in Control Panel: Sound at a pulse rate.
 - 3. 80-Character LCD Display: Indicated all information associated with fire alarm condition, including type of alarm point and its location within protected premises.
 - 4. Historical Log: Record information associated with fire alarm control panel condition, along with time and date of occurrence.
 - 5. System output programs assigned via control-by-event equations to be activated by particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated.
 - 6. Audio Portion of System: Sound tone (California Temporal Pattern) until system is reset.

2.5 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Fire-alarm control unit and raceways shall withstand the effects of earthquake motions determined according to CBC.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2.6 FIRE ALARM FUNCTIONALITY

- A. Complete electrically supervised, distributed, networked, analog/addressable fire alarm and control system, with analog initiating devices, and integral multiple-channel voice evacuation.
- B. Fire Alarm System:
 - 1. Consist of multiple-voice channels with no additional hardware required for total of 4 channels.
 - 2. Incorporate multiprocessor-based control panels, including model E3 Series including Intelligent Network INCC Command Center(s) (INCC),
- C. Intelligent Loop Interface, Intelligent Network Transponders, communicating over peer-to-peer token ring network with capacity of up to 64 nodes.
 - 1. Each ILI Node: Incorporate 2 Signaling Line Circuits (SLC), with capacity to support a minimum of 99 analog addressable detectors and a minimum of 98 addressable modules per SLC.
 - a. Edwards

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2. Voice Data: Transmit over single pair of wires or fiber optic cable.
3. Control Panels: Capability to accept firmware upgrades via connection with laptop computer, without requirement of replacing microchips.
4. Network:
 - a. Based on peer-to-peer token ring technology operating at 625 K baud, using Class A
 - b. Capability of using twisted-pair wiring, pair of fiber optic cable strands up to 200 microns, or both, to maximize flexibility in system configuration.
5. Each Network Node:
 - a. Capability of being programmed off-line using Windows-based software supplied by fire alarm system manufacturer. Capability of being downloaded by connecting laptop computer into any other node in system. Systems that require system software to be downloaded to each transponder at each transponder location shall not be acceptable.
 - b. Capability of being grouped with any number of additional nodes to produce a "Region", allowing that group of nodes to act as 1, while retaining peer-to-peer functionality. Systems utilizing "Master/Slave" configurations shall not be acceptable.
 - c. Capability of annunciating all events within its "Region" or annunciating all events from entire network, on front panel LCD without additional equipment.
 - d. Incorporate Boolean control-by-event programming, including as a minimum AND, OR, NOT, and Timer functions.
6. Each Control Panel: Capability of storing its entire program, and allow installer to activate only devices that are installed during construction, without further downloading of system.
7. Password Protection: Each system shall be provided with 4 levels of password protection with up to 16 passwords.

2.7 FIRE-ALARM CONTROL UNIT (Existing to Remain)

- A. Supply user interface, including LCD or touch-screen 1/4 VGA display Intelligent Loop Interface Modules, manual switching, phone, and microphone inputs to the network. INCC shall consist of the following units and components:
 1. Power Supply Module with batteries.
 2. Intelligent Network Interface Voice Gateway INCC Command Center.
 3. 80-Character LCD Display.
 4. Intelligent Loop Main Board Interface.
 5. Intelligent Loop Supplemental Interface.
 6. Ethernet card for network.
 7. RS-485 Repeater.
 8. Auxiliary Switch Module.
- B. System Cabinet:

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1. Surface or semi-flush mounted with texture finish. System Cabinet (B-, C-, or D-Size Cabinet) with associated inner door.
 2. Consists of back-box, inner door, and door.
 3. Available in at least 3 sizes to best fit project configuration.
 4. Houses one or more Power Supply Modules, Intelligent Network Interface Voice Gateway, 1 or more ILI assemblies, and other optional modules as specified.
 5. Construction: Dead-front steel construction with inner door to conceal internal circuitry and wiring.
 6. Wiring Gutter Space: A minimum of 1-inch wiring gutter space behind mounting plate.
 7. Wiring: Terminated on removable terminal blocks to allow field servicing of modules without disrupting system wiring.
- C. Power Supply Module Edwards: Use latest technologies to provide power to INCC and incorporate the following features:
1. Power-saving switching technology using no step-down transformers.
 2. 9-amp continuous-rated output to supply up to all power necessary under normal and emergency conditions for INCC Command Center Modules.
 3. Integral battery charger with capacity to charge up to 55 amp-hour batteries while under full load.
- D. Batteries:
1. Sufficient capacity to provide power for entire system upon loss of normal AC power for a period of 24 hours with 15 minutes of alarm signaling at end of this 24-hour period, as required by NFPA 72, Local Systems.
- E. LCD Display Module Edwards:
1. LCD Display: 80-character RS-485 based textual annunciator with capability of being mounted locally or remotely. Provides audible and visual annunciation of all alarms and trouble signals. Provide dedicated LEDs for:
 - a. AC Power On: Green.
 - b. Alarm: Red.
 - c. Supervisory: Yellow.
 - d. System Trouble: Yellow.
 - e. Power Fault: Yellow.
 - f. Ground Fault: Yellow.
 - g. System Silenced: Yellow.
 2. 80-Character Alphanumeric Display: Provide status of all analog/addressable sensors, monitor and control modules. Display shall be backlit liquid crystal type (LCD), clearly visible in dark and under all light conditions.
 3. Panel shall contain 4 functional keys:
 - a. Alarm Acknowledge.
 - b. Trouble Acknowledge.
 - c. Signal Silence.
 - d. System Reset/Lamp Test.

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4. Panel shall contain 3 configuration buttons:
 - a. Menu/Back.
 - b. Back Space/Edit.
 - c. OK/Enter.
 5. Panel shall have 12-key telephone-style keypad to permit selection of functions.
 6. LCD display module shall be UPL 2572 Listed.
- F. Intelligent Loop Interface Edwards Series: System shall be of multiprocessor design to allow maximum flexibility of capabilities and operation. Intelligent Loop Interface shall be capable of mounting in stand-alone enclosure or integrated with Intelligent Network INCC Command Center (INCC) as specified.
1. Field Programmable: System shall be capable of being programmed by Field Configuration Program (FCP), allowing programming to be downloaded via portable computer from any node on network.
 2. RS-232C Serial Output: Supervised RS-232C serial port shall be provided to operate remote printers and/or video terminals, accept downloaded program from portable computer, or provide 80-column readout of all alarms, troubles, location descriptions, time, and date. Communication shall be standard ASCII code operating from 1,200 to 115,200 baud rate.
 3. RS-485 Serial Output: Shall incorporate RS-485 bus via ribbon harness for connection of modules inside same cabinet, and via 4-wire quick connector for connection of modules up to 3,000 feet from cabinet. RS-485 bus shall support up to 16 ASM-16 auxiliary switch modules, 6 LCD-E3 main annunciators, and 5 LCD-7100 annunciators.
 4. Peer-to-Peer Panel Configuration: All Loop Interface Modules shall incorporate own programming, log functions, Central Processor Unit, and control-by-event (CBE) programming. If any loop becomes disabled, each remaining loop driver shall continue to communicate with remainder of network and maintain normal operation. "Degrade" configurations under these conditions shall not be acceptable.
 5. Control-by-Event (CBE) Program: Shall be capable of programming using Boolean logic including AND, OR, NOT, and TIMING functions to provide complete programming flexibility.
 6. Alarm Verification: Smoke detector alarm verification shall be standard option while allowing other devices such as manual stations and sprinkler flow to create immediate alarm. This feature shall be selectable for smoke sensors that are installed in environments prone to nuisance or unwanted alarms.
 7. Alarm Signals: All alarm signals shall be automatically latched or "locked in" at control panel until operated device is returned to normal and control panel is manually reset. When used for sprinkler flow, "SIGNAL SILENCE" switch may be bypassed, if required by Authority Having Jurisdiction.
 8. Electrically Supervised:
 - a. Each SLC and NAC circuit shall be electrically supervised for opens, shorts, and ground faults. Occurrence of fault shall activate system trouble circuitry, but shall not interfere with proper operation of other circuits.

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- b. Yellow "SYSTEM TROUBLE" LEDs shall light and system audible sounder shall steadily sound when trouble is detected in system. Failure of power, open or short circuits on SLC or NAC circuits, disarrangement in system wiring, failure of microprocessor or any identification module, or system ground faults shall activate this trouble circuit. Trouble signal shall be acknowledge by operating "TROUBLE ACKNOWLEDGE" switch. This shall silence sounder. If subsequent trouble conditions occur, trouble circuitry shall resound. During alarm, all trouble signals shall be suppressed with exception of lighting yellow "SYSTEM TROUBLE" LEDs.
- 9. Drift Compensation – Analog Smoke Sensors: System software shall automatically adjust each analog smoke sensor approximately once each week for changes in sensitivity due to effects of component aging or environment, including dust. Each sensor shall maintain its actual sensitivity under adverse conditions to respond to alarm conditions while ignoring factors which generally contribute to nuisance alarms. System trouble circuitry shall activate, display "DIRTY DETECTOR" and "VERY DIRTY DETECTOR" indications and identify individual unit that requires maintenance.
- 10. Analog Smoke Sensor Test: system software shall automatically test each analog smoke sensor a minimum of 3 times daily. Test shall be recognized functional test of each photocell (analog photoelectric sensors) and ionization chamber (analog ionization sensors) as required annually by NFPA 72. Failure of sensor shall activate system trouble circuitry, display "Test Failed" indication, and identify individual device that failed.
- 11. Remote Station: Fire alarm system shall transmit alarm, supervisory, and trouble signals with alarm having priority over supervisory and trouble signals. Interface with existing or security system RTU via dry contact.
- 12. Network Annunciator Option: Each display shall provide option of being configured as network annunciator. Options for annunciation shall default as regional annunciator with capability of selecting global annunciation to provide system-wide protection and Acknowledge, Silence, and Reset capabilities. See drawings.
- 13. Redundant History Log: Shall contain full 4100 event history log supporting local and network functions. If a main processor or network node is lost the entire log shall be accessible at any other Loop Interface board. This shall be demonstrated by removing power from INCC Command Center followed by extraction of history log from any loop driver location, including INCC Command Center or Transponder.
- 14. LEDs Indicator and Outputs: Each Loop Interface shall incorporate as a minimum the following diagnostic LED indicators:
 - a. Power: Green.
 - b. Alarm: Red.
 - c. Supervisory: Yellow.
 - d. General Trouble: Yellow.
 - e. Ground Fault: Yellow.
 - f. Transmit: Green.
 - g. Receive: Green

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15. Auxiliary Power Outputs: Each Loop Interface shall provide the following supply outputs:
 - a. 24 VDC non-resettable, 1 amp. Maximum, power limited.
 - b. 24 VDC resettable, 1 amp. Maximum, power limited.
16. Microprocessor: Loop interface shall incorporate 32-bit RISC processor. Isolated “watchdog” circuit shall monitor microprocessor and upon failure shall activate system trouble circuits on display. Microprocessor shall access system program for all control-by-event (CBE) functions. System program shall not be lost upon failure of both primary and secondary power. Programming shall support Boolean logic including AND, OR, NOT, TIME DELAY functions for maximum flexibility.
17. Auto Programming: System shall provide for all SLC devices on any SLC loop to be pre-programmed into system. Upon activation of auto programming, only devices that are present shall activate. This allows for system to be commissioned in phases without need of additional downloads.
18. Environmental Drift Compensation: System shall provide for setting Environmental Drift Compensation by device. When detector accumulates dust in chamber and reaches unacceptable level but yet still below allowed limit, control panel shall indicate maintenance alert warning. When detector accumulates dust in chamber above allowed limit, control panel shall indicate maintenance urgent warning.
19. NON-FIRE Alarm Module Reporting: Non-reporting type ID shall be available for use for energy management or other non-fire situations. NON-FIRE point operation shall not affect control panel operation nor shall it display message at panel LDC. Activation of NON-FIRE point shall activate control by event logic, but shall not cause indication on control panel.
20. 1-Man Walk Test:
 - a. System shall provide both basic and advanced walk test for testing entire fire alarm system. Basic walk test shall allow single operator to run audible tests on panel. All logic equation automation shall be suspended during test and while annunciators can be enabled for test, all shall default to disabled state. During advanced walk test, field-supplied output point programming shall react to input stimuli, such as CBE and logic equations. When points are activated in advanced test mode, each initiating event shall latch input. Advanced test shall be audible and shall be used for pull station verification, magnet activated tests on input devices, input and output device, and wiring operation/verification.
 - b. Test feature is intended to provide for certain random spot testing of system and is not intended to comply with requirements of testing fire alarm systems in accordance with NFPA 72, as it is impossible to test all functions and verify items such as annunciation with only 1 persons.
21. Signaling Line Circuits: Each module shall provide communication with analog/addressable (initiation/control) devices via 2 signaling line circuits. Each signaling line circuit shall be capable of being wired Class A, or Class B, Style 4. Circuits shall be capable of operating in NFPA Class A configuration when

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equipped with isolator modules between each module type device and isolator sensor bases. Each circuit shall communicate with a maximum of 99 analog sensors and 98 addressable monitor/control devices. Unique 40-character identifier shall be available for each device. Devices shall be of the Velocity series with capability to poll 10 devices at a time with a maximum polling time of 2 seconds when both SLCs are fully loaded.

22. Notification Appliance Circuits: 2 independent NAC circuits shall be provided, polarized and rated at 2 amperes DC per circuit, individually over current protected and supervised for opens, grounds and short circuits. They shall be capable of being wired Class B, or Class A.
23. Alarm Dry Contacts: Provide alarm dry contacts (Form C) rated 2 amps at 30 VDC (resistive) and transfer whenever system supervisory condition occurs.
24. Trouble Dry Contacts: Provide trouble dry contacts (Form C) rated 2 amps at 30 VDC (resistive) and transfer whenever system trouble occurs.

G. Notification-Appliance Circuit:

1. Audible appliances shall sound in a three-pulse temporal pattern, as defined in NFPA 72.
2. Where notification appliances provide signals to sleeping areas, the alarm signal shall be a 520-Hz square wave with an intensity 15 dB above the average ambient sound level or 5 dB above the maximum sound level, or at least 75 dBA, whichever is greater, measured at the pillow.
3. Visual alarm appliances shall flash in synchronization where multiple appliances are in the same field of view, as defined in NFPA 72.

H. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, and supervisory and digital alarm communicator transmitters shall be powered by 24-V dc source.

1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.

I. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.

1. Batteries: Sealed lead calcium.

2.8 MANUAL FIRE-ALARM BOXES

A. Products:

1. Edwards

B. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.

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1. Manual Fire Alarm Stations: Non-code, non-break glass type, equipped with key lock so they may be tested without operating handle.
2. Operated Station: Visually apparent, as operated, at a minimum distance of 100 feet from front or side.
3. Stations shall be designed so after actual activation, they cannot be restored to normal except by key reset.
4. Manual stations shall be construction of Lexan with clearly visible operating instructions provided on cover. The word FIRE shall appear on front of stations in raised letter, 1.75 inches or larger.
5. Addressable manual stations shall, on command from control panel, send data to panel representing state of manual switch and addressable communication module status.
6. Double-action mechanism requiring two actions to initiate an alarm, pull-lever type; with integral] addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.

2.9 SYSTEM SMOKE DETECTORS

A. Products:

1. Edwards Model # 4098-9714.

B. General Requirements for System Smoke Detectors:

1. Comply with UL 268; operating at 24-V dc, nominal.
2. Detectors shall be two-wire type.
3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
4. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
5. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
6. Integral Visual-Indicating Light: LED type, indicating detector has operated and power-on status.
7. Remote Control: Unless otherwise indicated, detectors shall be digital-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by fire-alarm control unit.

C. Photoelectric Smoke Detectors:

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
 - a. Edwards Model # 4098-9756.

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2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).

2.10 HEAT DETECTORS

A. Products:

1. Edwards_ Model #4098-9733

B. General Requirements for Heat Detectors: Comply with UL 521.

1. Temperature sensors shall test for and communicate the sensitivity range of the device.

C. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F or a rate of rise that exceeds 15 deg F per minute unless otherwise indicated.

1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

2.11 NOTIFICATION APPLIANCES – ALARM HORN, STROBE AND HORN/STROBE DEVICES

- A. Furnish and install where indicated on the plans, alarm horn, strobe and horn/strobe devices. The audible/visual devices shall be combination horn-strobe units. The horn/strobe devices shall have a rated input voltage of 24 volts DC and a current drain of 0.120 amp and shall be connected in parallel and be polarized to allow DC supervision of the alarm lines.
- B. The audible section shall be a vibrating horn of rugged vandal-resistant construction. The horn mechanism shall be contained in a die cast housing providing a rated sound level of 88dBA at ten (10) feet as measured in a UL type reverberant room. The visual section shall be a strobe using a Xenon flashtube in a clear housing with Solid State circuiting for maximum reliability and efficiency. The strobe unit shall have a meantime between failure (MTBF) of 1,000 hours or greater. The strobe section shall have a minimum intensity rating of 8,000 peak candela with a flash rate of approximately one flash per second.
- C. The alarm horn/strobe device shall be of the semi-flush type designed for mounting to a standard 4" square electrical outlet box. Each device shall be provided with a semi-flush accessory plate. Exterior horns shall be weatherproof.

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2.12 REMOTE ANNUNCIATOR

- A. Description: Annunciator functions shall match those of fire-alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control unit, including acknowledging, silencing, resetting, and testing.
 - 1. Mounting: Surface cabinet, NEMA 250, Type 1.
- B. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire-alarm control unit. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.

2.13 ADDRESSABLE INTERFACE DEVICE

- A. Addressable Dry Contact Monitor Modules:
 - 1. Products:
 - a. Edwards Model
 - 2. Provide to connect 1 supervised IDC zone of conventional alarm initiating devices (any N>O> dry contact device) to 1 of the fire alarm control panel SLCs.
 - 3. Mount in standard deep electrical box.
 - 4. IDC Zone: Suitable for Class B operation.
- B. Addressable Control Module:
 - 1. Products:
 - a. Edwards Model
 - 2. Provide to supervise and control operation of 1 conventional NAC of compatible, 24-VDC powered, polarized audio/visual notification appliances or UL-listed polarized relays for fan shutdown and other auxiliary control functions.
 - 3. Mount in standard 4-inch square, 2-1/8-inch deep electrical box or to surface-mounted back box.
 - 4. Control Module NAC: Wire for Class B with up to 1 amp of inductive signal or 2 amps of resistive signal operation. Relay coil shall be magnetically latched to reduce wiring connection requirements and to ensure 100 percent of all auxiliary relay or NACs shall be energized at same time on same pair of wires.
 - 5. Audio/Visual Power: Provide by separate supervised power circuit from main fire alarm control panel or from supervised, UL-listed remote power supply.
- C. Addressable Relay Module:
 - 1. Products:
 - a. Edwards Model
 - 2. Available for HVAC control and other building functions. Relay shall have 2 Form C sets of contacts that operate in tandem and are rated for a minimum of 2.0

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amps resistive or 1.0 amps inductive. Relay coil shall be magnetically latched to reduce wiring connection requirements and to ensure 100 percent of all auxiliary relay or NACs shall be energized at same time on same pair of wires.

3. Mount in standard 4-inch square, 2-1/8-inch deep electrical box or to surface-mounted back box.

2.14 SPARE PARTS CABINET

- A. NEMA 1 cabinet with hinged lockable door and painted to match FACP, sized to accommodate the Maintenance Materials specified herein. Provide an engraved nameplate to read "FIRE ALARM SYSTEM SPARE PARTS CABINET".

2.15 DEVICE GUARDS

- A. Description: Welded wire mesh of size and shape for the manual station, smoke detector, gong, or other device requiring protection.
 1. Factory fabricated and furnished by device manufacturer.
 2. Finish: Paint, color white.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.
 1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.
- B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EQUIPMENT INSTALLATION

- A. Comply with NFPA 72,, CFC and CBC, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in CEC including, but not limited to, Article 760, "Fire Alarm Systems."
 1. Devices placed in service before all other trades have completed cleanup shall be replaced.

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2. Devices installed but not yet placed in service shall be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.
- B. Connecting to Existing Equipment: Verify that existing fire-alarm system is operational before making changes or connections.
1. Connect new equipment to existing control panel in existing part of the building.
 2. Connect new equipment to existing monitoring equipment at the supervising station.
 3. Expand, modify, and supplement existing control equipment as necessary to extend existing control monitoring functions to the new points. New components shall be capable of merging with existing configuration without degrading the performance of either system.
- C. Install wall-mounted equipment, with tops of cabinets not more than 78 inches above the finished floor.
1. Comply with requirements for seismic-restraint devices specified in Section 26 05 48.16 "Seismic Controls for Electrical Systems."
- D. Manual Fire-Alarm Boxes:
1. Install manual fire-alarm box in the normal path of egress within 60 inches of the exit doorway.
 2. Mount manual fire-alarm box on a background of a contrasting color.
 3. The operable part of manual fire-alarm box shall be between 42 inches and 48 inches above floor level. All devices shall be mounted at the same height unless otherwise indicated.
- E. Smoke- or Heat-Detector Spacing:
1. Comply with the "Smoke-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for smoke-detector spacing.
 2. Comply with the "Heat-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for heat-detector spacing.
 3. HVAC: Locate detectors not closer than 36 inches from air-supply diffuser or return-air opening.
 4. Lighting Fixtures: Locate detectors not closer than 12 inches from any part of a lighting fixture and not directly above pendant mounted or indirect lighting.
- F. Install a cover on each smoke detector that is not placed in service during construction. Cover shall remain in place except during system testing. Remove cover prior to system turnover.
1. Do not install smoke detector in duct smoke-detector housing during construction. Install detector only during system testing and prior to system turnover.

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- G. Remote Status and Alarm Indicators: Install in a visible location near each smoke detector, sprinkler water-flow switch, and valve-tamper switch that is not readily visible from normal viewing position.

3.3 PATHWAYS

- A. Pathways shall be installed in EMT, minimum $\frac{3}{4}$ -inch conduit size.
- B. Exposed EMT shall be painted red enamel.

3.4 GROUNDING

- A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.
- B. Ground shielded cables at the control panel location only. Insulate shield at device location.

3.5 FIELD QUALITY CONTROL

- A. Field tests shall be witnessed by the Project Inspector.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Tests and inspections.
 - 1. Visual Inspection: Conduct visual inspection prior to testing.
 - a. Inspection shall be based on completed record Drawings and system documentation that is required by the "Completion Documents, Preparation" table in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - 2. System Testing: Comply with the "Test Methods" table in the "Testing" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - 3. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" section of the "Fundamentals" chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
- D. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.
- E. Fire-alarm system will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

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- G. Provide NFPA 101 certificates to the owner, local fire official, architect of record and DSA.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train District's maintenance personnel to adjust, operate, and maintain fire-alarm system.
- B. Demonstrate audibility of all interior and exterior speakers add to the existing system. Testing shall be done in the presence of the project Inspector and School District representatives. Testing shall be conducted indoors with ambient noise present. Outdoor testing shall be conducted during outdoor play time. If speakers are not audible, add additional speakers as needed.

END OF SECTION 28 31 11

SPECIFICATIONS

SECTION 31 10 00

SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Protecting existing vegetation to remain.
 - 2. Removing existing vegetation.
 - 3. Clearing and grubbing.
 - 4. Stripping and stockpiling topsoil.
 - 5. Removing above- and below-grade site improvements.
 - 6. Disconnecting, capping or sealing, and removing site utilities or abandoning site utilities in place.
 - 7. Temporary erosion and sedimentation control.
- B. Related Requirements:
 - 1. Section 01 57 23 "Temporary Storm Water Pollution Control" for temporary erosion- and sedimentation-control measures.

1.3 DEFINITIONS

- A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.
- C. Topsoil: Top layer of the soil profile consisting of existing native surface and existing in-place surficial organic soil layer; the zone where plant roots grow.
- D. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.
- E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

SITE CLEARING

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1.4 PRE-INSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site.

1.5 MATERIAL OWNERSHIP

- A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain District's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.6 INFORMATIONAL SUBMITTALS

- A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
 - 1. Use sufficiently detailed photographs or video recordings.
 - 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designated to remain.
- B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.7 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from District and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by District or authorities having jurisdiction.
 - 3. Maintain emergency vehicle access traffic ways at all times. If the Work impacts the emergency vehicle access traffic way, coordinate with the local Fire Marshal.
- B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining District's property will be obtained by District before award of Contract.
 - 1. Do not proceed with work on adjoining property until directed by District Construction Manager.
- C. Salvageable Improvements: Carefully remove items indicated to be salvaged and store where indicated.
- D. Utility Locator Service: Retain a professional utility locator service and have all existing underground utilities located and surface-identified before site clearing.

SPECIFICATIONS

- E. Do not commence site clearing operations until temporary erosion-control, sedimentation-control and plant-protection measures are in place.
- F. Tree- and Plant-Protection Zones: The following practices are prohibited within plant protection zones:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Parking vehicles or equipment.
 - 3. Foot traffic.
 - 4. Erection of sheds or structures.
 - 5. Impoundment of water.
 - 6. Excavation or other digging unless otherwise indicated.
 - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
 - 8. Do not direct vehicle or equipment exhaust toward protection zones.
 - 9. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.
- G. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.
- H. Burning: Burning is not permitted on the site.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 31 20 00 "Earth Moving."
 - 1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly identify trees, shrubs, and other vegetation to remain. Wrap a 1-inch blue vinyl tie tape flag around each tree trunk at 54 inches above the ground.
- C. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to District.

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3.2 TREE AND PLANT PROTECTION

- A. Protect trees remaining on-site.
 - 1. Protect shrubs and other vegetation indicated to remain or be relocated.
 - 2. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by District Construction Manager.

3.3 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Coordinate with and follow all the requirements contained in Section 01 57 23 "Temporary Storm Water Pollution Control."
- C. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- D. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- E. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

3.4 EXISTING UTILITIES

- A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.
 - 1. Arrange with utility companies to shut off indicated utilities.
 - 2. Protect all utilities to remain in place.
 - 3. Cap or seal utilities in accordance with the appropriate code and industry standard.
- B. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by District or others, unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify District Construction Manager not less than five days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without District Construction Manager's written permission.
- C. Removal of underground utilities is included in earthwork sections; in applicable fire suppression, plumbing, HVAC, electrical, communications, electronic safety and

SPECIFICATIONS

security, and utilities sections; and in Section 02 41 16 "Structure Demolition" and Section 02 41 19 "Selective Demolition."

3.5 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 - 2. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches below exposed subgrade.
 - 3. Use only hand methods for grubbing within protection zones.
 - 4. Chip removed tree branches and dispose of off-site.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to depth of 6 inches in a manner to prevent intermingling with underlying subsoil or other waste materials.
 - 1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects larger than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil away from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
 - 1. Limit height of topsoil stockpiles to 72 inches.
 - 2. Do not stockpile topsoil within protection zones.
 - 3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.
 - 4. Stockpile surplus topsoil to allow for re-spreading deeper topsoil.

3.7 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.

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1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off District's property.
- B. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials, and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 31 10 00

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SECTION 31 20 00

EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Excavating and compacting fill material for rough grading the Site.
 - 2. Excavating and compacting fill material for building and retaining wall foundations.
 - 3. Excavating utility trenches and pits for buried utility structures
 - 4. Placing pipe bedding material and compacting trench backfill.
 - 5. Preparing subgrade for slab-on-grade, hardscape pavement, and landscape improvements.
 - 6. Installing retaining wall backdrain and compacting wall backfill material.
 - 7. Preparing subgrade for traffic rated pavement structural sections
 - 8. Compacting aggregate base and aggregate subbase courses for traffic rated pavements.
- B. Geotechnical Report: District has commissioned a geotechnical report in accordance with the requirements of the CBC. This report is not a part of the Contract Documents. The report is available for Contractor's examination.
 - 1. Geotechnical Report Publication Information:
 - a. Title: Addendum 2 Report, Preliminary Geotechnical and Geological Engineering Investigation, New Building with Exterior Patio and Kindergarten Classroom Building, Del Rosa Elementary School, 3395 Mountain Avenue, San Bernardino, CA 92404
 - b. Date: 06/20/2020
 - c. Author: Koury Engineering & Testing, Inc.
 - d. Document / Project Number: Report No. 2 / Project No. 18-1028 / 20-1637
- C. Related Requirements:
 - 1. Section 013201 "Construction Progress Documentation".
 - 2. Section 01 32 33 "Preconstruction Photographic Documentation".
 - 3. Section 01 45 00 "Environmental Testing of Imported Fill Material".
 - 4. Section 31 10 00 "Site Clearing".

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1.3 UNIT PRICES

- A. Rock Measurement: Volume of rock actually removed, measured in original position, but not to exceed the following. Unit prices for rock excavation include replacement with approved materials.
 - 1. 24 inches outside of concrete forms other than at footings.
 - 2. 12 inches outside of concrete forms at footings.
 - 3. 6 inches outside of minimum required dimensions of concrete cast against grade.
 - 4. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
 - 5. 6 inches beneath bottom of concrete slabs-on-grade.
 - 6. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide.

1.4 DEFINITIONS

- A. Backfill: Soil, engineered material, or controlled low-strength material used to fill an excavation.
 - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Pavement Structural Section: An engineered structural element typically composed of distinct thickness and / or density of rigid concrete pavement or flexible asphalt concrete pavement, base course, subbase course, and subgrade, designed to support a specific load.
- C. Base Course: Engineered aggregate material compacted to a specified density and layer thickness between pavement and the subgrade or subbase course, if applicable.
- D. Subbase Course: Engineered aggregate material compacted to a specified density and layer thickness between base course layer and subgrade.
- E. Subgrade: The bottom surface of an excavation which is to support compacted fill, backfill, or structure foundations or the upper 12 inches of compacted fill to support a pavement structural section or surface improvements.
- F. Pipe Bedding Course: A clean, granular material placed full width from the bottom of the excavated trench subgrade to above the top of the pipe to support the buried pipe within the trench.
- G. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- H. Drainage Course (Capillary Break): Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- I. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

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1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Construction Manager. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
 2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
 3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by District. Unauthorized excavation, as well as remedial work directed by Construction Manager, shall be without additional compensation.
- J. Fill: Soil or engineered materials used to raise existing grades and support surface improvements.
- K. Formational Materials / Formation: An undisturbed geologic unit of rock strata possessing similar properties and lithology.
- L. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock-excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:
1. Equipment for Footing, Trench, and Pit Excavation: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch-maximum-width, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,700 lbf and stick-crowd force of not less than 18,400 lbf with extra-long reach boom.
 2. Equipment for Bulk Excavation: Late-model, track-mounted loader; rated at not less than 230-hp flywheel power and developing a minimum of 47,992-lbf breakout force with a general-purpose bare bucket.
- M. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- N. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.
- 1.5 PRE-INSTALLATION MEETINGS
- A. Pre-installation Conference: Conduct pre-excavation conference at Project site.
1. Review methods and procedures related to earthmoving, including, but not limited to, the following:
 - a. Personnel and equipment needed to make progress and avoid delays.
 - b. Coordination of Work with utility locator service.
 - c. Coordination of Work and equipment movement with the locations of tree- and plant-protection zones.

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- d. Extent of trenching by hand or with air spade.
- e. Field quality control.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of the following manufactured products required:
 - 1. Geotextiles.
 - 2. Warning tapes.
 - 3. Plastic Vapor Barrier
- B. Samples for Verification: For the following products, in sizes indicated below:
 - 1. Geotextile: 12 by 12 inches.
 - 2. Warning Tape: 12 inches long; of each color.
 - 3. Plastic Vapor Barrier: 12 by 12 inches.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:
 - 1. Classification according to ASTM D 2487.
 - 2. Laboratory compaction curve according to ASTM D 1557.
 - 3. Expansion Index per ASTM D 4829.
 - 4. Sand Equivalent Value per ASTM D 2419
 - 5. R-Value according to California Test Method 301.
- C. Pre-excavation Photographs or Video: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth-moving operations. Submit before earth moving begins.

1.8 QUALITY ASSURANCE

- A. Geotechnical Testing Agency Qualifications: The District will retain a DSA accepted testing agency according to ASTM E 329 and ASTM D 3740 for testing indicated.

1.9 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from District and authorities having jurisdiction.

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2. Provide alternate routes around closed or obstructed traffic ways if required by District or authorities having jurisdiction.
 3. Maintain emergency vehicle access traffic ways at all times. If the Work impacts the emergency vehicle access traffic way, coordinate with the local Fire Marshal.
- B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining District's property will be obtained by the District before award of Contract.
1. Do not proceed with work on adjoining property until directed by the Construction Manager.
- C. Utility Locator Service: Retain a professional utility locator service and have all existing underground utilities located and surface-identified before beginning earth-moving operations.
- D. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation-control measures specified in Section 01 50 00 "Temporary Facilities and Controls", Section 31 10 00 "Site Clearing" and Section 01 57 "Temporary Storm Water Pollution Control" are in place.
- E. The following practices are prohibited within protection zones:
1. Storage of construction materials, debris, or excavated material.
 2. Parking vehicles or equipment.
 3. Foot traffic.
 4. Erection of sheds or structures.
 5. Impoundment of water.
 6. Excavation or other digging unless otherwise indicated.
 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- F. Do not direct vehicle or equipment exhaust towards protection zones.
- G. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.
- H. Existing Utilities: Do not interrupt utilities serving facilities occupied by District or others unless permitted in writing by District and then only after arranging to provide temporary utility services according to requirements indicated.
1. Notify District not less than five days in advance of proposed utility interruptions.
 2. Do not proceed with utility interruptions without District's written permission.
- I. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

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PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, free of rock or gravel larger than 6 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
 - 1. Expansion Index: Not more than 20 as measured by ASTM D 4829.
 - 2. Upper 18 inches of subgrade fill under landscaped areas: Soil containing not more than 10% stones or lumps larger than 1-1/2 inches.
- C. Unsatisfactory Soils: Soil Classification Groups OL, CH, MH, OH, and PT according to ASTM D 2487; Soil Classification Groups GC, SC, CL and ML where those soils are classified as medium or highly expansive by ASTM D 4829.
 - 1. Unsatisfactory soils include soft or yielding soil materials exposed at bottom of excavations
 - 2. Unsatisfactory soils include satisfactory soils possessing a moisture content not within ± 2 percent of the optimum moisture content at time of excavation and compaction.
- D. Backfill and Fill: Satisfactory soil or engineered materials.
- E. Subbase Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; with at least 90 percent passing a 2-1/2-inch sieve and not more than 25 percent passing a No. 200 sieve.
 - 1. Conforms to Caltrans Standard Specifications or "Greenbook" Standard Specifications for Public Works for Class II aggregate subbase material.
 - 2. R-Value of not less than 50 according to California Test Method 301.
 - 3. Sand Equivalent Value of at least 21 per ASTM D 2419.
- F. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 294/D 2940M; with not more than 2 percent passing the No. 200 sieve
 - 1. Conforms to Caltrans Standard Specifications or "Greenbook" Standard Specifications for Public Works for Class II aggregate base material.
 - 2. R-Value of not less than 78 according to California Test Method 301.
 - 3. Sand Equivalent Value of at least 25 per ASTM D 2419.
- G. Bedding Course:
 - 1. Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

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2. Conforms to “Greenbook” Standard Specifications for Public Works for bedding material.
 3. Sand Equivalent Value of not less than 20 per ASTM D 2419
- H. Drainage Course (Capillary Break):
1. Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and no more than 2 percent passing the No. 200 sieve.
 2. Conforms to Section 200-1.4 of the “Greenbook” Standard Specifications for Public Works No. 4 Concrete Aggregates.
- I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and zero to 5 percent passing a No. 4 sieve.
- J. Sand: ASTM C 33/C 33M; fine aggregate.
- K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 GEOTEXTILES

- A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
1. Survivability: As follows:
 - a. Grab Tensile Strength: 157 lbf; ASTM D 4632.
 - b. Sewn Seam Strength: 142 lbf; ASTM D 4632.
 - c. Tear Strength: 56 lbf; ASTM D 4533.
 - d. Puncture Strength: 65 lbf; ASTM D 4833.
 2. Apparent Opening Size: No. 70 sieve, maximum; ASTM D 4751.
 3. Permittivity: 1.8 per second, minimum; ASTM D 4491.
 4. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.
- B. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
1. Survivability: As follows:
 - a. Grab Tensile Strength: 247 lbf; ASTM D 4632.
 - b. Sewn Seam Strength: 222 lbf; ASTM D 4632.
 - c. Tear Strength: 90 lbf; ASTM D 4533.
 - d. Puncture Strength: 90 lbf; ASTM D 4833.

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2. Apparent Opening Size: No. 60 sieve, maximum; ASTM D 4751.
3. Permittivity: 0.02 per second, minimum; ASTM D 4491.
4. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

2.3 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored as follows:
 1. Red: Electric.
 2. Yellow: Gas, oil, steam, and dangerous materials.
 3. Orange: Telephone and other communications.
 4. Blue: Water systems.
 5. Green: Sewer systems.
- B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:
 1. Red: Electric.
 2. Yellow: Gas, oil, steam, and dangerous materials.
 3. Orange: Telephone and other communications.
 4. Blue: Water systems.
 5. Green: Sewer systems.

- 2.4 Plastic Barrier: Minimum 15-mil thick plastic membrane which complies with ASTM E 1745 and installed per ASTM E 1643

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.
- B. Protect and maintain all storm water BMPs, including erosion and sediment controls during earth-moving operations.

3.2 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

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- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
 - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

3.3 EXPLOSIVES

- A. Explosives: Explosives are not approved for construction operations.

3.4 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
- B. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Geotechnical Engineer. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract Time may be authorized for rock excavation.
 - 1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.
 - 2. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the dimensions provided elsewhere in the Section.

3.5 EXCAVATION FOR STRUCTURES AND RETAINING WALLS

- A. Over excavate existing fill material under planned structures entirely to a depth of 10 feet below the existing grade or 8 feet below the deepest planned foundation, whichever is greater, within a tolerance of ± 1 inch.
- B. Extend over excavations 8 feet beyond the planned foundation perimeter, or up to existing structures, whichever is less.
- C. Where excavations extend up to existing improvements less than 8 feet beyond the planned foundation perimeter, the excavation shall be performed with slot cuts or as directed by the geotechnical engineer, to project the integrity of existing improvements.

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- D. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for constructing new services, other construction, and for inspection of work.
- E. Notify Project Inspector when excavations have reached the specified subgrade elevation. The Project Inspector will arrange for the District's Testing Agency to observe the bottom of the excavation and determine if additional over excavation is required.
 - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
 - 2. Pile Foundations: Stop excavations 6 to 12 inches above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
 - 3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.
- F. Excavations at Edges of Tree- and Plant-Protection Zones:
 - 1. Excavate by hand or with an air spade to indicated lines, cross sections, elevations, and subgrades. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.

3.6 EXCAVATION FOR WALKS AND HARDSCAPE

- A. Excavate existing fill material under planned walks and hardscape entirely to at least 24 inches below planned subgrade elevation.
- B. Extend excavation out 2 feet beyond the planned walks and hardscape or up to existing improvements, whichever is less.
- C. Notify Project Inspector when excavations have reached the specified subgrade elevation. The Project Inspector will arrange for the District's Testing Agency to observe the bottom of the excavation and determine if additional excavation is required.
- D. Scarify, moisture condition to within ± 2 percent of the optimum moisture content, and recompact the upper 12 inches of excavation bottom to at least 93 percent relative compaction.
- E. Place fill material in layers not more than 8 inches in loose thickness for material compacted by heavy compaction equipment and not more than 4 inches in loose thickness for material compacted by hand-operated tampers, up to the planned subgrade elevations, and compacted to at least 93 percent relative compaction per ASTM D 1557.

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3.7 EXCAVATION FOR STRUCTURAL PAVEMENTS

- A. Excavate fill material under traffic rated structural pavements entirely to 24 inches below planned subgrade elevation.
- B. Extend excavation out 2 feet beyond the planned structural pavement or up to existing improvements, whichever is less.
- C. Notify Project Inspector when excavations have reached the specified subgrade elevation. The Project Inspector will arrange for the District's Testing Agency to observe the bottom of the excavation and determine if additional excavation is required.
- D. Scarify, moisture condition to within ± 2 percent of the optimum moisture content, and recompact the upper 12 inches of excavation bottom to at least 95 percent relative compaction.
- E. Place fill material in layers not more than 8 inches in loose thickness for material compacted by heavy compaction equipment and not more than 4 inches in loose thickness for material compacted by hand-operated tampers, up to the planned subgrade elevations.

3.8 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
- B. For the excavation of landscape irrigation trenches, see also Section 32 84 00 "Planting Irrigation."
- C. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.
 - 1. Clearance: 12 inches each side of pipe or conduit unless otherwise indicated.
- D. Trench Bottoms:
 - 1. Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
 - 2. Unless indicated otherwise, excavate trenches 4 inches deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.
 - 3. Unless indicated otherwise, excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
 - 4. Notify Project Inspector when excavations have reached the specified subgrade elevation. The Project Inspector will arrange for the District's Testing Agency to observe the bottom of the excavation and determine if additional excavation is required.

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E. Trenches in Tree- and Plant-Protection Zones:

1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.

3.9 SUBGRADE INSPECTION

- A. Notify Project Inspector when excavations have reached specified subgrade elevation. The Project Inspector will arrange for the District's Testing Agency to observe the subgrade.
- B. If Testing Agency determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 1. Excavate soft, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Testing Agency, and replace with compacted backfill or fill as directed.
- D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Testing Agency, without additional compensation.

3.10 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Construction Manager.
 1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Construction Manager.

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3.11 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover stockpiles to prevent windblown dust.
 - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.
 - 2. Obtain District's acceptance of stockpile locations prior to creation. If stockpile must be moved, obtain District's acceptance.

3.12 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 - 1. Construction below finish grade including, where applicable, subdrain, damp proofing, waterproofing, and perimeter insulation.
 - 2. Surveying locations of underground utilities for Record Documents.
 - 3. Testing and inspecting underground utilities.
 - 4. Removing concrete formwork.
 - 5. Removing trash and debris.
 - 6. Removing temporary shoring, bracing, and sheeting.
 - 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Do not place backfill on uncompacted subgrade or surfaces that are muddy, soft, yielding, pumping, rutting, frozen, or contain frost or ice.

3.13 UTILITY TRENCH BACKFILL

- A. Place bedding course on trench bottoms and where indicated, up to 12 inches above utility lines and in accordance with Section 306-6 of the "Greenbook" Standard Specifications for Public Works Construction.
- B. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
 - 1. Unless otherwise indicated, provide pea gravel bedding for sanitary sewer and storm sewer piping.
 - 2. Clean sand may be used for bedding under piping other than sewer piping.
- C. Moisture condition backfill material to within ± 2 percent of the optimum moisture content, place in layers not more than 8 inches in loose thickness, and compact to not less than 93 percent relative compaction per ASTM D1557, except subgrade beneath structural pavements.
- D. Beneath structural pavement, moisture condition backfill material to within ± 2 percent of the optimum moisture content, place in layers not more than 8 inches in loose

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thickness, and compact to not less than 95 percent relative compaction per ASTM D1557.

- E. Do not place trench backfill or bedding material on uncompacted subgrade or surfaces that are muddy, soft, yielding, pumping, rutting, frozen, or contain frost or ice.
 - F. Trenches under Foundations: Unless otherwise indicated, backfill trenches excavated under foundation footings and within the zone of influence beneath foundations with concrete to elevation of bottom of footings. Concrete is specified in Section 03 30 00 "Cast-in-Place Concrete."
 - G. Trenches under Roadways and Driveways: Unless otherwise indicated, provide 4-inch-thick, concrete-base slab support for piping or conduit less than 30 inches below finished surface of roadways or driveways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase course (or base course if no subbase course is indicated.) Concrete is specified in Section 03 30 00 "Cast-in-Place Concrete."
 - H. Backfill voids with satisfactory soil while removing shoring and bracing.
 - I. Initial Backfill:
 - 1. Soil Backfill: Place and compact initial backfill of pea gravel or satisfactory soil, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.
 - 2. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
 - J. Final Backfill:
 - 1. Soil Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.
 - K. Warning Tape: Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.
 - L. Coordinate backfilling with utilities testing.
- 3.14 SOIL FILL
- A. Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from subgrade before placing fills.
 - B. Plow, scarify, bench, or break up sloped surfaces steeper than 5 horizontal to 1 vertical so fill material will bond with existing material.

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- C. Scarify, moisture condition to within ± 2 percent of the optimum moisture content, and recompact the upper 12 inches of subgrade to at least 93 percent relative compaction per ASTM D 1557.
- D. Do not place subbase course or base course on uncompacted subgrade or surfaces that are muddy, soft, yielding, pumping, rutting, frozen, or contain frost or ice.
- E. All imported soil material shall be tested and approved by Geotechnical Engineer prior to hauling on site.

3.15 SOIL MOISTURE CONTROL

- A. Uniformly moisture condition or aerate subgrade and each subsequent fill or backfill layer to within ± 2 percent of optimum moisture content prior to compaction.
 - 1. Do not place fill or backfill material on uncompacted subgrade or surfaces that are muddy, soft, yielding, pumping, rutting, frozen, or contain frost or ice.
 - 2. Remove and replace, or scarify and aerate, otherwise satisfactory soil material that exceeds the optimum moisture content by 2 percent or is too wet to compact to specified dry unit weight.

3.16 COMPACTION OF BACKFILL AND FILL MATERIALS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose thickness for material compacted by heavy compaction equipment and not more than 4 inches in loose thickness for material compacted by hand-operated tampers up to planned elevations.
- B. Place backfill and fill materials evenly on all sides of structures to planned elevations and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following specified percentages of maximum dry unit weight in accordance with ASTM D 1557:
 - 1. Under structures, building slabs, foundations, steps, and hardscape pavement, moisture condition backfill and fill material to within ± 2 percent of the optimum moisture content, place in layers not more than 8 inches in loose thickness, and compact to at least 95 percent relative compaction.
 - 2. Under traffic rated structural pavements, scarify, moisture condition to within ± 2 percent of the optimum moisture content, and recompact the upper 12 inches of subgrade and each layer of fill material to at least 95 percent relative compaction.
 - 3. Under turf or unpaved areas, moisture condition backfill and fill material to within ± 2 percent of the optimum moisture content, place in layers not more than 8 inches in loose thickness, and compact to at least 93 percent relative compaction.
 - 4. For utility trenches, moisture condition backfill material to within ± 2 percent of the optimum moisture content, place in layers not more than 8 inches in loose thickness, and compact to at least 93 percent relative compaction, except for areas beneath traffic rated, structural pavements.

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3.17 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 - 1. Provide a smooth transition between adjacent existing grades and new grades.
 - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:
 - 1. Turf or Unpaved Areas: Plus or minus 1 inch.
 - 2. Walks: Plus or minus 1 inch.
 - 3. Pavements: Plus or minus 1/2 inch.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.18 SUBSURFACE DRAINAGE

- A. Subdrain Pipe: Specified in Section 33 46 00 "Subdrain."
- B. Subsurface Drain: Place subsurface drainage geotextile around perimeter of subdrain trench. Place a 6-inch course of filter material on subsurface drainage geotextile to support subdrain pipe. Encase subdrain pipe in a minimum of 12 inches of filter material, placed in compacted layers 6 inches thick, and wrap in subsurface drainage geotextile, overlapping sides and ends at least 6 inches.
- C. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches of final subgrade, in compacted layers 6 inches thick. If indicated on drawings, overlay drainage backfill with one layer of subsurface drainage geotextile, overlapping sides and ends at least 6 inches.

3.19 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

- A. Do not place subbase course or base course on uncompacted subgrade or surfaces that are muddy, soft, yielding, pumping, rutting, frozen, or contain frost or ice.
- B. On prepared, compacted subgrade, place subbase course and base course under traffic rated structural pavements as follows:
 - 1. If subdrain textile is indicated on drawings, install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
 - 2. Moisture condition subbase and base material to within ± 2 percent of the optimum moisture content, place in layers not more than 8 inches in loose

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thickness, and compact to not less than 95 percent relative compaction in accordance with ASTM D 1557.

3. Place subbase course and base course in layers of equal thickness, with no loose uncompacted layer more than 8 inches thick or less than 3 inches thick, to required grades, lines, cross sections, and thickness.
4. Shape base course to required crown elevations and cross-slope grades.
5. Pavement Shoulders: Place shoulders along edges of subbase course and base course to prevent lateral movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent relative compaction in accordance with ASTM D 1557.

3.20 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

1. Do not place drainage course on surfaces that are muddy, soft, yielding, pumping, frozen, or contain frost or ice.
- B. On prepared, compacted subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
1. If subdrain textile is indicated on drawings, install subdrain geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
 2. Place drainage course 6 inches or less in compacted thickness in a single layer.
 3. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
 4. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent relative compaction in accordance with ASTM D 1557.

3.21 FIELD QUALITY CONTROL

- A. Testing Agency: District will engage a qualified independent geotechnical engineering testing agency to perform tests and inspections.
- B. Allow testing agency to observe and test, the bottom of excavations, subgrades, and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Project Inspector.
- D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2937, and ASTM D 6938, as applicable. Tests will be performed at the following locations and frequencies:

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1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab but in no case fewer than three tests.
 2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 feet or less of wall length but no fewer than two tests.
 3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 100 feet or less of trench length but no fewer than two tests.
- E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.22 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
1. Scarify or remove and replace soil material to depth as directed by Geotechnical Engineer; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.23 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off District's property.

END OF SECTION 31 20 00

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SECTION 32 13 13 CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes Concrete Paving including the following:
 - 1. Curbs and gutters.
 - 2. Walks.
- B. Related Requirements:
 - 1. Section 03 30 00 "Cast-in-Place Concrete" for general building applications of concrete.
 - 2. Section 32 13 73 "Concrete Paving Joint Sealants" for joint sealants in expansion and contraction joints within concrete paving and in joints between concrete paving and asphalt paving or adjacent construction.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash, slag cement, and other pozzolans.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 PRE-INSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to concrete paving, including but not limited to, the following:
 - a. Concrete mixture design.
 - b. Quality control of concrete materials and concrete paving construction practices.
 - 2. Require representatives of each entity directly concerned with concrete paving to attend, including the following:

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- a. Contractor's superintendent.
- b. Independent testing agency responsible for concrete design mixtures.
- c. Ready-mix concrete manufacturer.
- d. Concrete paving Subcontractor.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Initial Selection: For each type of product, ingredient, or admixture requiring color selection.
- C. Samples for Verification: For each type of product or exposed finish, prepared as Samples of size indicated below:
 1. Colored Concrete: 3" x 3" samples. Provide two samples of each color.
- D. Design Mixes: For each concrete paving mix. Include alternate design mixes when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 1. Mix designs are subject to approval of the District's testing laboratory of record for compliance with requirements.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Material Certificates: For the following, from manufacturer:
 1. Cementitious materials.
 2. Steel reinforcement and reinforcement accessories.
 3. Fiber reinforcement.
 4. Admixtures.
 5. Curing compounds.
 6. Applied finish materials.
 7. Bonding agent or epoxy adhesive.
 8. Joint fillers.

1.7 QUALITY ASSURANCE

- A. Codes and Standards: Comply with local governing regulations if more stringent than herein specified.
- B. Comply with applicable provisions of the following, except as otherwise indicated:
 1. Applicable portions of the CBC.

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2. The U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities.
 3. Conform to applicable City codes for paving work on public property.
- C. Continuous surfaces, including walks and sidewalks, shall have a continuous common surface, not interrupted by abrupt changes in level exceeding 1/2 inch
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant and each aggregate from one source.
- E. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by the requirements of the Contract Documents.
- F. Concrete Testing Service: Engage a qualified independent testing agency to design concrete mixes.
1. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 2. Qualification requirements are in addition to those specified in Section 01 40 02 "Quality Requirements / Contractor Laboratory."
- G. Mockups: Cast mockups of full-size sections of concrete pavement to demonstrate typical joints, surface finish, texture, color, and standard of workmanship.
1. Build mockup panels not less than 4' x 4' for each different integrally colored concrete paving and finish. Locate on site as directed by Construction Manager.
 2. Notify Construction Manager seven days in advance of dates and times when mockups will be constructed.
 3. Obtain Construction Manager's approval of mockups before starting construction.
 4. Maintain approved mockups during construction in an undisturbed condition as a standard for judging the completed pavement.
 5. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Construction Manager specifically approves such deviations in writing.
 6. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
 7. Demolish and remove non-approved mockups from the site.

1.8 FIELD CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
- B. Hot-Weather Concrete Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

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2. Cover steel reinforcement with water-soaked burlap, so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with ACI 301 unless otherwise indicated.

2.2 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
 1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.3 STEEL REINFORCEMENT

- A. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, fabricated from as-drawn steel wire into flat sheets.
- B. Epoxy-Coated Welded-Wire Reinforcement: ASTM A 884/A 884M, Class A, plain steel.
- C. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.
- D. Galvanized Reinforcing Bars: ASTM A 767/A 767M, Class II zinc coated, hot-dip galvanized after fabrication and bending; with ASTM A 615/A 615M, Grade 60 deformed bars.
- E. Epoxy-Coated Reinforcing Bars: ASTM A 775/A 775M or ASTM A 934/A 934M; with ASTM A 615/A 615M, Grade 60 deformed bars.
- F. Steel Bar Mats: ASTM A 184/A 184M; with ASTM A 615/A 615M, Grade 60 deformed bars; assembled with clips.
- G. Plain-Steel Wire: ASTM A 1064/A 1064M, as drawn.
- H. Deformed-Steel Wire: ASTM A 1064/A 1064M.
- I. Epoxy-Coated-Steel Wire: ASTM A 884/A 884M, Class A; coated, plain.

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- J. Epoxy-Coated, Joint Dowel Bars: ASTM A 775/A 775M; with ASTM A 615/A 615M, Grade 60 plain-steel bars.
- K. Tie Bars: ASTM A 615/A 615M, Grade 60; deformed.
- L. Hook Bolts: ASTM A 307, Grade A, internally and externally threaded. Design hook-bolt joint assembly to hold coupling against paving form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
- M. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded-wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, precast concrete, or fiber-reinforced concrete of greater compressive strength than concrete specified, and as follows:
 - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
 - 2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
- N. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating, compatible with epoxy coating on reinforcement.
- O. Zinc Repair Material: ASTM A 780/A 780M.

2.4 CONCRETE MATERIALS

- A. Cementitious Materials: Use the following cementitious materials, of same type, brand, and source throughout Project:
 - 1. Portland Cement: ASTM C 150/C 150M, **white** Portland cement **Type II**, low alkali.
 - a. Portland cement concrete paving shall be stable, firm, and slip resistant and shall comply with CBC sections 11B-302 and 11B-403.
 - 2. Fly Ash: ASTM C 618, Class N or Class F.
- B. Aggregate: ASTM C 33/C 33M, uniformly graded, from a single source.
 - 1. Fine Aggregate: Minimum sand equivalent (ASTM D 2419) is 80.
 - 2. Coarse Aggregate: Minimum cleanness value (CalTrans Test cv 227) is 80.
- C. Water: Potable and complying with ASTM C 94/C 94M.

2.5 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260/C 260M.

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- B. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
- C. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
- D. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
- E. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
- F. Water-Reducing and Accelerating Admixture: ASTM C 494/C 494M, Type E.
- G. Color Pigment: ASTM C 979/C 979M, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, nonfading, and resistant to lime and other alkalis.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Davis Colors.
 - b. Scofield, L. M. Company.
 - c. SureCrete Design Products.
 - d. Or equal.
 - 2. Color: As selected by Architect from manufacturer's full range.

2.6 FIBER REINFORCEMENT

- A. Synthetic Fiber: Fibrillated or monofilament polypropylene fibers engineered and designed for use in concrete paving, complying with ASTM C 1116/C 1116M, Type III, 1/2 to 1-1/2 inches long.

2.7 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ChemMasters, Inc.

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- b. Euclid Chemical Company (The); an RPM company.
 - c. L&M Construction Chemicals, Inc.
 - d. Or equal.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ChemMasters, Inc.
 - b. Dayton Superior.
 - c. L&M Construction Chemicals, Inc.
 - d. Or equal.

2.8 RELATED MATERIALS

- A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber in preformed strips.
- B. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 25 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.
- C. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- D. Epoxy-Bonding Adhesive: ASTM C 881/C 881M, two-component epoxy resin capable of humid curing and bonding to damp surfaces; of class suitable for application temperature, of grade complying with requirements, and of the following types:
 - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- E. Chemical Surface Retarder: Water-soluble, liquid, set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of 1/8 to 1/4 inch.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ChemMasters, Inc.
 - b. Scofield, L. M. Company.
 - c. Sika Corporation.
 - d. Or equal.

SPECIFICATIONS

2.9 CONCRETE MIXES

- A. Prepare design mixtures, proportioned according to ACI 211.1 and ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience. Mix designs are subject to approval of the District's testing laboratory.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method. Do not use District's field quality control testing agency for this purpose.
 - 2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that comply with or exceed requirements.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:
 - 1. Fly Ash or Pozzolan: 15 percent.
- C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content of 2.0 to 4.0 percent.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
- F. Synthetic Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd.
- G. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.
- H. Concrete Mixtures: Normal-weight concrete.
 - 1. Compressive Strength (28 Days): 3000 psi.
 - 2. Minimum cementitious content: 564 lbs Portland cement per Cu. Yd.
 - 3. Maximum W/C Ratio at Point of Placement: 0.50.
 - 4. Slump Limit: 4 inches.
 - a. Slump Limit for Concrete Containing High-Range Water-Reducing Admixture: Not more than 8 inches after adding admixture to plant- or site-verified 2- to 3-inch slump.

2.10 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M. Furnish batch certificates for each batch discharged and used in the Work.

CONCRETE PAVING

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1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
 1. For concrete batches of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
 2. For concrete batches larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..
 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

3.2 PREPARATION

- A. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

SPECIFICATIONS

3.4 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded-wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- E. Epoxy-Coated Reinforcement: Use epoxy-coated steel wire ties to fasten epoxy-coated reinforcement. Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M.
- F. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap of adjacent mats.

3.5 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
 - 1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
 - 1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
 - 2. Provide tie bars at sides of paving strips where indicated.
 - 3. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.

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1. Locate expansion joints at maximum intervals of 50 feet unless otherwise indicated.
 2. Extend joint fillers full width and depth of joint.
 3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Control Joints: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of the concrete thickness, as follows:
1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of control joints after applying surface finishes. Eliminate grooving-tool marks on concrete surfaces.
 2. Control joints shall be placed at a maximum aspect ratio of 1.5.
- E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in. Notify other trades to permit installation of their work.
- B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Comply with requirements and with recommendations ACI 301 for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

SPECIFICATIONS

- G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
 - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels and joint devices.
- H. Screed paving surface with a straightedge and strike off.
- I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- J. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing. If results are not approved, remove and replace with formed concrete.

3.7 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleed water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
 - 1. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface, perpendicular to line of traffic, to provide a uniform, fine-line texture.
 - 2. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

3.8 ~~DETECTABLE WARNING INSTALLATION~~

- A. ~~Blockouts: Form blockouts in concrete for installation of detectable paving units specified in Section 32 17 26 "Tactile Warning Surfacing."~~
 - 1. ~~Tolerance for Opening Size: Plus 1/4 inch, no minus.~~
- B. ~~Cast-in-Place Detectable Warning Tiles: Form blockouts in concrete for installation of tiles specified in Section 32 17 26 "Tactile Warning Surfacing." Screed surface of concrete where tiles are to be installed to elevation, so that edges of installed tiles will be flush with surrounding concrete paving. Embed tiles in fresh concrete to comply with~~

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~~Section 32 17 26 "Tactile Warning Surfacing" immediately after screeding concrete surface.~~

3.9 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive hot temperatures.
- B. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.
- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound where allowed, or a combination of these, as follows:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period, using cover material and waterproof tape.
 - 3. Curing Compound (Allowed only where other materials will not be applied over concrete): Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

3.10 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:
 - 1. Elevation: 1/4 inch.
 - 2. Thickness: Plus 3/8 inch, minus 1/4 inch.
 - 3. Surface: Gap below 10-feet-long; unleveled straightedge not to exceed 1/4 inch.
 - 4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches of tie bar.
 - 5. Lateral Alignment and Spacing of Dowels: 1 inch.

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6. Vertical Alignment of Dowels: 1/4 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of dowel.
8. Joint Spacing: 3 inches.
9. Contraction Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.

3.11 FIELD QUALITY CONTROL

- A. Testing Agency: District will engage a qualified testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this Article.
- B. Testing Services: Testing will be performed according to the following requirements:
 1. Sampling Fresh Concrete: Representative samples of fresh concrete will be obtained according to ASTM C 172, except modified for slump to comply with ASTM C 94.
 2. Slump: ASTM C 143; one test at point of placement for each compressive-strength test, but not less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.
 3. Air Content: ASTM C 231, pressure method; one test for each compressive-strength test, but not less than one test for each day's pour of each type of air-entrained concrete.
 4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each set of compressive-strength specimens.
 5. Compression Test Specimens: ASTM C 31/C 31M; one set of three standard cylinders for each compressive-strength test, unless otherwise indicated. Cylinders will be molded and stored for laboratory-cured test specimens.
 6. Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. One specimen will be tested at 7 days and two specimens at 28 days.
- C. Test results will be reported in writing to Architect, Project Inspector, Construction Manager, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive-strength tests will contain Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in pavement, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- D. Additional Tests: Testing and inspecting agency will make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by the Construction Manager.
- E. Concrete paving will be considered defective if it does not pass tests and inspections.

SPECIFICATIONS

- F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.12 REPAIR AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Construction Manager.
- B. Drill test cores where directed by Construction Manager, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with Portland cement concrete bonded to paving with epoxy adhesive.
- C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

3.13 PORTLAND CEMENT CONCRETE PAVING & CONCRETE FINISHES:

- A. Portland cement concrete paving shall be stable, firm, and slip resistant and shall comply with CBC Sections 11B-302 and 11B-403.

END OF SECTION 32 13 13

SPECIFICATIONS

SECTION 32 13 73 CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Expansion and contraction joints within Portland cement concrete pavement.
 - 2. Cold-applied joint sealants.
 - 3. Joint-sealant backer materials.
 - 4. Primers.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of joint sealant and accessory.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials to comply with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.6 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.

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2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range for this characteristic.

2.2 COLD-APPLIED JOINT SEALANTS

- A. Single-Component, Nonsag, Low-Modulus, Neutral-Curing, Silicone Joint Sealant for Concrete: ASTM D 5893/D 5893M, Type NS.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Roadsaver Silicone-SL; Crafco Inc.
 - b. 888; Dow Corning Corporation.
 - c. Pecora Corporation.
 - d. Or Equal.
- B. Multicomponent, Pourable, Urethane, Chemically Curing Elastomeric Formulation Jet-Fuel-Resistant Joint Sealant for Concrete: ASTM C 920; Type M; Grade P; Class 12-1/2; for Uses T, M, and, as applicable to joint substrates indicated, O.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Vulkem 202; Mameco International.
 - b. Urexpam NR-300; Pecora Corporation.
 - c. Sealtight Gardox; W. R. Meadows, Inc.
 - d. Or Equal.

SPECIFICATIONS

2.3 JOINT-SEALANT BACKER MATERIALS

- A. Joint-Sealant Backer Materials: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by joint-sealant manufacturer, based on field experience and laboratory testing.
- B. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D 5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.
- C. Backer Strips for Cold-Applied Joint Sealants: ASTM D 5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

2.4 PRIMERS

- A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from pre-installation joint-sealant-substrate tests and field tests.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
- B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on pre-installation joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

SPECIFICATIONS

3.3 INSTALLATION OF JOINT SEALANTS

- A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.
- B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions.
- C. Install joint-sealant backings to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of joint-sealant backings.
 - 2. Do not stretch, twist, puncture, or tear joint-sealant backings.
 - 3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install joint sealants immediately following backing installation, using proven techniques that comply with the following:
 - 1. Place joint sealants so they fully contact joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:
 - 1. Remove excess joint sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

3.4 CLEANING AND PROTECTION

- A. Clean off excess joint sealant as the Work progresses, by methods and with cleaning materials approved in writing by joint-sealant manufacturers.
- B. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

SPECIFICATIONS

END OF SECTION 32 13 73

SPECIFICATIONS

SECTION 32 17 23 PAVEMENT MARKINGS

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 painted markings applied to concrete pavement.
- B. Related Requirements:
 - 1. Section 32 13 13 "Concrete Paving" for painting exterior concrete surfaces other than pavement.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include technical data and tested physical and performance properties.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of CBC Title 24 for pavement-marking work.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.
- B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by the manufacturer. Protect stored materials from direct sunlight.

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1.6 FIELD CONDITIONS

- A. Environmental Limitations: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for alkyd materials and 55 deg F for water-based materials, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Kemiko.
 - 2. Scofield.
 - 3. Solomon.
 - 4. Or Equal.

2.2 PAVEMENT MARKINGS, GENERAL

- A. See drawings for pattern and color layout.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that pavement is dry and in suitable condition to begin pavement marking according to manufacturer's written instructions.
- B. Proceed with pavement marking only after unsatisfactory conditions have been corrected.

3.2 PAVEMENT MARKING

- A. Do not apply pavement-marking stain until layout, colors, and placement have been verified with the District Project Manager and District Construction Manager.
- B. Allow paving to age for a minimum of 30 days before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply stain with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates.

PAVEMENT MARKINGS

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1. Apply graphic symbols and lettering with stain-resistant, die-cut stencils, firmly secured to pavement. Mask an extended area beyond edges of each stencil to prevent stain application beyond the stencil. Apply stain so that it cannot run beneath the stencil.

3.3 PROTECTING AND CLEANING

- A. Protect pavement markings from damage and wear during remainder of construction period.
- B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 32 17 23

SPECIFICATIONS

SECTION 32 31 19 DECORATIVE METAL FENCES AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Decorative steel fences.
 - 2. Decorative steel swing gates.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For fencing and gates.
 - 1. Include plans, elevations, sections, gate locations, post spacing, and mounting and attachment details.
- C. Samples: For each fence material and for each color specified.
 - 1. Provide Samples 12 inches in length for linear materials.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding Certificates.

1.5 QUALITY ASSURANCE

- A. Mockup: Build mockup to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation. Provide a full size, complete mock of minimum one 'B' type panel and one single gate leaf. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- B. Installer Qualifications: Fabricator of products.

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- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code – Steel."

1.6 ACCESSIBILITY GUIDELINES

- A. Gates that are part of the accessible route shall meet all the requirements of an accessible door in compliance with CBC Section 11B-404.
- B. The levers of lever actuated latches or locks for accessible gates shall be curved with a return to within ½" of the gate surfaces to prevent catching on the clothing or persons. California Referenced Standards Code. T-24 Part 12, Section 12-10-202, Item (F).
- C. Swing doors and gate surfaces within 10" of the finish floor or ground shall have a smooth surface on the push side extending the full width of the door or gate. Parts creating horizontal or vertical joints in these surfaces shall be within 1/16" of the same plane as the other and be free of sharp or abrasive edges. Cavities created by added kick plates shall be capped. CBC Section 11B-404.2.10.

PART 2 - PRODUCTS

2.1 DECORATIVE STEEL FENCES

- A. Decorative Steel Fences: Fences made from steel tubing, bars and shapes, hot-dip galvanized.
- B. Posts: Square steel tubing.
 - 1. Line Posts: Size as indicated on drawings.
 - 2. End and Corner Posts: Size as indicated on drawings.
 - 3. Swing Gate Posts: Size as indicated on drawings.
- C. Post Caps: As indicated on drawings.
- D. Rails: As indicated on drawings.
- E. Pickets: 3/8" solid phenolic planks as indicated on drawings.
- F. Infill: Custom picket layout design as indicated on Drawings.
- G. Fasteners: Stainless-steel as indicated on drawings.
- H. Fabrication: Assemble fences into sections by screwing pickets to rails.
- I. Welding:
 - 1. Weld-all-around stiles and rails to fabricate fence panel structures or as otherwise indicated on drawings.

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- J. Grind and buff all weld locations to a smooth surface.
- K. Galvanizing: For items other than hardware that are indicated to be galvanized, hot-dip galvanize to comply with ASTM A 123/A 123M. For hardware items, hot-dip galvanize to comply with ASTM A 153/A 153M.
 - 1. Hot-dip galvanize posts and rails after fabrication.
- L. Finish: All metal surfaces shall be powder coated after galvanizing of fabricated panels and other components.

2.2 SWING GATES

- A. Gate Configuration: As indicated.
- B. Gate Frame Height: As indicated.
- C. Gate Opening Width: As indicated.
- D. Galvanized-Steel Frames and Bracing: Fabricate members from steel tubing, bars and shapes, hot-dip galvanized.
- E. Frame Corner Construction: Welded.
- F. Infill: Comply with requirements for adjacent fence or as indicated on drawings.
- G. Picket Size, Configuration, and Spacing: Comply with requirements for adjacent fence or as indicated on drawings..
- H. Hardware: Latches permitting operation from both sides of gate, hinges, and keepers for each gate leaf. Fabricate latches with integral eye openings for padlocking; padlock accessible from both sides of gate.
 - 1. Refer to Section 08 71 00 "Door Hardware" Specification for detailed hardware requirements.
- I. Grind and buff all weld locations to a smooth surface.
- J. Galvanizing: For items other than hardware that are indicated to be galvanized, hot-dip galvanize to comply with ASTM A 123/A 123M. For hardware items, hot-dip galvanize to comply with ASTM A 153/A 153M.
- K. Finish: All metal surfaces shall be powder coated after galvanizing of fabricated panels and other components.

2.3 STEEL AND IRON

- A. Plates, Shapes, and Bars: ASTM A 36/A 36M.

SPECIFICATIONS

- B. Bars (Pickets): Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.
- C. Tubing: ASTM A 500/A 500M, cold-formed steel tubing.

2.4 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Concrete: Normal-weight, air-entrained, ready-mix concrete complying with requirements in "Cast-in-Place Concrete" section with a minimum 28-day compressive strength of 3000 psi, 4-inch slump, and 1-inch maximum aggregate size.
- C. Nonshrink Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M and specifically recommended by manufacturer for exterior applications.
- D. Galvanizing Repair: Repair compound meeting or exceeding ASTM A 780.
- E. Finish: All metal surfaces shall be powder coated after galvanizing of fabricated panels and other components.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, construction layout, and other conditions affecting performance of the Work.
- B. Do not begin installation before final grading is completed unless otherwise permitted by District Construction Manager.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.3 DECORATIVE FENCE INSTALLATION

- A. Install fences according to manufacturer's written instructions.

SPECIFICATIONS

- B. Install fences by setting posts as indicated and field bolting the stiles of the assemblies to posts.
- C. Post Excavation: Drill or hand-excavate holes for posts in firm, undisturbed soil. Excavate holes to a diameter of not less than 4 times post size and a depth of not less than 24 inches plus 3 inches for each foot or fraction of a foot that fence height exceeds 4 feet.
- D. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.
 - 1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
 - 2. Concrete Fill: Place concrete around posts and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
 - a. Exposed Concrete: Finish and slope top surface to drain water away from post and detail as indicated on drawings.
 - b. Concealed Concrete: Top 2 inches below grade as indicated on Drawings to allow covering with surface material. Slope top surface of concrete to drain water away from post.
 - 3. Posts Set in Concrete: Extend post to within 6 inches of specified excavation depth, but not closer than 3 inches to bottom of concrete.
 - 4. Space posts uniformly at indicated spacing.

3.4 GATE INSTALLATION

- A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.5 ADJUSTING

- A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
- B. Lubricate hardware and other moving parts.

END OF SECTION 32 31 19

SPECIFICATIONS

SECTION 32 31 20

HEAVY INDUSTRIAL ALUMINUM ORNAMENTAL FENCE SYSTEM

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The contractor shall provide all labor, materials and appurtenances necessary for installation of the industrial ornamental aluminum fence system defined herein.

1.02 SYSTEM DESCRIPTION

- B. The manufacturer shall supply a total industrial ornamental aluminum fence system of (Basis of Design) the Ameristar® Echelon II® Majestic™ design. The system shall include all components (i.e., pickets, rails, posts, gates and hardware) required.

1.02.1 QUALITY ASSURANCE

- C. The contractor shall provide laborers and supervisors who are thoroughly familiar with the type of construction involved and materials and techniques specified.

1.04 REFERENCES

- ASTM B117 - Practice for Operating Salt-Spray (Fog) Apparatus.
- ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
- ASTM D523 - Test Method for Specular Gloss.
- ASTM D822 - Practice for Conducting Tests on Paint and Related Coatings and Materials using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus.
- ASTM D1654 - Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
- ASTM D2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
- ASTM D2794 - Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
- ASTM D3359 - Test Method for Measuring Adhesion by Tape Test.

HEAVY INDUSTRIAL ALUMINUM ORNAMENTAL FENCE SYSTEM

32 31 20 - 1

DEL ROSA FULL DAY KINDER CLASSROOMS

SPECIFICATIONS

1.05 SUBMITTAL

- A. The manufacturer's submittal package shall be provided prior to installation.

1.06 PRODUCT HANDLING AND STORAGE

- A. Upon receipt at the job site, all materials shall be checked to ensure that no damage occurred during shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and drainage, and to protect against damage, weather, vandalism and theft.

PART 2 – MATERIALS

2.01 MANUFACTURER

- A. Basis of Design: The industrial ornamental aluminum fence system shall conform to Ameristar Echelon II, Majestic, 2-Rail style manufactured by Ameristar Fence Products, Inc., in Tulsa, Oklahoma.

2.02 MATERIAL

- A. Aluminum material for fence framework (i.e., tubular pickets, rails and posts) shall conform to the requirements of ASTM B221. The aluminum extrusions for posts and rails shall be Alloy and Temper Designation 6005-T52. The aluminum extrusions for pickets shall be Alloy and Temper Designation 6063-T52.
- B. The manufactured framework shall be subjected to a high-temperature, in-line, multi-stage, and multi-layer thermal stratification coating process including, as a minimum, a six-stage pretreatment/wash and an electrostatic spray application of a polyester finish. The topcoat shall be a "no-mar" TGIC polyester powder coat finish with a minimum thickness of 2 mils (0.0508mm). The color shall be White.
- C. Material for fence pickets shall be 1" square x 0.062" thick (.125" wall for Invincible) extruded tubing. The cross-sectional shape of the rails shall have outside cross-section dimensions of 1.75" square. The top wall and internal web of the rail shall be 0.070" thick; the sidewalls shall be 0.070" thick for superior vertical load strength. Picket holes in the rail shall be spaced 4.715" o.c. Picket retaining rods shall be 0.125" diameter galvanized steel. High quality PVC grommets shall be supplied to seal all picket-to-rail intersections.
- D. Bracket to rail attachments shall be made using specially designed one-way tamperproof security nuts with carriage bolt. Bracket to post connections shall be made using self-drilling hex-head screws.
- E. Aluminum castings shall be used for all rings, post caps, finials, and miscellaneous adornments.

2.03 FABRICATION

SPECIFICATIONS

- A. Pickets, rails and posts shall be pre-cut to specified lengths. Rails shall be pre-punched to accept pickets.
- B. The rail inner slide shall be fully inserted into the rail outer channel to form the raceway for the internal retaining rod. Grommets shall be inserted into the pre-punched holes in the rails, and pickets shall be inserted through the grommets so that pre-drilled picket holes align with the internal raceway of the two-part rails. (Note: This can best be accomplished by using an alignment template). Retaining rods shall be inserted into each rail so that they pass through the pre-drilled holes in each picket, thus completing the panel assembly.
- C. Completed panels shall be capable of supporting a 300 lb. load (applied at midspan) without permanent deformation. Panels shall be biasable to a 25% change in grade.
- D. Gates shall be fabricated using 1.75" sq. reinforced rail material, 2" sq. x .250" gate ends, and 1" sq. x .125" pickets. All rail and upright intersections shall be joined by welding. All picket and rail intersections shall be joined by welding.
- E. Gates that are part of the accessible route shall meet all the requirements of an accessible door in compliance with CBC Section 11B-404.
- F. The levers of lever actuated latches or locks for accessible gates shall be curved with a return to within ½" of the gate surfaces to prevent catching on the clothing or persons. California Referenced Standards Code. T-24 Part 12, Section 12-10-202, Item (F).
- G. Swing doors and gate surfaces within 10" of the finish floor or ground shall have a smooth surface on the push side extending the full width of the door or gate. Parts creating horizontal or vertical joints in these surfaces shall be within 1/16" of the same plane as the other and be free of sharp or abrasive edges. Cavities created by added kick plates shall be capped. CBC Section 11B-404.2.10.

PART 3 - EXECUTION

3.01 PREPARATION

- A. All new installation shall be laid out by the contractor in accordance with the construction plans.

3.02 FENCE INSTALLATION

- A. Fence post shall be spaced according to Table 3, plus or minus ½". Fence panels shall be attached to posts with brackets supplied by the manufacturer. Posts shall be set in concrete footers having a minimum depth of 36" (Note: In some cases, local restrictions of freezing weather conditions may require a greater depth). The concrete specification from the structural sections of this specification shall govern material requirements for the concrete footer. Posts setting by other methods such as plated posts or grouted core-drilled footers are permissible only if shown by engineering analysis to be sufficient in strength for the intended application.

SPECIFICATIONS

3.03 FENCE INSTALLATION MAINTENANCE

- A. When cutting/drilling rails or posts adhere to the following steps to seal the exposed surfaces; 1) Remove all metal shavings from cut area. 2) Apply custom finish paint matching fence color. Failure to seal exposed surfaces per steps 1& 2 above will negate warranty. Spray cans or paint pens shall be used to prime and finish exposed surfaces; it is recommended that paint pens be used to prevent overspray.

3.04 GATE INSTALLATION

- A. Gate posts shall be spaced according to the manufacturers' gate drawings, dependent on standard out-to-out gate leaf dimensions and gate hardware selected. Type and quantity of gate hinges shall be based on the application, weight, height, and number of gate cycles. The manufacturers' gate drawings shall identify the necessary gate hardware required for the application. Gate hardware shall be provided by the manufacture of the gate and shall be installed per manufacturer's recommendations.

3.05 CLEANING

- A. The contractor shall clean the jobsite of excess materials; post-hole excavations shall be scattered uniformly away from posts.

END OF SECTION 32 31 20

SPECIFICATIONS

SECTION 33 05 00 COMMON WORK RESULTS FOR UTILITIES

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. This Section includes the following:
 - 1. Piping joining materials.
 - 2. Transition fittings.
 - 3. Dielectric fittings.
 - 4. Sleeves.
 - 5. Identification devices.
 - 6. Grout.
 - 7. Flowable fill.
 - 8. Piped utility demolition.
 - 9. Piping system common requirements.
 - 10. Equipment installation common requirements.
 - 11. Painting.
 - 12. Concrete bases.
 - 13. Metal supports and anchorages.

1.3 DEFINITIONS

- A. Exposed Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions.
- B. Concealed Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- C. ABS: Acrylonitrile-butadiene-styrene plastic.
- D. CPVC: Chlorinated polyvinyl chloride plastic.
- E. PE: Polyethylene plastic.
- F. PVC: Polyvinyl chloride plastic.

SPECIFICATIONS

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Dielectric fittings.
 - 2. Identification devices.

1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.6 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Steel Piping Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
 - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- C. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.8 COORDINATION

- A. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- B. Coordinate installation of identifying devices after completing covering and painting if devices are applied to surfaces.
- C. Coordinate size and location of concrete bases. Formwork, reinforcement, and concrete requirements are specified in Section 03 30 00 "Cast-in-Place Concrete."

SPECIFICATIONS

PART 2 - PRODUCTS

2.1 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - 1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch maximum thickness, unless otherwise indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 - 2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- E. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.
- F. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- G. Solvent Cements for Joining Plastic Piping:
 - 1. ABS Piping: ASTM D 2235.
 - 2. CPVC Piping: ASTM F 493.
 - 3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
 - 4. PVC to ABS Piping Transition: ASTM D 3138.
- H. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.

2.2 TRANSITION FITTINGS

- A. Transition Fittings, General: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.
- B. Transition Couplings NPS 1-1/2 and Smaller:
 - 1. Underground Piping: Manufactured piping coupling or specified piping system fitting.
 - 2. Aboveground Piping: Specified piping system fitting.

SPECIFICATIONS

C. AWWA Transition Couplings NPS 2 and Larger:

1. Description: AWWA C219, metal sleeve-type coupling for underground pressure piping.

D. Plastic-to-Metal Transition Fittings:

1. Description: CPVC and PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.

E. Plastic-to-Metal Transition Unions:

1. Description: MSS SP-107, CPVC and PVC four-part union. Include brass threaded end, solvent-cement-joint plastic end, rubber O-ring, and union nut.

F. Flexible Transition Couplings for Underground Nonpressure Drainage Piping:

1. Description: ASTM C 1173 with elastomeric sleeve, ends same size as piping to be joined, and corrosion-resistant metal band on each end.

2.3 DIELECTRIC FITTINGS

A. Dielectric Fittings, General: 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: Factory fabricated, union, NPS 2 and smaller.
 - a. Pressure Rating: 150 psig minimum at 180 deg F.
 - b. End Connections: Solder-joint copper alloy and threaded ferrous; threaded ferrous.

C. Dielectric Flanges:

1. Description: Factory-fabricated, bolted, companion-flange assembly, NPS 2-1/2 to NPS 4 and larger.
 - a. Pressure Rating: 150 psig minimum.
 - b. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Kits:

1. Description: Nonconducting materials for field assembly of companion flanges, NPS 2-1/2 and larger.
 - a. Pressure Rating: 150 psig minimum.
 - b. Gasket: Neoprene or phenolic.

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- c. Bolt Sleeves: Phenolic or polyethylene.
- d. Washers: Phenolic with steel backing washers.

E. Dielectric Couplings:

- 1. Description: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining, NPS 3 and smaller.
 - a. Pressure Rating: 300 psig at 225 deg F.
 - b. End Connections: Threaded.

F. Dielectric Nipples:

- 1. Description: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining.
 - a. Pressure Rating: 300 psig at 225 deg F.
 - b. End Connections: Threaded or grooved.

2.4 SLEEVES

- A. Mechanical sleeve seals for pipe penetrations are specified in Section 22 05 17 "Sleeves and Sleeve Seals for Plumbing Piping."
- B. Galvanized-Steel Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- C. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized, plain ends.
- D. Cast-Iron Sleeves: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- E. PVC Pipe Sleeves: ASTM D 1785, Schedule 40.
- F. Molded PE Sleeves: Reusable, PE, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

2.5 IDENTIFICATION DEVICES

- A. General: Products specified are for applications referenced in other utilities Sections. If more than single type is specified for listed applications, selection is Installer's option.
- B. Equipment Nameplates: Metal permanently fastened to equipment with data engraved or stamped.
 - 1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and essential data.
 - 2. Location: Accessible and visible.

SPECIFICATIONS

- C. Snap-on Plastic Pipe Markers: Manufacturer's standard preprinted, semirigid, snap-on type. Include color-coding according to ASME A13.1, unless otherwise indicated.
- D. Pressure-Sensitive Pipe Markers: Manufacturer's standard preprinted, color-coded, pressure-sensitive-vinyl type with permanent adhesive.
- E. Pipes with OD, Including Insulation, Less Than 6 Inches: Full-band pipe markers, extending 360 degrees around pipe at each location.
- F. Pipes with OD, Including Insulation, 6 Inches and Larger: Either full-band or strip-type pipe markers, at least three times letter height and of length required for label.
- G. Lettering: Manufacturer's standard preprinted captions as selected by Architect.
- H. Plastic Tape: Manufacturer's standard color-coded, pressure-sensitive, self-adhesive vinyl tape, at least 3 mils thick.
 - 1. Width: 1-1/2 inches on pipes with OD, including insulation, less than 6 inches; 2-1/2 inches for larger pipes.
 - 2. Color: Comply with ASME A13.1, unless otherwise indicated.
- I. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch sequenced numbers. Include 5/32-inch hole for fastener.
 - 1. Material: 0.032-inch-thick, polished brass.
 - 2. Material: 0.0375-inch-thick stainless steel.
 - 3. Material: 3/32-inch-thick plastic laminate with 2 black surfaces and a white inner layer.
 - 4. Material: Valve manufacturer's standard solid plastic.
 - 5. Size: 1-1/2 inches in diameter, unless otherwise indicated.
 - 6. Shape: As indicated for each piping system.
- J. Valve Tag Fasteners: Brass, wire-link or beaded chain; or brass S-hooks.
- K. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.
 - 1. Engraving: Engraver's standard letter style, of sizes and with terms to match equipment identification.
 - 2. Thickness: 1/16 inch, for units up to 20 sq. in. or 8 inches in length, and 1/8 inch for larger units.
 - 3. Fasteners: Self-tapping, stainless-steel screws or contact-type permanent adhesive.
- L. Plastic Equipment Markers: Manufacturer's standard laminated plastic, in the following color codes:
 - 1. Green: Cooling equipment and components.
 - 2. Yellow: Heating equipment and components.

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3. Brown: Energy reclamation equipment and components.
4. Blue: Equipment and components that do not meet criteria above.
5. Hazardous Equipment: Use colors and designs recommended by ASME A13.1.
6. Terminology: Match schedules as closely as possible. Include the following:
 - a. Name and plan number.
 - b. Equipment service.
 - c. Design capacity.
 - d. Other design parameters such as pressure drop, entering and leaving conditions, and speed.
7. Size: 2-1/2 by 4 inches for control devices, dampers, and valves; 4-1/2 by 6 inches for equipment.

M. Plasticized Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with mat finish suitable for writing.

1. Size: 3-1/4 by 5-5/8 inches.
2. Fasteners: Brass grommets and wire.
3. Nomenclature: Large-size primary caption such as DANGER, CAUTION, or DO NOT OPERATE.

N. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in piped utility identification with corresponding designations indicated. Use numbers, letters, and terms indicated for proper identification, operation, and maintenance of piped utility systems and equipment.

1. Multiple Systems: Identify individual system number and service if multiple systems of same name are indicated.

2.6 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

2.7 FLOWABLE FILL

A. Description: Low-strength-concrete, flowable-slurry mix.

1. Cement: ASTM C 150, Type I, Portland.
2. Density: 115- to 145-lb/cu. ft.
3. Aggregates: ASTM C 33, natural sand, fine.
4. Admixture: ASTM C 618, fly-ash mineral.
5. Water: Comply with ASTM C 94/C 94M.

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6. Strength: 100 to 200 psig at 28 days.

PART 3 - EXECUTION

3.1 PIPED UTILITY DEMOLITION

- A. Refer to Section 02 41 19 "Selective Demolition" for general demolition requirements and procedures.
- B. Disconnect, demolish, and remove piped utility systems, equipment, and components indicated to be removed.
 1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 2. Piping to Be Abandoned in Place: Drain piping. Fill abandoned piping with flowable fill, and cap or plug piping with same or compatible piping material.
 3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make operational.
 5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to the District.
- C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 DIELECTRIC FITTING APPLICATIONS

- A. Dry Piping Systems: Connect piping of dissimilar metals with the following:
 1. NPS 2 and Smaller: Dielectric unions.
 2. NPS 2-1/2 to NPS 12: Dielectric flanges or dielectric flange kits.
- B. Wet Piping Systems: Connect piping of dissimilar metals with the following:
 1. NPS 2 and Smaller: Dielectric couplings or dielectric nipples.
 2. NPS 2-1/2 to NPS 8: Dielectric nipples or dielectric flange kits.
 3. NPS 10 and NPS 12: Dielectric flange kits.

3.3 PIPING INSTALLATION

- A. Install piping according to the following requirements and utilities Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and

SPECIFICATIONS

calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on the Coordination Drawings.

- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping to permit valve servicing.
- E. Install piping at indicated slopes.
- F. Install piping free of sags and bends.
- G. Install fittings for changes in direction and branch connections.
- H. Select system components with pressure rating equal to or greater than system operating pressure.
- I. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of equipment areas or other wet areas 2 inches above finished floor level.
 - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
 - a. PVC Pipe Sleeves: For pipes smaller than NPS 6.
 - b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.
- J. Verify final equipment locations for roughing-in.
- K. Refer to equipment specifications in other Sections for roughing-in requirements.

3.4 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and utilities Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

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1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- E. Welded Joints: Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- F. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- G. Grooved Joints: Assemble joints with grooved-end pipe coupling with coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.
- H. Soldered Joints: Apply ASTM B 813 water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy (0.20 percent maximum lead content) complying with ASTM B 32.
- I. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
- J. Pressure-Sealed Joints: Assemble joints for plain-end copper tube and mechanical pressure seal fitting with proprietary crimping tool to according to fitting manufacturer's written instructions.
- K. Plastic Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 appendixes.
 3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
 4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
 5. PVC Nonpressure Piping: Join according to ASTM D 2855.
 6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.
- L. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.
- M. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.
- N. Plastic Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
1. Plain-End PE Pipe and Fittings: Use butt fusion.

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2. Plain-End PE Pipe and Socket Fittings: Use socket fusion.
- O. Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

3.5 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
 3. Install dielectric fittings at connections of dissimilar metal pipes.

3.6 EQUIPMENT INSTALLATION

- A. Install equipment level and plumb, unless otherwise indicated.
- B. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference with other installations. Extend grease fittings to an accessible location.
- C. Install equipment to allow right of way to piping systems installed at required slope.

3.7 PAINTING

- A. Painting of piped utility systems, equipment, and components is specified in Section 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting."
- B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.8 IDENTIFICATION

- A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.
 1. Stenciled Markers: According to ASME A13.1.
 2. Plastic markers, with application systems. Install on insulation segment if required for hot noninsulated piping.
 3. Locate pipe markers on exposed piping according to the following:
 - a. Near each valve and control device.
 - b. Near each branch, excluding short takeoffs for equipment and terminal units. Mark each pipe at branch if flow pattern is not obvious.
 - c. Near locations where pipes pass through walls or floors or enter inaccessible enclosures.

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- d. At manholes and similar access points that permit view of concealed piping.
 - e. Near major equipment items and other points of origination and termination.
- B. Equipment: Install engraved plastic-laminate sign or equipment marker on or near each major item of equipment.
 - 1. Lettering Size: Minimum 1/4 inch high for name of unit if viewing distance is less than 24 inches, 1/2 inch high for distances up to 72 inches, and proportionately larger lettering for greater distances. Provide secondary lettering two-thirds to three-fourths of size of principal lettering.
 - 2. Text of Signs: Provide name of identified unit. Include text to distinguish among multiple units, inform user of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.
- C. Adjusting: Relocate identifying devices that become visually blocked by work of this or other Divisions.

3.9 CONCRETE BASES

- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
 - 1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
 - 2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of base.
 - 3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
 - 4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 5. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
 - 7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Section 03 30 00 "Cast-in-Place Concrete."

3.10 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Refer to Section 05 50 00 "Metal Fabrications" for structural steel.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor piped utility materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

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3.11 GROUTING

- A. Mix and install grout for equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

END OF SECTION 33 05 00

SPECIFICATIONS

SECTION 33 41 00 STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Reference Standards:
 - 1. Standard Specifications for Public Works, current edition, including Regional and City of San Bernardino Supplemental Amendments.

1.2 SUMMARY

- A. Section Includes:
 - 1. Pipe and fittings.
 - 2. Nonpressure transition couplings.
 - 3. Cleanouts.
 - 4. Drains.
 - 5. Encasement for piping.
 - 6. Cleanouts.
 - 7. Channel drainage systems.
 - 8. Catch basins.
 - 9. Stormwater inlets.
 - 10. Pipe outlets.
 - 11. Stormwater disposal systems.
- B. Related Requirements:
 - 1. Section 31 20 00 "Earth Moving" for excavating, trenching, and backfilling, and underground warning tapes.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Drop inlets.
 - 2. Cleanouts and drains.
 - 3. Pipe and fittings.
- B. Shop Drawings:

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1. Cleanouts: Include plans, elevations, sections, details, frames, and covers.
2. Catch basins. Include plans, elevations, sections, details, frames, covers, and grates.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of cast-iron soil pipe and fitting, from manufacturer.
- B. Field quality-control reports.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic cleanouts, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle cleanouts according to manufacturer's written rigging instructions.
- D. Handle catch basins according to manufacturer's written rigging instructions.

1.6 PROJECT CONDITIONS

- A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by District or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 1. Notify District Construction Manager no fewer than three days in advance of proposed interruption of service.
 2. Do not proceed with interruption of service without District Construction Manager's written permission.

PART 2 - PRODUCTS

2.1 PVC PIPE AND FITTINGS

- A. PVC Gravity Sewer Piping:
 1. Pipe and Fittings: ASTM F 679, PVC gravity sewer pipe with bell-and-spigot ends and with integral ASTM F 477, elastomeric seals for gasketed joints.

2.2 NONPRESSURE TRANSITION COUPLINGS

- A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.

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B. Unshielded, Flexible Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fernco Inc.
 - b. Mission Rubber Company.
 - c. NDS Inc.
 - d. Or Equal.
2. Description: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.

C. Ring-Type, Flexible Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fernco Inc.
 - b. Logan Clay Pipe.
 - c. Mission Rubber Company.
 - d. Or Equal.
2. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

2.3 CLEANOUTS

A. Plastic Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. NDS Inc.
 - b. Sioux Chief Manufacturing Company, Inc.
 - c. Zurn Industries, LLC.
 - d. Or Equal.
2. Description: PVC body with PVC threaded plug. Include PVC drain pipe fitting and riser to cleanout of same material as drain piping.

2.4 DRAINS

A. Cast-Iron Area Drains:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Smith, Jay R. Mfg. Co.
 - b. Watts; a Watts Water Technologies company.

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- c. Zurn Industries, LLC.
 - d. Or Equal.
- 2. Description: ASME A112.6.3 gray-iron round body with anchor flange and round secured grate. Include bottom outlet with inside calk or spigot connection, of sizes indicated.
- 3. Top-Loading Classification(s): Medium and Heavy Duty.

2.5 CATCH BASINS

- A. Standard Precast Concrete Catch Basins:
 - 1. Materials and dimensions per City of San Bernardino standards.
 - 2. Type of catch basin and additional dimensions as indicated on Drawings.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- C. Install cleanouts for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing drain is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
- F. Install gravity-flow, nonpressure drainage piping according to the following:
 - 1. Install piping pitched down in direction of flow.
 - 2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
 - 3. Install piping with 36-inch minimum cover unless drawings indicate otherwise.
 - 4. Install hub-and-spigot, cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook."

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- a. Backfill trench and compact.
- 5. Install PVC drain piping according to ASTM D 2321 and ASTM F 1668.
- 6. Install concrete drain piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."
- G. Install corrosion-protection as indicated on drawings.

3.2 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, nonpressure drainage piping according to the following:
 - 1. Join hub-and-spigot, cast-iron soil piping with gasketed joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
 - 2. Join PVC profile gravity drain piping according to ASTM D 2321 for elastomeric-seal joints or ASTM F 794 for gasketed joints.
 - 3. Join dissimilar pipe materials with nonpressure-type flexible couplings.

3.3 CLEANOUT INSTALLATION

- A. Concrete Cleanouts: Construct concrete cleanouts according to City of San Bernardino standards. Set cleanout frames and covers flush with finished surface.
- B. Plastic Cleanouts: Use cast-iron soil pipe fittings in drain pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in drain pipe.
 - 1. Install cleanouts and riser extensions from drain pipes to cleanouts at grade.
 - 2. Use commercially manufactured 45 degree wye and 45 degree bend fittings in storm drain pipes and risers for cleanouts.
 - 3. Install piping so cleanouts open in direction of flow in storm drain pipe.
 - 4. Unpaved Areas: Set cleanout tops 1 inch above surrounding earth grade.
 - 5. Paved Areas (Walkways, Roadways, etc.): Set cleanout tops flush with pavement surface.

3.4 DRAIN INSTALLATION

- A. Install type of drains in locations indicated.
 - 1. Use Light-Duty, top-loading classification drains in earth or unpaved foot-traffic areas.
 - 2. Use Medium-Duty, top-loading classification drains in paved foot-traffic areas.
 - 3. Use Heavy-Duty, top-loading classification drains in vehicle-traffic service and parking areas.
 - 4. Use Extra-Heavy-Duty, top-loading classification drains in roads.
- B. Embed drains in 4-inch minimum concrete around bottom and sides.
- C. Fasten grates to drains if indicated.

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- D. Set drain frames and covers with tops flush with pavement surface.
- E. Assemble trench sections with flanged joints.
- F. Embed trench sections in 4-inch minimum concrete around bottom and sides.

3.5 CATCH BASIN INSTALLATION

- A. Construct in accordance with City of San Bernardino standards.
- B. Construct to sizes and shapes indicated on Drawings
- C. Set frames and grates to elevations indicated.

3.6 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318.

3.7 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping in building's storm building drains.
- B. Connect force-main piping to building's storm drainage force mains.
- C. Make connections to existing piping and underground manholes or cleanouts.
 - 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 - 2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 - 3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes, cleanouts, and structures by cutting into existing unit and creating an opening large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe, manhole, cleanout, or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
 - a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
 - b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.

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4. Protect existing piping, manholes, cleanouts, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.
- D. Pipe couplings, expansion joints, and deflection fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
 1. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure drain piping unless otherwise indicated.
 - a. Shielded flexible couplings for same or minor difference OD pipes.
 - b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
 - c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.
 2. Use pressure-type pipe couplings for force-main joints.

3.8 CLOSING ABANDONED STORM DRAINAGE SYSTEMS

- A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:
 1. Close open ends of piping with at least 8-inch-thick, brick masonry bulkheads.
 2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
- B. Abandoned Manholes, Cleanouts, and Structures: Excavate around manholes, cleanouts, and structures as required and use one procedure below:
 1. Remove manhole, cleanout, or structure and close open ends of remaining piping.
 2. Remove top of manhole, cleanout, or structure down to at least 36 inches below final grade. Fill to within 12 inches of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.
- C. Backfill to grade.

3.9 IDENTIFICATION

- A. Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.
 1. Use warning tape or detectable warning tape over ferrous piping.

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2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.10 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
 1. Submit separate reports for each system inspection.
 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
 1. Do not enclose, cover, or put into service before inspection and approval.
 2. Test completed piping systems according to requirements of authorities having jurisdiction.
 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
 4. Submit separate report for each test.
 5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
 - a. Exception: Piping with soil-tight joints unless required by authorities having jurisdiction.
 - b. Option: Test plastic piping according to ASTM F 1417.
 - c. Option: Test concrete piping according to ASTM C 924.
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.11 CLEANING

- A. Clean interior of piping of dirt and superfluous materials. Flush with potable water.

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END OF SECTION 33 41 00