



TETER, LLP

ARCHITECTS ENGINEERS CONNECTED

PROJECT MANUAL

CONTRACTUAL – LEGAL REQUIREMENTS
TECHNICAL SPECIFICATIONS

FOR

UNIVERSAL TK CLASSROOM

Project No.: 22-12390

DSA File No.: 15-73

DSA Appl. No.: 03-122652

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT

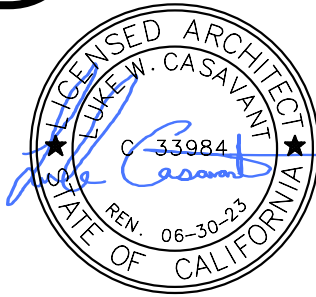
APP: 03-122652 INC:

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DATE: 10/21/2022

SECTION 000107
SEALS PAGE



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SECTION 011100
SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:

1. Project information.
2. Work covered by Contract Documents.
3. Work by separate contracts.
4. Access to site.
5. Coordination with occupants.
6. Work restrictions.
7. Specification and drawing conventions.

- B. Related Sections:

1. Division 01 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

- A. Project Identification:

**Standard ES Universal TK Classroom
115 E. Minner Ave
Bakersfield, CA 93308**

Architect's Project Number: **22-12390**

- B. Owner:

**Standard School District
1200 N. Chester Avenue
Bakersfield, CA 93308**

Telephone: **(661) 392-2110**
Contact: **LeAnna Alsup**

C. Architect:

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1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of the Project is defined by the Contract Documents and consists of the following:

1. (1) New approved relocatable classroom purchased by the owner under a separate contract Modular manufacturer will deliver and install buildings after site pad has been completed by the site contractor.
2. Site preparation for modular building including but not limited to: Coordination with modular manufacturer, preparing pit set pad, concrete slurry pad below, building, site reconfiguration, site accessibility, rework of irrigation system, landscape, flatwork, fencing repair, associated fire alarm, drainage, and underground/ under building utilities.

B. Type of Contract: Project will be constructed under a single prime contract.

1.5 WORK UNDER SEPARATE CONTRACTS

A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

B. Concurrent Work: Owner has awarded separate contract(s) for the following construction operations at Project site. Those operations will be conducted simultaneously with work under this Contract. (REF

1. Modular building stem wall concrete foundation, off-site and on-site construction of modular building, set up and installation of building.

1.6 ACCESS TO SITE

- A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Driveways, Walkways and Entrances: Keep driveways, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.7 COORDINATION WITH OCCUPANTS

- A. Full Owner Occupancy: Owner will occupy site and adjacent building(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.
 - 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
 - 2. Notify the Owner not less than 72 hours in advance of activities that will affect Owner's operations.
- B. Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
 - 1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
 - 2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
 - 3. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
 - 4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.8 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, except as otherwise indicated.
 - 1. Submit a written request to the Architect for work hours outside of the indicted on-site hours; request subject to review by the Owner.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 - 1. Notify Architect and Owner not less than 2 days in advance of proposed utility interruptions.
 - 2. Obtain Architect's and Owner's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
 - 1. Notify Architect and Owner not less than 2 days in advance of proposed disruptive operations.
 - 2. Obtain Architect's and Owner's written permission before proceeding with disruptive operations.
- E. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

1.9 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 - 2. Specification requirements are to be performed with by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.
3. Keynoting: Materials and products are identified by reference keynotes.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 011101
MULTIPLE CONTRACT SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes a summary of the Work of each contract including responsibilities for coordination and temporary facilities and controls. Contracts include the following:
 - 1. Site Work Contract.
 - 2. Modular Building Contract.
- B. Specific requirements for Work of each contract are also indicated in individual Specification Sections and on Drawings.
- C. Related Requirements:
 - 1. Division 01 Section "Summary" for the Work covered by the Contract Documents, restrictions on use of Project site, coordination with occupants, and work restrictions.
 - 2. Division 01 Section "Project Management and Coordination" for general coordination requirements.

1.3 COORDINATION

- A. Coordinators: The Contractor for each contract shall appoint a project coordinator to be responsible for coordination of each contractor's work with other contractors.
- B. Coordination Activities: Coordination requirements shall include, but are not limited to, coordination of the following:
 - 1. Work between contracts.
 - 2. Access to shared or common work spaces.
 - 3. Temporary facilities and controls.
 - 4. Interruptions of permanent and temporary utilities, including those necessary to make connections for temporary services.
 - 5. Construction and operations of the Work with work performed by each Contract.
 - 6. Coordination drawings in collaboration with each contractor to coordinate work by more than one contract.
 - 7. Quality-assurance and quality-control services specified in Division 01 Section "Quality Requirements" as applicable to respective Work.

8. Sequence of activities to accommodate tests and inspections, and coordinate schedule of tests and inspections as applicable to respective Work.
9. Information necessary to adjust, move, or relocate existing utility structures affected by construction.
10. Locate existing permanent benchmarks, control points, and similar reference points, and establish permanent benchmarks on Project site.
11. Provide progress cleaning of common areas and coordinate progress cleaning of areas or pieces of equipment where more than one contractor has worked.
12. Cutting and patching.
13. Protection of the Work.
14. Completion of interrelated punch list items.

1.4 GENERAL REQUIREMENTS OF CONTRACTS

- A. Extent of Contract: Unless the Agreement contains a more specific description of the Work of each Contract, requirements indicated on Drawings and in Specification Sections determine which contract includes a specific element of Project.
 1. Unless otherwise indicated, the work described in this Section for each contract shall be complete systems and assemblies, including products, components, accessories, and installation required by the Contract Documents.
 2. Requirements Division 01 Specification Sections shall be applicable to each Contract for its own work.
- B. Temporary Facilities and Controls: In addition to specific responsibilities for temporary facilities and controls indicated in this Section and in Division 01 Section "Temporary Facilities and Controls," contractor for each contract is responsible for the following:
 1. Installation, operation, maintenance, and removal of each temporary facility necessary for its own normal construction activity, and costs and use charges associated with each facility, except as otherwise provided for in this Section.
 2. Plug-in electric power cords and extension cords, supplementary plug-in task lighting, and special lighting necessary exclusively for its own activities.
 3. Its own field office, complete with necessary furniture, utilities, and telephone service.
 4. Its own storage and fabrication sheds.
 5. Temporary enclosures for its own construction activities.
 6. Staging and scaffolding for its own construction activities.
 7. General hoisting facilities for its own construction activities.
 8. Waste disposal facilities, including collection and legal disposal of its own hazardous, dangerous, unsanitary, or other harmful waste materials.
 9. Progress cleaning of work areas affected by its operations on a daily basis.
 10. Secure lockup of its own tools, materials, and equipment.
 11. Construction aids and miscellaneous services and facilities necessary exclusively for its own construction activities.

1.5 SITE WORK CONTRACT

A. Work of the Site Work Contract includes, but is not limited to, the following:

1. Remaining work not identified as work under other contracts.
2. Selective demolition of selected site improvements as indicated on Drawings and as necessary to accommodate to complete the Work.
3. Site preparation: site clearing, earthwork including over excavation and backfill in preparation for construction of building pads for modular buildings.
 - a. Excavation for modular building footings after pads have been prepared shall be the responsibility of the Modular Building Contractors.
4. Site improvements, including pedestrian paving and fencing.
5. Site utilities, trenching, backfill, and patching.
6. Under building utilities and drainage
7. Rat slab under modular building

B. Temporary facilities and controls of the Site Work Contract include, but are not limited to, the following:

1. Temporary facilities and controls that are not otherwise specifically assigned to the Modular Building Contracts.
2. Sediment and erosion control.
3. Unpiped temporary toilet fixtures, wash facilities, and drinking water facilities, including disposable supplies.
4. Project identification and temporary signs.
5. General waste disposal facilities.
6. Temporary fire-protection facilities.
7. Barricades, warning signs, and lights.
8. Site enclosure fence.
9. Security enclosure and lockup.
10. Environmental protection.
11. Restoration of Owner's existing facilities used as temporary facilities.

C. Plumbing Work of the Site Work Contract includes, but is not limited to, the following:

1. Site water distribution, sewers, and storm drainage as indicated on the drawings.
2. Site water distribution shall be extended and connected to points of connection for modular buildings.
3. Under-building utilities for modular buildings; waste piping to terminate 5 inches above the top of the slab for bidding purposes.

D. Electrical Work of the Site Work Contract includes, but is not limited to, the following:

1. Site electrical distribution.
2. Site lighting.
3. Site communications and security.
4. Electrical service and distribution.
5. Communication and security.
6. Fire alarm systems and devices.

1.6 MODULAR BUILDINGS CONTRACT

- A. Work of the Modular Buildings Contract includes, but is not limited to, the following:
1. Structural design and preparation of construction documents through California Division of the State Architect Approval.
 2. Site and Plant construction of Modular buildings as indicated on the Drawings.
 3. Concrete stem walls for modular buildings, including building footings, footing excavation, formwork, reinforcing steel, and concrete.

1.7 CONTRACT COMPARISON

- A. Work outside of the modular buildings and the bleacher addition shall be the responsibility of the Site Work Contractor; Work interfacing with and relating to the modular building and bleacher addition shall be the responsibility of the Contracts as indicated on the drawings and as follows:

	Spec Section / Work Item	Site Work Contract	Modular Building Contract	Comments
1.	Division 01 Sections	X	X	As applicable to the work of each contract for its own work.
2.	014000 Quality and Testing Requirements: General	X	X	As applicable to the work of each contract for its own work.
3.	014000 Quality and Testing Requirements: Concrete testing for slabs & footings	X	X	As applicable to the work of each contract for its own work.
4.	015000 Temporary Facilities and Controls: Tools and equipment	X	X	As applicable to the work of each contract for its own work.
5.	015000 Temporary Facilities and Controls: Temporary power, water, and toilets	X		
6.	015000 Temporary Facilities and Controls: Temporary security fencing	X		
7.	024109 Selective Demolition:	X		As indicated on Drawings.
8.	101400 Signage: Signs for room and identification.	X		As indicated on Drawings.
9.	101405 Dimensional Sign Characters: Exterior building identification	X		As indicated on Drawings.
10.	Division 26 Electrical: Power distribution to and connection of power modular buildings.	X		As indicated on Drawings.
11.	Division 27 Telecommunication: Building security and IT devices and systems within the modular building.	X		

	Spec Section / Work Item	Site Work Contract	Modular Building Contract	Comments
12.	Division 28 Fire Alarm: Provide and install fire alarm devices and wiring within modular buildings	X		As indicated on Drawings.
13.	311100 Site Clearing: Site Clearing	X		
14.	312000 Earthwork: Over excavation, fill, and compaction in the area of modular building, surrounding site work and removal of excess soil	X		
15.	312000 Earthwork: Excavation for modular building footings, finish grading of soil in vicinity of modular building footings		X	As indicated on Drawings and as applicable to the work of each contract for its own work.
16.	321313 Concrete Paving and Walks: Concrete paving, walks and under building concrete slurry	X		Coordination required between contractors for locations and paving elevations.
17.	323119 Decorative Metal Fences and Gates: Fences and gates in the vicinity of the new modular building	X		

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 011103
ADDENDA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative requirements for Addenda issued prior to bid opening.
- B. Related Requirements:
 - 1. Division 00 Sections as applicable to contract requirements and modifications.
 - 2. Division 01 Section "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.
 - 3. Division 01 Section "Contract Modification Procedures" for changes to the Contract Documents after award of the Contract.

1.3 NOTICE TO BIDDERS

- A. Addenda will be issued to registered plan holders for changes to the drawings and specifications during the bidding period prior to the bid opening. Addenda shall serve to clarify, revise, and supersede information in the Project Manual, Drawings, and previously issued Addenda. Portions of the Addenda affecting the Contract Documents will be incorporated into the Contract by enumeration of the Addendum in the Owner/Contractor Agreement.
- B. The Bidder shall acknowledge receipt of this Addendum in the appropriate space on the Bid Form.

1.4 GOVERNING AGENCY REVIEW AND APPROVAL

- A. Addenda shall be submitted to the Authority having Jurisdiction (AHJ) by the project Architect and shall be approved by the AHJ in order to be officially incorporated into the construction documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 011105
USE OF ARCHITECT'S ELECTRONIC FILES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes Administrative and procedural requirements for use of Architect's electronic Contract Document drawing files.
- B. Related Sections:
 - 1. Division 01 Section "Project Management and Coordination."
 - 2. Division 01 Section "Submittal Procedures."
 - 3. Division 01 Section "Project Record Drawings."

1.3 USE OF ARCHITECT'S ELECTRONIC FILES

- A. Architect may make available to Contractor digital data files of Architect's Drawings for use in preparing shop drawings, coordination drawings, and project record drawings.
 - 1. Electronic files will be available without charge.
 - 2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
 - 3. Files will be supplied digitally via email or FTP site and will be in PDF, DWG, or similar common format.
 - 4. Waiver of Liability: Contractor, Subcontractors, and Suppliers of this Project shall each execute a waiver of liability for each use of the Architects electronic files.
 - a. Waiver of Liability form shall be submitted to the Architect at the time or request for use of Architect's electronic data files.
 - b. Waiver of Liability form shall be the "ELECTRONIC DATA FILE DISTRIBUTION WAIVER OF LIABILITY FORM" included at the end of this Specification Section.
 - c. The use of the electronic files shall only be used for this Project and for the identified purposes noted in the Waiver of Liability form.
 - 1) Each entity shall be responsible for complying with the restrictions of the Liability Waiver form.
 - 2) Electronic Contract Document drawing files received from the architect shall not be duplicated without written permission of the Architect.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

(Electronic Data File Distribution Waiver of Liability included on the following page)



TETER, LLP

ARCHITECTS ENGINEERS CONNECTED

ELECTRONIC DATA FILE DISTRIBUTION WAIVER OF LIABILITY

TETER, LLP

7535 North Palm, Suite 201

Fresno, California 93711

Project: _____

Intended Use: _____

Any electronic data, files or information provided under this Agreement are the property of the above listed Professionals and consultants (Team). It is understood and agreed that the information contained in these electronic data file shall not be copied or duplicated for any use other than the project for which they were created. It is understood by the undersigned that compatibility of this electronic media with other systems is not guaranteed, and conversion to other systems is done at the user's own risk.

The user hereby agrees and recognizes that designs, plans and data stored on electronic media including, but not limited to, computer disk and magnetic tape, may be subject to undetectable alteration and/or uncontrollable deterioration. It is agreed by the undersigned that the Team shall not be liable for the completeness or accuracy of any material provided on electronic media.

The undersigned agrees to defend, hold harmless and indemnify the Team and its officers, directors, employees, agents and consultants for any and all claims, losses, costs or damage whatsoever arising out of, resulting from, or in any way related to the use of electronic data files provided hereunder, whether that use is authorized or unauthorized. The user further agrees to defend, indemnify and hold harmless the Team its officers, directors, employees, agents and consultants from any and all claims, damages, losses, expenses and injuries arising out of the modification of the electronic data files by the user or by anyone obtaining said files through or from the user.

The Team bears no responsibility for the information in the electronic data files once it leaves the offices of **TETER, LLP**. The undersigned understands that the electronic data files are subject to applicable copyright laws of the United States and agrees to be bound by same. Upon our receipt of this agreement duly executed by an Officer of your firm you may request the Data files.

Name (Print/Sign): _____ Date: _____

Firm: _____

Phone and email: _____

Name (Print/Sign): _____ Date: _____

Firm: _____

Phone and email: _____

Name (Print/Sign): _____ Date: _____

Firm: _____

Phone and email: _____

SECTION 012500
SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Sections:
 - 1. Division 00 Section "Instructions to Bidders" and other Division 00 Sections as applicable to substitution requests prior to submission of bids.
 - 2. Division 01 Section "DSA Hourly Fee Services" for DSA hourly fee services for review of changes to DSA approved Construction Documents.
 - 3. Division 01 Section "Contract Modification Procedures" for changes to DSA approved Construction Documents."
 - 4. Division 01 Section "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.
 - 5. Divisions 02 through 33 Sections for specific requirements and limitations for substitutions.

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor that are not required in order to meet other Project requirements but may offer advantage to the Owner.

1.4 REGULATORY REQUIREMENTS

- A. Division of the State Architect (DSA) Review and Approval: Substitutions resulting in changes to DSA approved Construction Documents may be considered a change requiring DSA review and approval and submission of a DSA Construction Change Document (CCD) form by the Architect.
 - 1. DSA Construction Change Documents shall be as specified in Division 01 Section "Contract Modification Procedures."
 - 2. DSA Hourly Fee Services for review of CCD's shall be as specified in Division 01 Section "DSA Hourly Fee Services."

1.5 SUBMITTALS

- A. Substitution Requests: Submit documentation identifying product or fabrication or installation method to be replaced. Include Specification Section number and title, and Drawing numbers and titles.
 - 1. Substitution Request Form: Use form provided at the end of this Section.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from

- manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
- k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later. Architect will not act on any Post-Bid Substitutions until 7 days following the submission of the Schedule of Values per Division 01 Section "Payment Procedures."
- a. Forms of Acceptance:
 - 1) Substitutions Prior to Bid: Addenda will be issued for substitutions accepted prior to bid.
 - 2) Substitutions After Award of Contract: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.6 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage qualified testing agency to perform compatibility tests recommended by manufacturers.

1.7 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions After Award of Contract: The Contractor after award of the Contract, as allowed by the General Conditions, may submit materials and methods to be considered for substitutions.
1. The following are not considered to be substitutions:
 - a. Revisions to the Contract Documents requested by the Owner or Architect.
 - b. Specified options of products and construction methods included in the Contract Documents.
 - c. The Contractor's compliance with governing regulations and orders issued by governing authorities.
- B. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need for change, but not later than 21 days prior to time required for preparation and review of related submittals.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.
 - g. Requested substitution provides specified warranty.
 - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- C. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

- a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
- b. Requested substitution does not require extensive revisions to the Contract Documents.
- c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
- d. Substitution request is fully documented and properly submitted.
- e. Requested substitution will not adversely affect Contractor's construction schedule.
- f. Requested substitution has received necessary approvals of authorities having jurisdiction.
- g. Requested substitution is compatible with other portions of the Work.
- h. Requested substitution has been coordinated with other portions of the Work.
- i. Requested substitution provides specified warranty.
- j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION

(Substitution Request Form included on the following page)



TETER, LLP

ARCHITECTS ENGINEERS CONNECTED

SUBSTITUTION REQUEST FORM

FOR: Universal TK Classroom

We hereby submit for your consideration the following product instead of the specified item for the above project:

SECTION	PARAGRAPH	SPECIFIED ITEM
_____	_____	_____

Proposed Substitution: _____

Attach complete technical data, including laboratory tests, if applicable.

Include complete information on changes to Drawings and/or Specifications which proposed substitution will require for its proposed installation.

Fill in the blanks below:

A. Does the substitution affect dimension on Drawings:

B. Will the undersigned pay for changes to the building design, including engineering and detailing costs caused by the requested substitution?

C. What affect does substitution have on other trades?

D. Difference between proposed substitution and specified item?

E. Manufacturer's guarantees of the proposed and specified items are:

_____ Same _____ Different (explain on attachment)

F. Cost difference between proposed substitution and specified item - savings to Owner?

The undersigned states that the function, appearance and quality are equivalent or superior to the specified item and will be at no additional cost to the Owner.

Submitted to the Architect by:

Signature: _____

Firm: _____

Address: _____

Date: _____

Telephone: _____

Remarks: _____

For Use by Design Consultant

Accepted _____

Accepted as Noted _____

Not Accepted _____

Received Too Late _____

By: _____

Date: _____

SECTION 012600
CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications including the following:
 - 1. Governing Agency approval.
 - 2. Bulletins.
 - 3. Architect's Supplemental Instructions.
 - 4. Architect's Change Directive.
 - 5. Requests for Proposals.
 - 6. Change Order Requests.
 - 7. Cost Change Directives.
 - 8. Change Orders.
- B. Related Requirements:
 - 1. Division 00 Sections as applicable to contract requirements and modifications.
 - 2. Division 01 Section "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.
 - 3. Division 01 Section "DSA Hourly Fee Services" for fees charged by DSA for changes to the Construction Documents.

1.3 DEFINITIONS

- A. Contract Modification: A change to the Contract Agreement between the Owner and the Contractor affecting the Contract Documents, the Contract Time, and/or the Contract Amount.

1.4 GOVERNING AGENCY APPROVAL

- A. DSA Approval: Changes to DSA approved Construction Documents shall be reviewed and approved by DSA.
 - 1. Changes to DSA Approved Construction Documents shall comply with requirements of DSA Interpretive Regulation IR A-6, "Construction Change

Document Submittal and Approval Process” and shall be accompanied by DSA Form 140 “Application for Submittal of Post-Approval Document.”

2. Architect shall be responsible for preparing Construction Change Documents and submitting documentation to DSA.

- B. DSA Hourly Fee Services: Changes to DSA approved Construction Documents shall be reviewed by DSA and shall be subject to DSA Hourly Fee Services. Charges will be made to the Owner by DSA.

1. Where changes to DSA approved Construction Documents are the result of actions by the Contractor, the Contractor shall be liable for DSA Hourly Fee Services as described in Division 01 Section “DSA Hourly Fee Services.”

1.5 BULLETINS

- A. Bulletins: A form used by the Architect for issuing Architect’s Supplemental Instructions (ASI), Architect’s Change Directives (ACD), and Requests for Proposals (RFP).

1.6 ARCHITECT’S SUPPLEMENTAL INSTRUCTION

- A. Architect’s Supplemental Instruction (ASI): Supplemental instructions will be issued by the Architect authorizing minor changes in the Work not involving adjustment to the Contract Sum or the Contract Time.

1. Architect’s Supplemental Instructions will be issued via Bulletin and signed by the Architect.
2. Contractor’s Response: Contractor shall perform the work indicated in the Architect’s Supplemental Instruction without adjustment to the Contract Sum or the Contract Time. If the Contractor determines that an adjustment to the Contract Sum or the Contract Time is necessary due to the Architect’s Supplemental Instruction, the Contractor shall respond to the Architect’s Supplemental Instruction as if it were an Architect/Owner initiated Request for Proposal.

- B. DSA Review and Approval: Architect’s Supplemental Instructions affecting changes to the DSA Approved Construction Documents shall be subject to DSA review and approval; Architect shall submit applicable DSA CCD documentation to DSA for approval.

1.7 ARCHITECT’S CHANGE DIRECTIVE

- A. Architect’s Change Directive (ACD): Architect’s Change Directives will be issued by the Architect instructing the Contractor to proceed with a change in the Work for subsequent inclusion in a Change Order.

1. Architect’s Change Directives will be issued via Bulletin and signed by the Architect.

2. Architect's Change Directives contain a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation by Contractor: Maintain detailed records on a time and material basis of work required by the Architect's Change Directive.
 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.
- C. DSA Review and Approval: Architect's Change Directives affecting changes to the DSA Approved Construction Documents shall be subject to DSA review and approval; Architect shall submit applicable DSA CCD documentation to DSA for approval.

1.8 REQUEST FOR PROPOSALS

- A. Requests for Proposals: Requests for Proposals are Architect/Owner initiated requests for estimates of changes to the Contract Sum and/or Contract Time for proposed changes; Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. The description may include supplemental or revised Drawings and Specifications.
 1. Requests for Proposals will be issued by the Architect via Bulletin.
 2. Requests for Proposals are not authorization or instructions to either stop work in progress or execute proposed change(s).
 3. Contractor's Response: Within not more than 7 days after receipt of Request for Proposal, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - e. Quotation Form: Use forms acceptable to Architect.
- B. Architect's Response: Within 7 days after receipt of Contractor's response to Architect/Owner initiated Request for Proposal, Architect will:
 1. Issue a Change Order or Cost Change Directive for accepted proposals.
 2. Notify the Contractor of unaccepted proposals.
 3. Issue an Architect's Change Directive where changes are necessary for the progress of the Work and changes to the Contract Sum and the Contract Time are in dispute.

1.9 CHANGE ORDER REQUEST

- A. Change Order Request (COR): Change Order Requests are documents initiated by the Contractor requesting a Contract Modification due to unforeseen conditions, or latent or changed conditions.
1. Change Order Request Form: Use form acceptable to Architect.
 2. Include a statement outlining reasons for the Change Order Request and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 3. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 4. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 5. Include costs of labor and supervision directly attributable to the change.
 6. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 7. Comply with requirements in Division 01 Section "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
- B. Architect's Response: Within 7 days after receipt of Contractor's Change Order Request, Architect will:
1. Issue a Cost Change Directive for accepted Change Order Requests that do not require changes to the approved Construction Documents.
 2. Issue a Change Order and/or Cost Change Directive for accepted Change Order Requests that require changes to the approved Construction Documents.
 - a. Where Change Order Requests require changes to the Contract Documents, Architect will provide a detailed description of proposed changes in the Work via Change Order.
 3. Issue an Architect's Change Directive where changes are necessary for the progress of the Work and changes to the Contract Sum and the Contract Time are in dispute.
 4. Notify the Contractor of unaccepted proposals.

1.10 COST CHANGE DIRECTIVE (CCD)

- A. Cost Change Directive: A Cost Change Directive is a document issued by the Architect notifying Contractor of Owner's acceptance of changes to the Contract Sum proposed by the Contractor.

1.11 CHANGE ORDERS

- A. Change Orders: Change orders are a document defining Contract Modifications; upon Owner's approval of proposed Contract Modifications, Architect will issue a Change Order for signatures of Owner and Contractor on form provided by Architect.
- B. DSA Review and Approval: Change Orders affecting changes to the DSA Approved Construction Documents shall be subject to DSA review and approval; Architect shall submit applicable DSA CCD documentation to DSA for approval.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 012605
DSA HOURLY FEE SERVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
- B. Division of the State Architect (DSA) Interpretive Regulation IR A-30 "DSA Hourly Fee Services" latest edition (Document is available on DSA's website under "Publications;" Interpretive Regulations (IRs); A- Administrative; IR-30).

<https://www.dgs.ca.gov/dsa/>

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for DSA Hourly Fee Services associated with changes to DSA approved Construction Documents.
- B. Related Requirements:
 - 1. Division 00 Sections as applicable to contract requirements and modifications.
 - 2. Division 01 Section "Addenda."
 - 3. Division 01 Section "Substitution Procedures."
 - 4. Division 01 Section "Contract Modification Procedures."
 - 5. Division 01 Section "Payment Procedures."
 - 6. Division 01 Section "Submittal Procedures."
 - 7. Division 01 Section "Product Requirements."

1.3 DSA HOURLY FEE SERVICES

- A. General: Changes to DSA approved Construction Documents shall be documented by the use of DSA Construction Change Document (CCD) forms. CCD forms shall be submitted to DSA by the Architect.
 - 1. Refer to Division 01 Section "Contract Modification Procedures" for additional information regarding DSA CCD's.
- B. DSA Hourly Fee Services: Changes to DSA approved Construction Documents shall be reviewed by DSA and shall be subject to DSA Hourly Fee Services for review at a rate established by DSA IR A-30. Charges will be made to the Owner by DSA.
 - 1. Hourly Rate: Rate per hour as established by DSA IR A-30, latest edition.

- C. Bidder's Responsibility: Prior to bidding, where a bidder's request for substitution or similar action results in a change requiring DSA Hourly Fee Services, bidder shall submit a deposit to the Architect for reimbursement for DSA Hourly Fee Services. The deposit amount shall be established by the Architect, a minimum of one hour of DSA Hourly Fee Services (hourly rate as established by DSA IR A-30) will not be refundable. Deposits shall be made payable to the Owner.
- D. Contractor's Responsibility: When a contractor's action results in a change requiring DSA Hourly Fee Services, charges by DSA to the Owner will be deducted from the Contract Sum and the Architect will issue a Change Order on a quarterly basis to adjust the Contract Sum.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 012613
REQUEST FOR INFORMATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative provisions for preparation, submittal and response to Contractor's Request for Information (RFI's) during construction of project.

1.3 DEFINITIONS

- A. RFI, Request for Information: Request from Contractor seeking information required by or clarification of the Contract Documents.

1.4 SUBMITTALS

- A. RFI Submittals: Submit RFI's via email as PDF electronic files; include attachments in PDF electronic file format.

1.5 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
 - 1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
 - 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
 2. Project number.
 3. Date.
 4. Name of Contractor.
 5. Name of Architect
 6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Form: Use RFI form included at end of this Section or form acceptable to Architect. Upon request from the Contractor, the form at the end of this section will be made available in WORD format from the Architect.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond.
1. Allow 10 working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
 2. Architect will not act on any RFI's until 7 days following the submission of the Schedule of Values per Division 01 Section "Payment Procedures."
 3. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 4. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
 5. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."

- a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.
- 6. Distribution: The Architect shall distribute one electronic copy of each completed RFI review to the Contractor and the Owner.
- E. Regulatory Requirements: Architect's responses that modify the Contract Documents affecting Structural Safety, Fire and Life Safety, and/or Access Compliance shall be submitted to the Division of the State Architect for review and approval.
 - 1. Changes to DSA approved Construction Documents shall be as specified in Division 01 Section "Contract Modification Procedures."
- F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the sequential RFI number. Submit log weekly unless otherwise directed in writing by Architect. Include the following:
 - 1. Project name.
 - 2. Name and address of Contractor.
 - 3. Name and address of Architect.
 - 4. RFI number including RFIs that were returned without action or withdrawn.
 - 5. RFI description.
 - 6. Date the RFI was submitted.
 - 7. Date Architect's response was received.
- G. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within 7 days if Contractor disagrees with response.
- H. Contractor's Expense for RFI's: Architect will review and respond to legitimate RFI's at no additional cost to the Contractor. RFI's determined by the Architect to be flagrant or unnecessary will have the expense for the Architect's time paid by the Owner with the amount being deducted from the Contract Sum. The expense will be based on an hourly rate in accordance with the Architect's standard hourly rate schedule in effect at the time the work is performed with a minimum of one hour for each flagrant or unnecessary RFI.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

(REQUEST FOR INFORMATION form included on the following page)

**TETER**

ARCHITECTS ENGINEERS CONNECTED

REQUEST FOR INFORMATION

Project:**Universal TK Classroom****TETER Project No. 22-12390**

1200 Discovery Drive Suite 160

Bakersfield, CA, 93309

Client Project No.

DSA File No.

DSA Appl No.

Date:

Request for Information No. _____

☐ Deviation from Contract Docs☐ Correction of Non-Compliant Work**From:****Name****Company Name****To:****Name***Title or Department***TETER**

123 Street Address

City, State, Zip

Drawing: _____

Detail No. _____

Specification: _____

Addendum: _____

Respond by:

Priority

(Low) 1 2 3 4 5 (High)

Subject: _____

Information Requested:

Contractor's Recommendation:

Probable Cost Effect: _____ Probable Time Effect: _____

Architect's Response:

Disclaimer

The work shall be carried out in accordance with the above supplemental instructions pursuant the Contract Documents, without change in the Contract Sum or Contract Time. Proceeding with the Work, according to these instructions, indicates your acknowledgement that there will be no change in the Contract Sum or Contract Time. If the Contractor considers that this response requires a change in the Contract Sum or Contract Time, the Contractor shall not proceed with this Work and shall promptly submit an item proposal.

SECTION 012900
PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections:
 - 1. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 2. Division 01 Section "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.
 - 3. Division 01 Section "Submittal Procedures" for administrative requirements governing the preparation and submittal of the submittal schedule.

1.3 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's construction schedule.
 - 1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with continuation sheets.
 - b. Submittal schedule.
 - c. Items required to be indicated as separate activities in Contractor's construction schedule.

2. Submit the Schedule of Values to Architect at earliest possible date but no later than 7 days before the date scheduled for submittal of initial Applications for Payment.
 - a. Architect will not act on any RFI's, Post-Bid Substitutions, and/or changes to the project scope, cost, or schedule until 7 days following the submission of the Schedule of Values.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
 1. Identification: Include the following Project identification on the schedule of values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 2. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
 - 1) Labor.
 - 2) Materials.
 - 3) Equipment.
 3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of 5 percent of Contract Sum.
 - a. Include separate line items under Contractor and principal subcontracts for project closeout requirements in an amount totaling 5 percent of the Contract Sum and subcontract amount.
 4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

- a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.
- 6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
- 7. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
- 8. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
 - 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment application shall be as indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
 - 1. If dates and periods are not indicated in the Agreement between Owner and Contractor at time of bidding, the date for Application for Payment shall be established by the Owner to correspond with the Owner's administrative procedures in order to allow for processing and approval of Application for Payment. The period of construction work covered by each Application for Payment shall be one month.
 - 2. Submit draft copy of Application for Payment 7 days prior to due date for review by Architect.
- C. Application for Payment Forms: Use forms acceptable to Architect and Owner for Applications for Payment. Submit forms for approval with initial submittal of schedule of values.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
 4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 3. Provide summary documentation for stored materials indicating the following:
 - a. Materials previously stored and included in previous Applications for Payment.
 - b. Work completed for this Application utilizing previously stored materials.
 - c. Additional materials stored with this Application.
 - d. Total materials remaining stored, including materials with this Application.
- F. Transmittal: Submit 6 signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. When an application shows completion of an item, submit conditional final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.

- H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of values.
 3. Contractor's construction schedule (preliminary if not final).
 4. Submittal schedule (preliminary if not final).
 5. List of Contractor's staff assignments.
 6. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 7. Initial progress report.
 8. Report of preconstruction conference.
- I. Application for Payment at Substantial Completion: After issuance of the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portions of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Updated final statement, accounting for final changes to the Contract Sum.
 3. Evidence that claims have been settled.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013113
PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General project coordination procedures.
 - 2. Administrative and supervisory personnel.
 - 3. Coordination drawings.
- B. Related Sections:
 - 1. Division 01 Section "Project Meetings" for project meetings.
 - 2. Division 01 Section "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
 - 3. Division 01 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 4. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.
 - 5. Section 019113 "General Commissioning Requirements" for coordinating the Work with Owner's Commissioning Authority.

1.3 SUBMITTALS

- A. List of Key Personnel Names: Within 15 calendar days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses, cellular telephone numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
 - 1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.
- B. Coordination Drawings:

1. Initial Submittal: Submit digital PDF document of each coordination drawing for each condition where Coordination Drawings are required.
2. Project Closeout:
 - a. Submit 3 printed "Record" copies of each coordination drawing for each condition where Coordination Drawings are required.
 - b. Submit "Record" electronic coordination drawing files.

1.4 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 1. Preparation of Contractor's construction schedule.
 2. Preparation of the schedule of values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Preinstallation conferences.
 7. Project closeout activities.
 8. Startup and adjustment of systems.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.5 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity. Coordination Drawings shall include the work of multiple trades on the same drawing. Where applicable, provide coordination drawings for the following:
1. Utility connections for building services.
 2. Utility connections for equipment.
 3. The crossing of multiple underground utilities.
 4. Equipment installations and required service space with adjacent construction.
 5. Work above ceilings including but not limited to lighting fixtures, ductwork, fire sprinkler piping, mechanical equipment, and building structure.
- B. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
1. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 2. Coordinate the addition of trade-specific information to the coordination drawings in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 3. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 4. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 5. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 6. Indicate required installation sequences.
 7. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
 8. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
 9. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.

- c. Panel board, switchboard, switchgear, transformer, busway, generator, and motor-control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
- 10. Fire-Protection System: Show the following:
 - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
- C. Coordination Drawings: Where Project conditions necessitate coordination drawings, provide coordination drawings as follows:
 - 1. Overhead Work and Work Above Finished Ceilings: Indicate framing for support of ceiling and wall systems, conduit and piping runs, plumbing, mechanical, and electrical equipment, and related Work. Locate components to accommodate layout of light fixtures indicated on Drawings. Show the work of each trade including, but not limited to, pipe runs, mechanical ductwork, cable trays, conduit runs, and bracing and supports.
 - a. Indicate locations of all dampers, valves, cleanouts and other devices requiring human access for maintenance and repair. Where access panels are required, show locations and indicate size.
 - b. Show the height above finish floor each item, demonstrating sufficient space for installation and maintenance. Indicate sizes of ducts, piping and similar items.
 - c. Layout of work shall be done in such a manner to avoid conflicts between the work of different trades, finish ceiling heights, soffits, light fixtures or other finish work at ceilings and soffits.
 - d. Should unavoidable conflicts occur that affect finish ceiling and soffit heights, methods of installations, methods of construction or means of accessibility, the contractor shall clearly identify each location for review by the Architect.
 - 2. Equipment Rooms and Outdoor Service Yards: Show work above and below grade including mechanical, plumbing, fire protection, fire alarm, and electrical equipment, and related supports, accessories, and utility connections. Include the following information:
 - a. Equipment: Show equipment and locations, utility connections, and working and service clearances.
 - b. Utilities: Show above and below grade utilities; indicate heights and below grade elevations, sizes of piping and conduit, dimensions between utilities and between utilities and other obstructions including concrete footings for other work. Show locations of all shut-off and isolation valves, cleanouts, filters, and other devices requiring human access for maintenance and repair.
 - c. Enclosures: Show limits of enclosure including walls, doors, fences, and gates; confirm door and gate access width for equipment.
 - d. Dimensions: Indicate dimensions as appropriate to insure adequate clearance will be provided for installation, service, and operation of

equipment; include horizontal and vertical dimensions between utilities to insure clearance for installation of utilities. Include vertical dimension(s) of equipment and distances to overhead obstructions where applicable.

3. Roof Mounted Equipment: Show equipment that will be located on the roof, include the following:
 - a. Equipment locations and horizontal distances between equipment.
 - b. Locations of roof penetrations, sizes of penetrations, and indicate the horizontal distance between penetrations and roof mounted equipment.
 - c. Pipe and conduit runs including locations and type(s) of supports.
 - d. Distance between all roof mounted equipment and roof drainage features. Equipment shall be located so as to not obstruct roof drainage; provide at least 24 inches between equipment platforms and valleys formed by the intersection of roof planes and crickets.
 4. Underground Site Utilities and Utilities Below Slabs on Grade within Building Areas: Where underground utilities cross other utilities, penetrate footings, underground structures or other obstructions; show the work that will be placed underground; include the following information:
 - a. Indicate types and sizes of utility piping and elevations below grade.
 - b. Show footings and other underground structures; where unavoidable conflicts occur between underground structures/footings and utilities, indicate depths below grade and clearly identify locations for sleeving for review by Architect.
 5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
- D. Coordination Drawing Digital Data Files: Prepare coordination digital data files according to the following requirements:
- E. Coordination Drawing Digital Data Files: Submit digital coordination drawing files using PDF format.
1. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
 - a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
 - b. Digital Data Software Program: Drawings are available in PDF format.
 - c. Contractor shall execute a data licensing agreement as required by Division 01 Section "Use of Architect's Electronic files."
- F. Review: Architect will review coordination drawings to confirm that, in general, the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not

being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.

- G. Resolution of conflicts occurring in the Work after Coordination Drawings have been prepared shall be the responsibility of the Contractor. Contractor shall bear all costs associated with resolution of conflicts including additional contract time, architectural and engineering services fees, and loss of use to the Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013119
PROJECT MEETINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative provisions for project meetings, including, but not limited to, the following:
 - 1. Preconstruction conferences.
 - 2. Preinstallation conferences.
 - 3. Progress meetings.
 - 4. Project Closeout Conference.
- B. Related requirements include but are not limited to the following:
 - 1. Division 01 Sections as applicable to project management.

1.3 PRECONSTRUCTION CONFERENCE

- A. Preconstruction Conference: Schedule a preconstruction conference before starting construction at the project site, at a time convenient to the Owner, Inspector of Record, and the Architect, but no later than 14 days after execution of the Agreement. Hold the conference at the Project Site or another convenient location. Owner and Architect to conduct the meeting to review responsibilities and personnel assignments.
- B. Attendees: Authorized representatives of the Owner, Architect, and their consultants; the Contractor and its superintendent shall attend the conference. Major subcontractors and other concerned parties shall be invited to attend the conference, but attendance is not mandatory. Participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.
- C. Agenda: Discuss items of significance that could affect progress, including but not limited to the following:
 - 1. Tentative construction schedule.
 - 2. Critical work sequencing and long-lead items.
 - 3. Designation of key personnel and their duties.
 - 4. Lines of communication.
 - 5. Procedures for processing field decisions and Change Orders.
 - 6. Procedures for processing Applications for Payment.

7. Procedures for RFI's.
8. Procedures for testing and inspection.
9. Submittal procedures.
10. Sustainability requirements including construction waste management and disposal.
11. Preparation of record documents.
12. Use of the premises.
13. Work restrictions and working hours.
14. Temporary facilities and controls.
15. Parking availability.
16. Office, work, and storage areas.
17. Equipment deliveries and priorities.
18. Safety procedures and first aid.
19. Security.
20. Housekeeping.
21. Owner's alcohol, drug and tobacco policy.

- D. Minutes: Contractor shall record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, Inspector of Record, and Architect, within three days of the meeting.

1.4 PREINSTALLATION CONFERENCES

- A. Preinstallation Conferences: Conduct a preinstallation conference at the Project Site before each construction activity that requires coordination with other construction.
- B. Attendees: Installers and representatives of manufacturers and fabricators involved in or affected by the installation, and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise the Owner, Inspector of Record, and Architect of scheduled meeting dates.
- C. Agenda: Review the progress of other construction activities and preparations for the particular activity under consideration at each preinstallation conference, including requirements for the following:
1. Contract Documents.
 2. Options.
 3. Related RFI's, Proposal Requests, and Change Orders.
 4. Purchases.
 5. Deliveries.
 6. Submittals.
 7. Sustainability requirements.
 8. Possible conflicts.
 9. Compatibility problems.
 10. Time schedules.
 11. Weather limitations.
 12. Manufacturer's written instructions.
 13. Warranty requirements.
 14. Compatibility of materials.
 15. Acceptability of substrates.

16. Temporary facilities.
 17. Space and access limitations.
 18. Regulations of authorities having jurisdiction.
 19. Safety.
 20. Testing and inspecting requirements.
 21. Required performance results.
 22. Recording requirements.
 23. Protection.
 24. Record significant conference discussions, agreements, disagreements, including corrective measures and actions.
 25. Promptly distribute minutes of the meeting to each party present and to other parties requiring information, including the Owner and the Architect.
 26. Do not proceed with the installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of Work and reconvene the conference at the earliest feasible date.
- D. Minutes: Contractor shall record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, Inspector of Record, and Architect, within three days of the meeting.

1.5 PROGRESS MEETINGS

- A. Progress Meetings: Conduct progress meetings at the Project Site at regular intervals to be established by the Architect, Inspector of Record, Contractor, and Owner.
1. Coordinate dates of meetings with preparation of the payment request.
- B. Attendees: In addition to representatives of the Owner and Architect, each subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.
- C. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the status of the Project. Review proposed percentages of work completed for current months progress payment.
1. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

2. Review the present and future needs of each entity present, including the following:

- a. Interface requirements.
- b. Sequence of operation.
- c. Status of submittals.
- d. Status of Sustainability documentation.
- e. Deliveries.
- f. Off-site fabrication.
- g. Access.
- h. Site utilization.
- i. Temporary facilities and services.
- j. Status of correction of deficient items.
- k. Field observations.
- l. Status of RFI's, Proposal Requests, and Change Orders.
- m. Progress cleaning.
- n. Quality and work standards.
- o. Documentation of information for payment requests.
- p. Request for Information

- D. Minutes: Contractor shall record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, Inspector of Record, and Architect, within three days of the meeting.

- E. Schedule Updating: Revise the Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue the revised schedule to the Owner, the Architect, and all other parties involved in the project. Failure to revise and keep current the Contractor's construction schedule may be grounds for returning Application for Payment unreviewed.

1.6 PROJECT CLOSEOUT CONFERENCE

- A. Project Closeout Conference: Conduct a project closeout conference, at a time convenient to Owner and Architect, but not less than 90 days prior to the scheduled date of Substantial Completion. Conduct the conference to review requirements and responsibilities related to Project closeout.

- B. Attendees: Authorized representatives of Owner, Architect and their consultants; Contractor and its superintendent. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.

- C. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

1. Preparation of record documents.
2. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
3. Submittal of written warranties.
4. Requirements for completing Sustainability documentation.
5. Requirements for preparing operations and maintenance data.

6. Requirements for delivery of material samples, attic stock, and spare parts.
 7. Requirements for demonstration and training.
 8. Preparation of Contractor's punch list.
 9. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 10. Submittal procedures.
 11. Responsibility for removing temporary facilities and controls.
- D. Minutes: Contractor shall record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, Inspector of Record, and Architect, within three days of the meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013200
CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Contractor's construction schedule.
 - 2. Special reports.
- B. Related Sections include but are not limited to the following:
 - 1. Division 01 Section "Submittal Procedures" for submitting schedules and reports.
 - 2. Division 01 Section "Quality and Testing Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of the Project.
- C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- D. Event: The starting or ending point of an activity.
- E. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- F. Milestone: An activity, which occurs in an instant and thus has no time duration, a key or critical point in time for reference or measurement.

1.4 SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
1. Working electronic copy of schedule file, where indicated.
 2. PDF electronic file.
- B. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
1. Submit electronic copy of schedule labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.
- D. Construction Schedule Updating Reports: Submit with Applications for Payment.
- E. Special Reports: Submit at time of unusual event.

1.5 QUALITY ASSURANCE

- A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Meetings." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:
1. Discuss constraints, including
 2. Review delivery dates for Owner-furnished products.
 3. Review schedule for work of Owner's separate contracts.
 4. Review submittal requirements and procedures.
 5. Review time required for review of submittals and resubmittals.
 6. Review requirements for tests and inspections by independent testing and inspecting agencies.
 7. Review time required for Project closeout and Owner startup procedures, including commissioning activities.
 8. Review and finalize list of construction activities to be included in schedule.
 9. Review procedures for updating schedule.

1.6 COORDINATION

- A. Coordinate preparation and processing of schedules with performance of construction activities and with scheduling of separate contractors.
- B. Coordinate Contractor's construction schedule with the submittal schedule and other required schedules.
 - 1. Secure time commitments for performing critical elements of the Work from entities involved.
 - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
 - 1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
 - 2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - 3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
 - 4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
 - 5. Completion: Indicate completion in advance of date established for completion, and allow time for Architect's administrative procedures necessary for certification of completion.
 - 6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
 - 1. Phasing: Arrange list of activities on schedule by phase.
 - 2. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.

3. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 4. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 5. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Partial occupancy before Substantial Completion.
 - e. Use of premises restrictions.
 - f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control.
 6. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Submittals.
 - b. Purchases.
 - c. Mockups.
 - d. Fabrication.
 - e. Sample testing.
 - f. Deliveries.
 - g. Installation.
 - h. Tests and inspections.
 - i. Adjusting.
 - j. Curing.
 - k. Startup and placement into final use and operation.
 7. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Temporary enclosure and space conditioning.
 - c. Permanent space enclosure.
 - d. Completion of mechanical installation.
 - e. Completion of electrical installation.
 - f. Substantial Completion.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.
- E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis to demonstrate the effect of the proposed change on the overall project schedule.

- F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
1. Unresolved issues.
 2. Unanswered Requests for Information.
 3. Rejected or unreturned submittals.
 4. Notations on returned submittals.
 5. Pending modifications affecting the Work and Contract Time.
- G. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
- H. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

- A. General: Prepare network diagrams using AON (activity-on-node) format.
- B. CPM Schedule: Prepare Contractor's construction schedule using a time-scaled CPM network analysis diagram for the Work.
1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 30 days after date established for the Notice to Proceed.
 - a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.
 2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
 3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
 4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.
- C. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Prepare a skeleton network to identify probable critical paths.
1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

- a. Preparation and processing of submittals.
 - b. Mobilization and demobilization.
 - c. Purchase of materials.
 - d. Delivery.
 - e. Fabrication.
 - f. Utility interruptions.
 - g. Installation.
 - h. Work by Owner that may affect or be affected by Contractor's activities.
 - i. Testing
 - j. Commissioning.
 - k. Punch list and final completion.
 - l. Activities occurring following final completion.
- 2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
- 3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
- 4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
 - a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
- D. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.
- E. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
 - 1. Contractor or subcontractor and the Work or activity.
 - 2. Description of activity.
 - 3. Main events of activity.
 - 4. Immediate preceding and succeeding activities.
 - 5. Early and late start dates.
 - 6. Early and late finish dates.
 - 7. Activity duration in workdays.
 - 8. Total float or slack time.
 - 9. Average size of workforce.
- F. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
 - 1. Identification of activities that have changed.
 - 2. Changes in early and late start dates.
 - 3. Changes in early and late finish dates.
 - 4. Changes in activity durations in workdays.

5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

2.3 SPECIAL REPORTS

- A. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.
 1. Submit special reports directly to Owner within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare a detailed report. Submit with a request for information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At progress meetings, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 3. As the Work progresses, indicate final completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Architect, Owner, Inspector of Record, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
 1. Post copies in Project meeting rooms and temporary field offices.
 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION

SECTION 013233
PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Concealed Work photographs.
 - 3. Periodic construction photographs.
- B. Related Sections:
 - 1. Division 02 Section "Selective Demolition" for photographic documentation before building demolition operations commence.
 - 2. Division 31 Section "Site Clearing" for photographic documentation before site clearing operations commence.

1.3 SUBMITTALS

- A. Digital Photographs: Submit image files at monthly intervals coinciding with the cutoff date associated with each Application for Payment.
 - 1. Submit photos by uploading to Project FTP site. Include copy of key plan indicating each photograph's location and direction.
 - 2. Identification: Provide the following information with each image description:
 - a. Date photograph was taken.
 - b. Description of location, vantage point, and direction.
 - c. Unique sequential identifier keyed to accompanying key plan.
 - 3. Key Plan: Include key plan of Project site and/or building(s) indicating location and direction of each photograph or group of photographs. Include same information as corresponding photographic documentation.

1.4 PHOTOGRAPHIC FORMATS AND MEDIA

- A. Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of 12 megapixels, and at an image resolution of not less than 3200 by 2400 pixels. Use flash in low light levels or backlit conditions.
- B. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
- C. File Names: Name media files with location or area photograph was taken, date, and sequential numbering suffix.

1.5 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs with maximum depth of field and in focus.
- B. Key Plan: Maintain key plan with each set of construction photographs that identifies each photographic location.
- C. Preconstruction Photographs: Before commencement of the Work, take photographs of Project site and adjacent areas, including existing items to remain during construction, from different vantage points, as necessary to record preconstruction conditions.
 - 1. Take additional photographs as needed to record settlement or cracking of existing adjacent structures, pavements, and improvements.
- D. Periodic Construction Photographs: Take photographs to record construction progress at not greater than bi-weekly intervals with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.
- E. Concealed Work Photographs: Before proceeding with installing work that will conceal other work, take photographs sufficient in number, with annotated descriptions, to record nature and location of concealed Work, including, but not limited to, the following:
 - 1. Underground utilities.
 - 2. Underslab services.
 - 3. Piping.
 - 4. Electrical conduit.
 - 5. Waterproofing and weather-resistant barriers.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013300
SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Submittal schedule requirements.
- 2. Administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- 3. Cost for multiple resubmittals.

B. Related Sections:

- 1. Division 01 Section "Payment Procedures" for submitting Applications for Payment and the schedule of values.
- 2. Division 01 Section "Project Management and Coordination" for submitting coordination drawings.
- 3. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
- 4. Division 01 Section "Photographic Documentation" for submitting preconstruction photographs, periodic construction photographs, and final completion construction photographs.
- 5. Division 01 Section "Quality and Testing Requirements" for submitting test and inspection reports, and schedule of tests and inspections.
- 6. Division 01 Section "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
- 7. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
- 8. Division 01 Section "Project Record Drawings" for submitting record Drawings.
- 9. Division 01 Section "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 SUBMITTAL SCHEDULE

- A. Submittal Schedule: Submit as a submittal, a list of submittals arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or modifications to submittals

noted by the Architect and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal: Submit concurrently with start-up construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Name of subcontractor.
 - d. Description of the Work covered.
 - e. Scheduled date for Architect's final release or approval.
 - f. Scheduled dates for purchasing.
 - g. Scheduled date of fabrication.
 - h. Scheduled dates for installation.
 - i. Activity or event number.

1.4 SUBMITTAL FORMAT AND PROCEDURES

- A. General: Prepare and submit submittals required by individual Specification Sections.
 1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.
 2. Architect will not review submittals received from sources other than the Contractor.
- B. Electronic Digital Submittals: Prepare submittals as PDF package unless otherwise indicated, incorporate complete information into each PDF file, name PDF file with submittal number, and transmit submittal package to Architect via email.
 1. Paper Submittals: Where paper submittals are requested, necessary, or required in lieu of electronic submittals, prepare submittals in paper form and deliver to Architect. Transmit each paper submittal using transmittal form. Comply with the following:
 - a. Place a permanent label or title block on each submittal item for identification; include name of firm or entity that prepared submittal.
 - b. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.

- c. Number of Copies: Submit not less than three paper copies of each submittal unless otherwise indicated. Architect will return two copies.
 - d. Transmittal for Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using transmittal form.
- C. Submittal Cover Page Information: Include the following information on the submittal cover page for each submittal:
 - 1. Project name.
 - 2. Date.
 - 3. Name of Architect.
 - 4. Name of Contractor.
 - 5. Name of firm or entity that prepared submittal.
 - 6. Names of subcontractor, manufacturer, and supplier.
 - 7. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier and alphanumeric suffix for resubmittals.
 - 8. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
 - 9. Drawing number and detail references, as appropriate.
 - 10. Indication of full or partial submittal.
 - 11. Location(s) where product is to be installed, as appropriate.
 - 12. Other necessary identification.
 - 13. Remarks.
 - 14. Signature of transmitter.
 - 15. Contractor's review/approval stamp of size required by contractor, approximately 3 inches by 3 inches, on or beside title block to record Contractor's review and approval.
 - 16. Space for Architect's review stamp of not less than 4 inches wide by 3-1/2 inches high on or beside title block to record Architect's review stamp and action taken by Architect.
- D. Product Options:
 - 1. Clearly identify options requiring selection by Architect.
 - 2. Clearly identify product options required to comply with the Contract Documents.
- E. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.
- F. Field Conditions: Indicate field conditions where applicable to the work associated with the submittal.

- G. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. Coordinate timing of submitting submittals for related parts of the Work specified in different Sections so processing will not be delayed because of need to review related submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- H. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 14 calendar days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 14 calendar days for review of each resubmittal.
 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 calendar days for initial review of each submittal.
 5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 14 calendar days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
 - a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.
- I. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

- J. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- K. Use for Construction: Retain complete copies of submittals on Project site. Use only final submittals that are marked with acceptable notation from Architect's action stamp.

1.5 SUBMITTAL REQUIREMENTS

- A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - 1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
 - 2. Mark each copy of each submittal to show which products and options are applicable.
 - 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 - 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams that show factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 - 5. Submit Product Data before Shop Drawings, and before or concurrently with Samples.
- B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 - 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.

- e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 - 2. Drawing Sheet Size: Except for templates, patterns, and similar full-size Drawings, prepare Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
 - 3. Submit Shop Drawings in PDF format unless otherwise indicated.
- C. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other materials.
- 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 - 2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
 - a. Project name and submittal number.
 - b. Generic description of Sample.
 - c. Product name and name of manufacturer.
 - d. Sample source.
 - e. Number and title of applicable Specification Section.
 - f. Specification paragraph number and generic name of each item.
 - 3. Submit samples in PDF format unless physical samples are required.
 - 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 - 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
 - 6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of

repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

- a. Number of Samples: Submit three (3) sets of Samples. Architect will retain two (2) Sample sets; remainder will be returned.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three (3) sets of paired units that show approximate limits of variations.
- D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 2. Manufacturer and product name, and model number if applicable.
 3. Number and name of room or space.
 4. Location within room or space.
- E. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.
- G. Certificates:
 1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
 2. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
 3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
 4. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

5. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

H. Test and Research Reports:

1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - a. Name of evaluation organization.
 - b. Date of evaluation.
 - c. Time period when report is in effect.
 - d. Product and manufacturers' names.
 - e. Description of product.
 - f. Test procedures and results.
 - g. Limitations of use.

1.6 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.

- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file(s) of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

1.7 CONTRACTOR'S REVIEW

- A. Contractor's Review of Submittals: Contractor shall review each submittal and check for completeness, coordination with other Work of the Contract, and compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
 - 1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.
 - 2. Contractor's approval shall certify the following actions by the Contractor:
 - a. Field measurements have been determined, verified, and indicated on submittal.
 - b. Field conditions have been verified and coordinated with Work associated with the submittal.
 - c. The Work associated with the submittal is in conformance with the Contract Documents.
 - d. Work being performed by various subcontractors and trades is coordinated with Work associated with the submittal including work being performed by others for the Owner.
 - e. Deviations from the Contract Documents are identified and notes.

1.8 ARCHITECT'S REVIEW

- A. Architect's Review and Action: Architect will review each submittal, indicate corrections or revisions required, mark with an action stamp indicating one of the following actions, and return it.
 - 1. Reviewed: Final unrestricted release, work may proceed, provided it complies with the Contract Documents.
 - 2. Furnish as Corrected: Final but restricted release, work may proceed, provided written confirmation is delivered to Architect by Contractor that installed work complied with notations and corrections on submittal and with Contract Documents.

3. Revise and Resubmit: Returned for resubmittal, do not proceed with work. Revise submittal in accordance with notations thereon, and resubmit without delay to obtain an acceptable action marking. Do not allow submittals with this marking (or unmarked submittals where a marking is required) to be used in connection with performance of the Work.
 4. Rejected: Submittal content varies from the Contract Documents and is not acceptable for use on the Project, do not proceed with work. Revise submittal in accordance with notations thereon, and resubmit without delay to obtain an acceptable action marking. Do not allow submittals with this marking (or unmarked submittals where a marking is required) to be used in connection with performance of the Work.
- B. Non-conforming Submittals: The following are considered non-confirming submittals and will not be reviewed by the Architect.
1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.
 2. Architect will not review submittals received from sources other than the Contractor.
 3. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
 4. Incomplete submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- C. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

1.9 COST FOR MULTIPLE RESUBMITTALS

- A. Contractor's initial submittal and one resubmittal are included in the Architect's Construction Administration services to the Owner. Architect's services for review of subsequent resubmittals will be charged to the Owner at the Architect's current billing rate, and the Owner will deduct the charges from the Contract Amount by a change order.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 014000
QUALITY AND TESTING REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control including but not limited to the following:
 - 1. General quality requirements.
 - 2. Reports and documents.
 - 3. Contractor's responsibilities for testing and inspections.
 - 4. Project Inspector.
 - 5. Testing Agency.
 - 6. Governing agency testing and inspection requirements.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Requirements:
 - 1. Divisions 02 through 33 Sections for specific test and inspection requirements.
- D. DSA Testing and Inspection Requirements for School Construction: The following requirements are per the Division of the State Architect (DSA); requirements indicated below may be repeated elsewhere in this Section or in other Sections of the Project Manual, where conflicts occur, the most stringent condition shall apply.
 - 1. Tests:

- a. The owner will select an independent testing laboratory, approved by DSA, to conduct the tests. Selection of the material required to be tests shall be by the laboratory or the Owner's representative and not by the Contractor.
 - b. The Contractor shall notify the Owner's representative a sufficient time in advance of the manufacture of material to be supplied by him under the Contract Documents, which must by terms of the Contract be tested, in order that the Owner may arrange for the testing of same at the source of supply.
 - c. Any material shipped by the Contractor from the source of supply prior to having satisfactorily passed such testing and inspection or prior to the receipt of notice from said representative that such testing and inspection will not be required shall not be incorporated in the job.
 - d. The Owner will pay testing laboratory costs for all tests and inspections, but may be reimbursed by the Contractor for such costs under the Contract documents.
2. Tests Reports: One copy of all test reports shall be forwarded to the Division of the State Architect by the testing agency. Such reports shall include all the tests made, regardless of whether such tests indicate that 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. The reports shall show that the material or materials were sampled and tested in accordance with the requirements of Title 24 and with the approved specifications. Test reports shall show the specified design strength. They shall also state defiantly whether or not the material or materials tested comply with requirements.
 3. Verification of Test Reports: Each testing agency shall submit to the Division of the State Architect a verified report in duplicate covering all the tests which are required to be made by that agency during the progress of the project. Such report shall be furnished each time that work on the project is suspended, covering the tests up to that time, and at the completion of the project, covering all tests.
 4. Inspection by the Owner:
 - a. The Owner and his representatives shall at all times have access for the purpose of inspection to all parts of the work and to the shops wherein the work is in preparation, and the Contractor shall at all times maintain proper facilities and provide safe access for such inspection.
 - b. The Owner 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 charge to the Owner. If the Contractor does no correct such rejected work within a reasonable time, fixed by written notice, the Owner may correct same and charge expense to the Contractor.
 - c. Should it be considered necessary or advisable by the Owner at any time before final acceptance of the entire work to make an examination of the 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 the fault of the Contractor or his subcontractor, he shall defray all expenses of such examinations and of satisfactory reconstruction. 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 shall be allowed the Contractor.

5. Inspector – Owner's:

- a. An Inspector employed by the Owner, and approved by DSA, in accordance with the requirements of the California Code of Regulations, Title 24 will be assigned to the work. His duties are specifically defined in Title 24, Part I, Sec. 4-342.
- b. The work of construction in all stages of progress shall be subject to the personal continuous observation of the Inspector. He shall have free access to any or all parts 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 materials. Inspection of the work shall not relieve the Contractor from any obligation to fulfill this contract.

6. Inspector – Owner – Field Office: The Contractor shall provide for the use of the Owner's Inspector a temporary office to be located as directed by the Inspector and to be maintained until removal is authorized by the Owner. This office shall of substantial water proof construction with adequate natural light and ventilation by means of stock design windows. The door shall have a lock. A table satisfactory for the study of plans and two chairs shall be provided by the Contractor. The Contractor shall provide and pay for adequate electric lights, private local telephone service with a loud exterior bell, and adequate heat for this field office until the completion of the Contract.

1.3 DEFINITIONS

- A. Experienced: When used with an entity or individual, "experienced," unless otherwise further described, means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, subcontractor, or sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
 1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).
- D. Mockups: Full-size physical assemblies that are constructed either as freestanding temporary built elements or as part of permanent construction. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to

demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Laboratory Mockups: Full-size physical assemblies constructed and tested at testing facility to verify performance characteristics.
 2. Integrated Exterior Mockups: Mockups of the exterior envelope constructed on-site as freestanding temporary built elements or as indicated in-place portions of permanent construction, consisting of multiple products, assemblies, and subassemblies, with cutaways enabling inspection of concealed portions of the Work.
 - a. Include each system, assembly, component, and part of the exterior wall and/or roof to be constructed for the Project. Colors of components shall be those selected by the Architect for use in the Project.
 3. Product Mockups: Mockups that may include multiple products, materials, or systems specified in a single Section.
 4. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.
- E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.
- F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- G. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- H. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.
- I. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- J. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.4 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Statement: Submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.5 CONFLICTING REQUIREMENTS

- A. Referenced Standards: 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. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.6 INFORMATIONAL SUBMITTALS

- A. Reports: Prepare and submit certified written reports and documents as specified.

1.7 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Reports shall be prepared by the person performing the testing and inspecting. Include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, telephone number, and email address of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.

7. Identification of product and Specification Section.
 8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.
- B. Governing Agency Verified Reports: Complete and submit Verified Reports as required by the Division of the State Architect and the 2019 California Administrative Code, Section 4-336. Reports are required to be completed by Architect, Architect's consulting Engineers, Owner's Project Inspector, Contractor, and Testing Agency.
1. Form:
 - a. DSA form DSA-6C for Contractor.
 - b. DSA form DSA-6PI for Project Inspector.
 - c. DSA form DSA-6A/E for Architect and Architect's consulting Engineers.
- C. Manufacturer's Technical Representative's Field Reports: Provide written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Reports shall be prepared by Manufacturer's technical representative performing the testing and inspecting. Include the following:
1. Name, address, telephone number, and email address of technical representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- D. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Reports shall be prepared by Factory-authorized service representative performing the testing and inspecting. Include the following:
1. Name, address, telephone number, and email address of factory-authorized service representative making report.
 2. Statement that equipment complies with requirements.
 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 4. Statement whether conditions, products, and installation will affect warranty.
 5. Other required items indicated in individual Specification Sections.

- E. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.8 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- 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. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.
- 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. 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.
- E. Professional Engineer Qualifications: A professional engineer who is legally licensed to practice in the state where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- G. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect

installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

- I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - f. When testing is complete, remove test specimens, assemblies, and mockups; do not reuse products on Project.
 2. Testing Agency Responsibilities: Submit a written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 1. Build mockups of size indicated.
 2. Build mockups in location indicated or, if not indicated, as directed by Architect.
 3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 4. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
 5. Demonstrate the proposed range of aesthetic effects and workmanship.
 6. Obtain Architect's approval of mockups before starting corresponding Work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.
 7. Promptly correct unsatisfactory conditions noted by Architect's preliminary review, to the satisfaction of the Architect, before completion of final mockup.
 8. Approval of mockups by the Architect does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

9. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 10. Demolish and remove mockups when directed unless otherwise indicated.
- K. Integrated Exterior Mockups: Construct integrated exterior mockup as indicated on Drawings or as specified in individual specification Sections. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials. Comply with requirements in "Mockups" Paragraph.
1. Coordinate construction of the mockup to allow observation of air barrier installation, flashings, air barrier integration with fenestration systems, and other portions of the building air/moisture barrier and drainage assemblies, prior to installation of veneer, cladding elements, and other components that will obscure the work.

1.9 PROJECT INSPECTOR

- A. General: Owner will employ a Project Inspector for continuous inspection of the Work. Project Inspector shall be acceptable to Architect and approved by the Division of the State Architect.
1. Project Inspector shall act under the direction of the Architect and shall be subject to supervision by a representative of the Division of the State Architect.
- B. Qualifications for Project Inspector: Qualifications for the Project Inspector shall be as stated in the California Code of Regulations, Title 24, Part 1, 2019 California Administrative Code, Section 4-333.1. Project Inspector shall be DSA certified under one of the following classes:
1. Class 1: May inspect any project.
 2. Class 2: May inspect any project except a project containing one or more new large structures with a primary lateral load resisting system of steel, masonry, or concrete.
 3. Class 3: May inspect projects containing alterations to approved buildings, site placement of relocatable buildings, and construction of minor structures.
 4. Class 4: May inspect site placement of relocatable buildings and associated site work.
- C. Duties of the Project Inspector: Duties of the Project Inspector shall be as stated in the California Code of Regulations, Title 24, Part 1, 2019 California Administrative Code, Sections 4-333(b) and 4-342, and include the following:
1. Provide continuous inspection of the work.
 2. Maintain files and records of approved plans and specifications including addenda and change orders.
 3. Prepare semi-monthly reports of the progress of the work and submit copies to the Architect and the Division of the State Architect.
 4. Notify the Division of the State Architect at the following times:

- a. At the start of construction of the project or restart of construction if work has suspended for a period of 2 or more weeks.
 - b. At least 48 hours in advance of the time when foundation trenches will be complete, ready for footing forms.
 - c. At least 48 hours in advance of the first placement of foundation concrete and 24 hours in advance of any subsequent or significant concrete placement.
 - d. When all work on the project has been suspended for a period of more than 2 weeks.
- 5. Prepare and maintain records of certain phases of construction including but not limited to the following:
 - a. Concrete placing operations. Show date and time of placing concrete and the time and date of removal of forms in each portion of the structure.
 - b. Welding operations. The record shall include identification marks of welders, lists of defective welds, and manner of correction of defects.
- 6. Notify the Contractor, in writing, of any deviations from the approved construction documents.
- 7. Prepare and submit Project Inspector's Verified Report as required by DSA.

1.10 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to conduct tests and inspections required by authorities having jurisdiction. Testing agency shall be acceptable to Architect and the Division of the State Architect. Requirements for tests and testing agency shall be as stated in the California Code of Regulations, Title 24, Part 1, 2019 California Administrative Code, Section 4-335.
 - 1. Costs for testing agency services will be paid by the Owner.
 - 2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be paid by the Owner and the amount will be deducted from the Contract Sum by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
 - 1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 - 2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
7. Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - a. Access to the Work.
 - b. Incidental labor and facilities necessary to facilitate tests and inspections.
 - c. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 - d. Facilities for storage and field curing of test samples.
 - e. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 - f. Security and protection for samples and for testing and inspecting equipment at Project site.
8. 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.
 - a. Schedule times for tests, inspections, obtaining samples, and similar activities.
9. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's Construction Schedule. Update and submit with each Application for Payment.
 - a. Schedule Contents: Include tests, inspections, and quality-control services, including Contractor and Owner-retained services, commissioning activities, and other Project-required services paid for by other entities.
 - b. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.
- C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- D. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct tests and inspections.
 4. Prepare written reports of tests and inspections, state in each report whether tested and inspected Work complies with or deviates from requirements, and submit reports of each test, inspection, and similar quality-control service to Architect, Division of the State Architect, and Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform duties of Contractor.
- E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."
- F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

1.11 TESTS AND INSPECTIONS

- A. Structural Tests and Inspections shall be as specified in Division 02 through 33 Sections for specific materials and as required by form DSA-103 which lists tests and inspections required by DSA as applicable to Project conditions.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
1. Date test or inspection was conducted.
 2. Description of the Work tested or inspected.
 3. Date test or inspection results were transmitted to Architect.
 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

SECTION 014200 REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract. Architect's approval does not release the Contractor from the responsibility to fulfill Contract requirements.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and

effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

- 1. AABC - Associated Air Balance Council; www.aabc.com.
- 2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
- 3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
- 4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
- 5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
- 6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
- 7. ABMA - American Boiler Manufacturers Association; www.abma.com.
- 8. ACI - American Concrete Institute; (Formerly: ACI International); www.abma.com.
- 9. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
- 10. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
- 11. AF&PA - American Forest & Paper Association; www.afandpa.org.
- 12. AGA - American Gas Association; www.aga.org.
- 13. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
- 14. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
- 15. AI - Asphalt Institute; www.asphaltinstitute.org.
- 16. AIA - American Institute of Architects (The); www.aia.org.
- 17. AISC - American Institute of Steel Construction; www.aisc.org.
- 18. AISI - American Iron and Steel Institute; www.steel.org.
- 19. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
- 20. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
- 21. ANSI - American National Standards Institute; www.ansi.org.
- 22. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
- 23. APA - APA - The Engineered Wood Association; www.apawood.org.

24. APA - Architectural Precast Association; www.archprecast.org.
25. API - American Petroleum Institute; www.api.org.
26. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
27. ARI - American Refrigeration Institute; (See AHRI).
28. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
29. ASCE - American Society of Civil Engineers; www.asce.org.
30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
31. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
32. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
33. ASSE - American Society of Safety Engineers (The); www.asse.org.
34. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
35. ASTM - ASTM International; www.astm.org.
36. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
37. AWEA - American Wind Energy Association; www.awea.org.
38. AWI - Architectural Woodwork Institute; www.awinet.org.
39. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
40. AWPA - American Wood Protection Association; www.awpa.com.
41. AWS - American Welding Society; www.aws.org.
42. AWWA - American Water Works Association; www.awwa.org.
43. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
44. BIA - Brick Industry Association (The); www.gobrick.com.
45. BICSI - BICSI, Inc.; www.bicsi.org.
46. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.org.
47. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
48. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bissc.org.
49. CDA - Copper Development Association; www.copper.org.
50. CEA - Canadian Electricity Association; www.electricity.ca.
51. CEA - Consumer Electronics Association; www.ce.org.
52. CFFA - Chemical Fabrics and Film Association, Inc.; www.chemicalfabricsandfilm.com.
53. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
54. CGA - Compressed Gas Association; www.cganet.com.
55. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
56. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
57. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
58. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
59. CPA - Composite Panel Association; www.pbmdf.com.
60. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
61. CRRC - Cool Roof Rating Council; www.coolroofs.org.
62. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
63. CSA - Canadian Standards Association; www.csa.ca.
64. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
65. CSI - Construction Specifications Institute (The); www.csinet.org.

66. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
67. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
68. CWC - Composite Wood Council; (See CPA).
69. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
70. DHI - Door and Hardware Institute; www.dhi.org.
71. ECA - Electronic Components Association; (See ECIA).
72. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
73. ECIA - Electronic Components Industry Association; www.eciaonline.org.
74. EIA - Electronic Industries Alliance; (See TIA).
75. EIMA - EIFS Industry Members Association; www.eima.com.
76. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
77. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
78. ESTA - Entertainment Services and Technology Association; (See PLASA).
79. EVO - Efficiency Valuation Organization; www.evo-world.org.
80. FCI - Fluid Controls Institute; www.fluidcontrolsintitute.org.
81. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
82. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
83. FM Approvals - FM Approvals LLC; www.fmglobal.com.
84. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
85. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; www.floridarroof.com.
86. FSA - Fluid Sealing Association; www.fluidsealing.com.
87. FSC - Forest Stewardship Council U.S.; www.fscus.org.
88. GA - Gypsum Association; www.gypsum.org.
89. GANA - Glass Association of North America; www.glasswebsite.com.
90. GS - Green Seal; www.greenseal.org.
91. HI - Hydraulic Institute; www.pumps.org.
92. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
93. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
94. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
95. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
96. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
97. IAS - International Accreditation Service; www.iasonline.org.
98. IAS - International Approval Services; (See CSA).
99. ICBO - International Conference of Building Officials; (See ICC).
100. ICC - International Code Council; www.iccsafe.org.
101. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
102. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
103. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
104. IEC - International Electrotechnical Commission; www.iec.ch.
105. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
106. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
107. IESNA - Illuminating Engineering Society of North America; (See IES).

108. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
109. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
110. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.okstate.edu.
111. ILI - Indiana Limestone Institute of America, Inc.; www.ili.ai.com.
112. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
113. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
114. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
115. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
116. ISO - International Organization for Standardization; www.iso.org.
117. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
118. ITU - International Telecommunication Union; www.itu.int/home.
119. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
120. LMA - Laminating Materials Association; (See CPA).
121. LPI - Lightning Protection Institute; www.lightning.org.
122. MBMA - Metal Building Manufacturers Association; www.mbma.com.
123. MCA - Metal Construction Association; www.metalconstruction.org.
124. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
125. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
126. MHIA - Material Handling Industry of America; www.mhia.org.
127. MIA - Marble Institute of America; www.marble-institute.com.
128. MMPA - Moulding & Millwork Producers Association; www.wmmpa.com.
129. MPI - Master Painters Institute; www.paintinfo.com.
130. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
131. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
132. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
133. NADCA - National Air Duct Cleaners Association; www.nadca.com.
134. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
135. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
136. NBI - New Buildings Institute; www.newbuildings.org.
137. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
138. NCMA - National Concrete Masonry Association; www.ncma.org.
139. NEBB - National Environmental Balancing Bureau; www.nebb.org.
140. NECA - National Electrical Contractors Association; www.necanet.org.
141. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
142. NEMA - National Electrical Manufacturers Association; www.nema.org.
143. NETA - InterNational Electrical Testing Association; www.netaworld.org.
144. NFHS - National Federation of State High School Associations; www.nfhs.org.
145. NFPA - National Fire Protection Association; www.nfpa.org.
146. NFPA - NFPA International; (See NFPA).
147. NFRC - National Fenestration Rating Council; www.nfrc.org.
148. NHLA - National Hardwood Lumber Association; www.nhla.com.
149. NLGA - National Lumber Grades Authority; www.nlga.org.
150. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).

151. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
152. NRCA - National Roofing Contractors Association; www.nrca.net.
153. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
154. NSF - NSF International; www.nsf.org.
155. NSPE - National Society of Professional Engineers; www.nspe.org.
156. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
157. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
158. NWFA - National Wood Flooring Association; www.nwfa.org.
159. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
160. PDI - Plumbing & Drainage Institute; www.pdionline.org.
161. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
162. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
163. RFCI - Resilient Floor Covering Institute; www.rfci.com.
164. RIS - Redwood Inspection Service; www.redwoodinspection.com.
165. SAE - SAE International; www.sae.org.
166. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
167. SDI - Steel Deck Institute; www.sdi.org.
168. SDI - Steel Door Institute; www.steeldoor.org.
169. SEFA - Scientific Equipment and Furniture Association (The); www.sefalabs.com.
170. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
171. SIA - Security Industry Association; www.siaonline.org.
172. SJI - Steel Joist Institute; www.steeljoist.org.
173. SMA - Screen Manufacturers Association; www.smainfo.org.
174. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
175. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
176. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
177. SPIB - Southern Pine Inspection Bureau; www.spib.org.
178. SPRI - Single Ply Roofing Industry; www.spri.org.
179. SRCC - Solar Rating & Certification Corporation; www.solar-rating.org.
180. SSINA - Specialty Steel Industry of North America; www.ssina.com.
181. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
182. STI - Steel Tank Institute; www.steeltank.com.
183. SWI - Steel Window Institute; www.steelwindows.com.
184. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
185. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
186. TCNA - Tile Council of North America, Inc.; www.tileusa.com.
187. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
188. TIA - Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
189. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
190. TMS - The Masonry Society; www.masonrysociety.org.
191. TPI - Truss Plate Institute; www.tpinst.org.
192. TPI - Turfgrass Producers International; www.turfgrasssod.org.
193. TRI - Tile Roofing Institute; www.tilerroofing.org.

194. UL - Underwriters Laboratories Inc.; www.ul.com.
195. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
196. USAV - USA Volleyball; www.usavolleyball.org.
197. USGBC - U.S. Green Building Council; www.usgbc.org.
198. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
199. WASTEC - Waste Equipment Technology Association; www.wastec.org.
200. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
201. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
202. WDMA - Window & Door Manufacturers Association; www.wdma.com.
203. WI - Woodwork Institute; www.wicnet.org.
204. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
205. WWPA - Western Wood Products Association; www.wwpa.org.

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut für Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
3. ICC - International Code Council; www.iccsafe.org.
4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; www.quicksearch.dla.mil.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
8. FG - Federal Government Publications; www.gpo.gov.
9. GSA - General Services Administration; www.gsa.gov.
10. HUD - Department of Housing and Urban Development; www.hud.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.

18. USP - U.S. Pharmacopeial Convention; www.usp.org.
19. USPS - United States Postal Service; www.usps.com.

D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
5. FS - Federal Specification; Available from DLA Document Services; www.quicksearch.dla.mil.
 - a. Available from Defense Standardization Program; www.dsp.dla.mil.
 - b. Available from General Services Administration; www.gsa.gov.
 - c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org/ccb.
6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

E. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
3. CDHS; California Department of Health Services; (See CDPH).
4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
6. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.
7. TFS; Texas A&M Forest Service; Sustainable Forestry and Economic Development; www.txforestservice.tamu.edu.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 015000
TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
 - 1. Division 01 Section "Summary" for work restrictions and limitations on utility interruptions.
 - 2. Division 01 Section "Multiple Contract Summary" for responsibilities for temporary facilities and controls for projects utilizing multiple contracts.
 - 3. Division 01 Section "Fire Safety During Construction" for fire safety requirements during construction.
 - 4. Division 31 Sections applicable to site clearing, earthwork, and trenching for temporary erosion and sedimentation control.
 - 5. Division 32 Section "Asphalt Paving" for construction and maintenance of asphalt pavement for temporary roads and paved areas.
 - 6. Division 32 Section "Concrete Paving" for construction and maintenance of cement concrete pavement for temporary roads and paved areas.

1.3 USE CHARGES

- A. General: Installation, removal, and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to Owner, Architect, testing agencies, and authorities having jurisdiction.
- B. Water Service from Existing System: Water from Owner's existing water system is available for use; provide connections and extensions of services as required for construction operations.
 - 1. Water service is available for use without metering and without payment of use charges.
 - 2. Electric power service is available for use without metering and without payment of use charges.

1.4 SUBMITTALS

- A. Erosion and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
 - 1. Comply with submittal requirements of Division 31 through 33 Sections as applicable for temporary erosion and sedimentation control plans.

1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 REGULATORY REQUIREMENTS

- A. Regulatory Requirements: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:
 - 1. California Code of Regulations, Title 24, California Code requirements as applicable to the project.
 - 2. Health and safety regulations.
 - 3. Utility company regulations.
 - 4. Police, fire department, and rescue squad rules.
 - 5. Environmental protection regulations.
 - 6. Regional Air Pollution Control District permits and requirements.
 - 7. California Department of Water Resources, Stormwater General Permit for projects with site work area greater than one acre.
 - 8. Comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations," ANSI A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library "Temporary Electrical Facilities."

1.7 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.
- B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Materials for temporary facilities shall be acceptable to Architect, Owner, and Authorities having Jurisdiction (AHJ), shall be appropriate for intended use, and shall comply with governing codes and regulations.
- B. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts. Provide concrete or galvanized-steel bases for supporting posts.
- C. Fencing Windscreen: Polyester fabric scrim with grommets for attachment to chain link fence, size and color as acceptable to, or required by, authorities having jurisdiction.
- D. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.

2.2 TEMPORARY FIELD OFFICE FACILITIES

- A. Contractor's Field Office: Of sufficient size to accommodate needs of Contractor, Owner, Architect, construction personnel office activities, and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:
 - 1. Furniture necessary for use and storage of Project documents including file cabinets, plan tables, plan racks, and bookcases.
 - 2. Conference room or area of sufficient size to accommodate meetings of 10 individuals; furnish with conference table, chairs, and 4-foot square tack and marker boards.
 - 3. Electrical power service, 120-VAC, with no fewer than one duplex receptacle on each wall.
 - 4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 78 deg F.
 - 5. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.
 - 6. Communication Service and Equipment: Equip field office with phone and internet services and equipment adequate for project conditions and for use by Contractor, Architect, and Owner to access Project electronic documents and maintain electronic communications.
 - a. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.
 - b. Equip office with not less than the following:
 - 1) Desktop computer with capabilities compatible with Architect's requirements. Provide external hard drive backup.

- 2) Printer/Copier/Scanner: Single or multiple units as needed to accommodate color printing, photocopying, and scanning.
- B. Project Inspector's Field Office: Contractor shall provide temporary office facilities for the Owner's Project Inspector. Temporary facilities shall be of sufficient size to accommodate the needs of the Project Inspector and associated project records. Project Inspector facilities shall be provided with its own lockable exterior access, if interconnected with Contractor's facilities, a lockable door, controlled from the Project Inspector's side, shall be provided between the spaces. Furnish and equip office as follows:
1. Plan/layout table, 30 by 72 inches minimum.
 2. File cabinets having a total capacity of not less than eight (8) legal size file drawers.
 3. Open shelving/book case, 48 inches minimum in total shelving width.
 4. Desk and Chair.
 5. Plan rack.
 6. Internet service.
 7. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 78 deg F.
 8. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.

2.3 TEMPORARY STORAGE FACILITIES

- A. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
1. Store combustible materials apart from buildings.

2.4 TEMPORARY SANITARY FACILITIES

- A. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use by construction and related administrative personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities. Temporary toilets shall be self-contained, single-occupant units of the chemical, aerated recirculation type; provide units properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material. Use of Owner's sanitary facilities is not permitted.
1. Accessible Sanitary Facilities: Sanitary facilities serving support facilities such as offices, meeting rooms, plan rooms, and serving personnel not directly associated with the actual processes of construction shall be accessible for a person using a wheelchair and shall comply with CBC Section 11B-213 (Ref. CBC 11B-201.4).

2.5 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
 - 1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
 - 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Division 01 Section "Closeout Procedures."

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

- A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

3.2 INSTALLATION, GENERAL

- A. Locate facilities at locations directed by the Owner where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.3 TEMPORARY UTILITIES AND BUILDING HVAC

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
 - 1. Connect temporary sewers to private or municipal system as indicated on Drawings and as directed by authorities having jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
 - 1. Existing Water Service: Where connection to Owner's existing water service is available and allowed, clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- D. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
 - 1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
- E. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 - 1. Where temporary power service is required, install electric power service overhead unless otherwise indicated.
 - 2. Where Owner's existing power service is available, connect temporary service to Owner's existing power source, as directed by Owner, maintain equipment in a condition acceptable to Owner.
- F. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- G. Telephone Service: Provide temporary telephone service of sufficient size, capacity, and power characteristics required for construction operations in common-use facilities for use by all construction personnel. Install WiFi cell phone access equipment for each field office.
 - 1. Post a list of important telephone numbers at a conspicuous location, include the following:
 - a. Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Contractor's emergency after-hours telephone number.

- e. Architect's office.
- f. Engineers' offices.
- g. Owner's office.
- h. Principal subcontractors' field and home offices.

3.4 SUPPORT FACILITIES INSTALLATION

- A. General: Locate storage containers, and other temporary construction and support facilities for easy access in the areas designated and approved by the Architect and Owner. Comply with the following:
 - 1. Do not locate temporary offices, shops, and sheds within 30 feet of building lines.
 - 2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- C. Parking: Parking areas for construction personnel shall be at location(s) as directed by Owner.
- D. Dewatering: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
- E. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
 - 1. Identification Signs: Provide Project identification signs as indicated on Drawings.
 - 2. Project Address Sign: Provide temporary project address sign as required by Authority having Jurisdiction.
 - 3. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 - 4. Maintain and touchup signs so they are legible at all times.
- F. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations.
 - 1. Comply with requirements of the following:
 - a. Authorities having jurisdiction.

- b. Division 01 Section "Execution" for progress cleaning.
 - c. Division 01 Section "Construction Waste Management and Disposal."
- 2. Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F. Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material lawfully.
- G. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 - 1. Comply with work restrictions specified in Division 01 Section "Summary."
- C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements erosion and sedimentation-control Drawings, EPA Construction General Permit, or authorities having jurisdiction, whichever is more stringent.
 - 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree or plant- protection zones.
 - 2. Inspect, repair, and maintain erosion and sedimentation-control measures during construction until permanent vegetation has been established.
 - 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 - 4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

- F. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.
- G. Security Enclosure Fence and Lockup: Before construction operations begin, furnish and install project enclosure fence in a manner that will prevent people and animals from easily entering the site except by entrance gates. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
 - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
- H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- I. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- J. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- K. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
 - 1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
 - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - 3. Develop and supervise an overall fire-prevention and protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.6 MOISTURE AND MOLD CONTROL

- A. General: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
1. Protect porous materials from water damage.
 2. Protect stored and installed material from flowing or standing water.
 3. Keep porous and organic materials from coming into prolonged contact with concrete.
 4. Remove standing water from decks.
 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 2. Keep interior spaces reasonably clean and protected from water damage.
 3. Periodically collect and remove waste containing cellulose or other organic matter.
 4. Discard or replace water-damaged material.
 5. Do not install material that is wet.
 6. Discard, replace, or clean stored or installed material that begins to grow mold.
 7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
- D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective and require replacing.
 - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
 - c. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.7 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 - 2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION

SECTION 015116
FIRE SAFETY DURING CONSTRUCTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for fire safety during construction and demolition.
- B. Related Sections:
 - 1. Division 01 Section "Temporary Facilities and Controls" for additional facilities, requirements, and procedures required during construction.

1.3 SUBMITTALS

- A. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

1.4 REGULATORY REQUIREMENTS

- A. Regulatory Requirements: Comply with applicable provisions of the following:
 - 1. NFPA 241.
 - 2. California Fire Code, 2019 Edition, Chapter 33 "Fire Safety During Construction and Demolition" and the 2019 Editions of the following California Codes as Referenced by the California Fire Code:
 - a. California Building Code (CBC).
 - b. California Mechanical Code (CMC).
 - c. California Plumbing Code (CPC).
 - d. California Electrical Code (CEC).
- B. Temporary Heating Equipment (CFC 3303):
 - 1. General: Temporary heating devices shall be listed and labeled in accordance with the California Mechanical Code. Installation, maintenance and use of temporary heating devices shall be in accordance with the terms of the listing.

2. LP-Gas heaters: Heating devices shall be temporary, self-contained, liquid-propane-gas heaters with individual space thermostatic control. Fuel supplies for liquefied petroleum gas fired heaters shall comply with the California Fire Code, Chapter 61 Liquefied Petroleum Gases, and the California Mechanical Code.
3. Refueling: Refueling operations for liquid fueled equipment or appliances shall be conducted in accordance with the California Fire Code, Section 5705. The equipment or appliance shall be allowed to cool prior to refueling.
4. Installation: Clearance to combustibles from temporary heating devices shall be maintained in accordance with the labeled equipment. When in operation, temporary heating devices shall be fixed in place and protected from damage, dislodgement or overturning in accordance with the manufacturer's instructions.
5. Supervision: The use of temporary heating devices shall be supervised and maintained only by competent personnel.
6. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.

C. Precautions Against Fire (CFC 3304):

1. Smoking: Smoking shall not be allowed on the project site.
2. Combustible Debris, Rubbish and Waste:
 - a. Combustible debris, rubbish and waste shall not be accumulated within buildings.
 - b. Combustible debris, rubbish and waste material shall be removed from buildings at the end of each shift of work.
 - c. Rubbish containers with a capacity exceeding 5.33 cubic feet (40 gallons) used for temporary storage of combustible debris, rubbish and waste materials, shall have tight fitting or self-closing lids. Such containers shall be constructed entirely of materials that are non-combustible or materials that meet a peak rate of heat release not exceeding 300 kW/m² when tested in accordance with ASTM E 1354 at an incident heat flux of 50 kW/m² in the horizontal orientation.
 - d. Materials susceptible to spontaneous ignition, such as oily rags, shall be stored in a listed disposal container.
3. Burning: Burning of materials shall not be allowed on the project site.
4. Fire Watch: Where required by the fire code official, a fire watch shall be provided for building demolition and for building construction during working hours that is hazardous in nature, such as temporary heating or hot work.
 - a. Trained personnel shall be provided to serve as an on-site fire watch. Fire watch personnel shall be provided with not less than one approved means for notification of the fire department, and the sole duty of such personnel shall be to perform constant patrols and watch for the occurrence of fire. The combination of fire watch duties and site security is acceptable. Fire watch personnel shall be trained in the use of portable fire extinguishers.
 - b. The fire watch personnel shall keep a record of all time periods of duty, including a log entry each time the site was patrolled, and each time a structure under construction was entered and inspected. The records and log entries shall be made available for review by the fire code official upon request.

5. Cutting and Welding: Welding, cutting, open torches, and other hot work operations and equipment shall comply with California Fire Code, Chapter 35 "Welding and Other Hot Work."
6. Temporary Wiring for Electrical Power: Temporary wiring for electrical power and lighting installations used in connection with the construction, alteration or demolition of buildings, structures, equipment or similar activities shall comply with the California Electrical Code.

D. Flammable and Combustible Liquids (CFC 3305):

1. Storage of Flammable and Combustible Liquids: Storage of flammable and combustible liquids shall be in accordance with the California Fire Code, Section 5704.
2. Class I and Class II Liquids: Storage, use, and handling of flammable and combustible liquids at construction sites shall be in accordance with the California Fire Code, Section 5706.2. Ventilation shall be provided for operations involving the application of materials containing flammable solvents.
3. Housekeeping: Flammable and combustible liquid storage areas shall be maintained clear of combustible vegetation and waste materials. Such storage areas shall not be used for the storage of combustible materials.
4. Precautions Against Fire: Sources of ignition and smoking shall be prohibited in flammable and combustible liquid storage areas. Signs shall be posted in accordance the California Fire Code, Section 310.
5. Handling at Point of Final Use: Class I and Class II liquids shall be kept in approved safety containers.
6. Leakage and Spills: Leaking vessels shall be immediately repaired or taken out of service and spills shall be cleaned up and disposed of properly.

E. Flammable Gases (CFC 3306):

1. Storage and Handling: Storage and handling of flammable gasses shall comply with the California Fire Code, Chapter 58 "Flammable Gases and Flammable Cryogenic Fluids."
2. Cleaning with Flammable Gases: Flammable gases shall not be used to clean or remove debris from piping open to the atmosphere.

F. Explosive Materials (CFC 3307): Explosive materials shall not be allowed.

G. Owner's Responsibility for Fire Protection (CFC 3308)

1. Program Development: The Contractor shall be responsible for the development, implementation and maintenance of a written plan establishing a fire prevention program at the project site applicable throughout all phases of the construction.
2. Program Superintendent: The Contractor shall a person to be the Fire Prevention Program Superintendent who shall be responsible for the fire prevention program and ensure that it is carried out through completion of the project. The fire prevention program superintendent shall have the authority to enforce the provisions of the California Fire Code, Chapter 33, and other provisions as necessary to secure the intent of the California Fire Code, Chapter 33. Where guard service is provided in accordance with NFPA 241, the superintendent shall be responsible for the guard service.

3. Prefire Plans: The fire prevention program superintendent shall develop and maintain an approved prefire plan in cooperation with the fire chief. The fire chief and the fire code official shall be notified of changes affecting the utilization of information contained in such prefire plans.
4. Training: Training of responsible personnel in the use of fire protection equipment shall be the responsibility of the fire prevention program superintendent. Records of training shall be kept and made a part of the written plan for the fire prevention program.
5. Fire Protection Devices: The fire prevention program superintendent shall determine that all fire protection equipment is maintained and serviced in accordance with the California Fire Code. The quantity and type of fire protection equipment shall be approved. Fire protection equipment shall be inspected in accordance with the fire prevention program.
6. Hot Work Operations: The fire prevention program superintendent shall be responsible for supervising the permit system for hot work operations in accordance with the California Fire Code, Chapter 35.
7. Impairment of Fire Protection Systems: Impairments to any fire protection system shall be in accordance with the California Fire Code, Section 901.
 - a. Smoke detectors and smoke alarms located in an area where airborne construction dust is expected shall be covered to prevent exposure to dust or shall be temporarily removed. smoke detectors and alarms that were removed shall be replaced upon conclusion of dust producing work. Smoke detectors and smoke alarms that were covered shall be inspected and cleaned, as necessary, upon conclusion of dust producing work.
8. Temporary Covering of Fire Protection Devices: Temporary coverings placed on or over fire protection devices to protect them from damage during construction processes shall be immediately removed upon the completion of the construction processes in the room or area in which the devices are installed.

H. Fire Reporting (CFC 3309)

1. Emergency Telephone: Emergency telephone facilities with ready access shall be provided in an approved location at the construction site, or an approved equivalent means of communication shall be provided. The street address of the construction site and the emergency telephone number of the fire department shall be posted adjacent to the telephone. Alternatively, where an equivalent means of communication has been approved, the site address and fire department emergency telephone number shall be posted at the main entrance to the site, in guard shacks, and in the construction site office.

I. Access for Fire Fighting (CFC 3310):

1. Required Access: Approved vehicle access for firefighting shall be provided to all construction or demolition sites. Vehicle access shall be provided to within 100 feet of temporary or permanent fire department connections. Vehicle access shall be provided by either temporary or permanent roads capable of supporting vehicle loading under all weather conditions. Vehicle access shall be maintained until permanent fire apparatus access roads are available.

2. Key Boxes: Key boxes shall be provided as required by the California Fire Code, Chapter 5 "Fire Service Features."

J. Means of Egress (CFC 3311):

1. Stairways Required: (Requirements not applicable to buildings less than 50 feet in height or less than four stories).
2. Means of Egress: Required means of egress and required accessible means of egress shall be maintained during construction and demolition, remodeling or alterations and additions to any building unless an approved temporary means of egress system is provided.

K. Water Supply for Fire Protection (CFC 3312):

1. Water Supply for Fire Protection: An approved water supply for fire protection, either temporary or permanent, shall be made available as soon as combustible material arrives on site.

L. Portable Fire Extinguishers (CFC 3315):

1. Portable Fire Extinguishers: Structures under construction, alteration or demolition shall be provided with not less than one approved portable fire extinguisher in accordance with the California Fire Code, Section 906 and sized for not less than ordinary hazard, as follows:
 - a. At each stairway on all floor levels where combustible materials have accumulated.
 - b. In every storage and construction shed.
 - c. Additional portable fire extinguishers shall be provided where special hazards exist including, but not limited to, the storage and use of flammable and combustible liquids.

M. Motorized Construction Equipment (CFC 3316):

1. Conditions of Use: Internal combustion powered construction equipment shall be used in accordance with all of the following conditions:
 - a. Equipment shall be located so that exhausts do not discharge against combustible material.
 - b. Exhausts shall be piped to the outside of the building.
 - c. Equipment shall not be refueled while in operation.
 - d. Fuel for equipment shall be stored in approved areas outside of the building.

N. Safeguarding Roofing Operations (CFC 3317):

1. General: Roofing operations utilizing heat producing systems or other ignition sources shall be conducted in accordance with California Fire Code Sections 3317.2 and 3317.3, and Chapter 35.
2. Asphalt and Tar Kettles: Asphalt and tar kettles shall be operated in accordance with the California Fire Code, Section 303.
3. Fire Extinguishers for Roofing Operations: Fire extinguishers shall comply with the California Fire Code, Section 906. There shall be not less than one multi-purpose portable fire extinguisher with a minimum 3-A 40-B:C rating on the roof being covered or repaired.

PART 2 - PRODUCTS

2.1 TEMPORARY EQUIPMENT, GENERAL

- A. Temporary Equipment: Temporary equipment shall comply with requirements of Division 01 Section "Temporary Facilities and Controls," and shall comply with the requirements of this Section.

PART 3 - EXECUTION

- A. Fire Safety Observation, Procedures, and Features: Provide fire safety observation activities, procedures, and features as required and in compliance with regulatory requirements.

END OF SECTION

SECTION 016000
PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
 - 1. Division 01 Section "Substitution Procedures" for requests for substitutions.

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, which is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Products: Products of a listed manufacturer that are demonstrated to meet or exceed the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified 'Basis of Design' product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 SUBMITTALS

- A. Product Submittals: Comply with requirements in Division 01 Section "Submittal Procedures" and submittal requirements of Division 02 through 33 Sections to show compliance with product requirements.

1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

- B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. 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.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

- C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store products to allow for inspection and measurement of quantity or counting of units.
3. Store materials in a manner that will not endanger Project structure.
4. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
5. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 - 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 - 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
 - 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 - 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
 - 3. See Divisions 02 through 33 Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Warranty Submittals: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
 - 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 - 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 - 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 - 4. Where products are accompanied by the term "as selected," Architect will make selection.
 - 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Product Selection Procedures:

1. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
 - a. Limited list of products may be indicated by the phrase "Subject to compliance with requirements, provide one of the following."
2. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed or an unnamed product that complies with requirements.
 - a. Non-limited list of products is indicated by the phrase "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following."
 - b. Provision of an unnamed product is not considered a substitution, if the product complies with requirements.
3. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
 - a. Limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, provide products by one of the following."
4. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed or a product by an unnamed manufacturer that complies with requirements.
 - a. Non-limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following."
 - b. Provision of products of an unnamed manufacturer is not considered a substitution, if the product complies with requirements.

5. Basis of Design Products: Where Specifications include the phrase "Basis of Design" and lists a named manufacturer and product, provide the product indicated.
 - a. Where a "Basis of Design" manufacturer/product is followed by "Subject to compliance with requirements, provide product indicated or a comparable product by one of the following," and includes a list of manufacturers, a comparable product by one of the listed manufacturers may be provided in lieu of the basis of design manufacturer/product subject to compliance with product requirements and the following:
 - 1) Evidence that the proposed product:
 - a) Does not require revisions to the Contract Documents.
 - b) Is consistent with the Contract Documents and will produce the indicated results.
 - c) Is compatible with other portions of the Work.
 - 2) Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - 3) Evidence that proposed product provides specified warranty.
 - b. Where a "Basis of Design" manufacturer/product is followed by "Provide specified product or submit request for substitution," comply with requirements in Division 01 Section "Substitution Procedures" for consideration of an unnamed manufacturer or product.
- C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
 1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Division 01 Section "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 017300
EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting, patching and repairing.
 - 5. Coordination of Owner-installed products.
 - 6. Progress cleaning.
 - 7. Starting and adjusting.
 - 8. Protection of installed construction.
 - 9. Protection of existing construction.
 - 10. Correction of the Work.
- B. Related Requirements:
 - 1. Division 01 Section "Summary of Work" for limits on use of Project site.
 - 2. Division 02 Section "Selective Demolition" for demolition and removal of selected portions of the building.

1.3 DEFINITIONS

- A. Accessible Route: A continuous unobstructed path connecting accessible elements and spaces of an accessible site, building or facility that can be negotiated by a person with a disability using a wheelchair, and that is also safe for and usable by persons with other disabilities. Interior accessible routes may include corridors, hallways, floors, ramps, elevators and lifts. Exterior accessible routes may include accessible parking stalls and access aisles, curb ramps, crosswalks at vehicular ways, walks, ramps and lifts.
- B. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- C. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 SUBMITTALS

1.5 QUALITY ASSURANCE

- A. Surveyor Qualifications: A professional engineer or land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: When cutting of structural elements must be performed, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
 - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.
 - d. Fire-suppression systems.
 - e. Mechanical systems piping and ducts.
 - f. Control systems.
 - g. Communication systems.
 - h. Fire-detection and alarm systems.
 - i. Conveying systems.
 - j. Electrical wiring systems.
 - k. Operating systems of special construction.
 - 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
 - a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Sprayed fire-resistive material.
 - d. Equipment supports.
 - e. Piping, ductwork, vessels, and equipment.
 - 4. Visual Elements: Cut and patch construction in a manner that results in no visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic

qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

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

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in Division 02 through 33 Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Examine roughing-in for plumbing, mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - 1. Description of the Work.
 - 2. List of detrimental conditions, including substrates.
 - 3. List of unacceptable installation tolerances.
 - 4. Recommended corrections.
- D. 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 local utility and 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. Verify service space requirements for equipment and operating items.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Division 01 Section "Request for Information."

3.3 CONSTRUCTION LAYOUT

- A. General: Engage a land surveyor 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 limits on use of Project site.
 - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 4. Inform installers of lines and levels to which they must comply.
 - 5. Check the location, level and plumb, of every major element as the Work progresses.
 - 6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.

7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- B. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- C. 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.

3.4 FIELD ENGINEERING

- A. Survey of Accessible Routes: On completion of site improvements, prepare a topographic survey of accessible routes showing dimensions, locations, and elevations of accessible features in order to certify compliance with requirements for disabled access. Survey shall be limited to site features included in the Work of the Project.

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 minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.
- 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. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. 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.

- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 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.
- I. 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.
- J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.
- K. Repair or remove and replace damaged, defective, or nonconforming Work.

3.6 CUTTING, PATCHING, AND REPAIRING

- A. General: Employ skilled workers to perform cutting, patching, and/or repairing. Proceed with cutting, patching, and repairing at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Division 01 Section "Summary."

- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 6. Proceed with patching after construction operations requiring cutting are complete.
- H. Patching and Repairing: Patch and repair construction by grinding, filling, leveling, refinishing, closing up, and similar operations following performance of other work. Provide materials and comply with installation requirements specified in other Sections, where applicable.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched and repaired areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

- b. Where finishes have been removed, patch and repair substrates to receive new finishes; substrates shall be prepared to comply with requirements of manufacturer of final finish material.
- 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
- 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction personnel.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
 - 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 - 2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Division 01 Section "Construction Waste Management and Disposal."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Division 01.
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Division 01 Section "Quality Requirements."

3.10 PROTECTION AND REPAIR

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.
- C. Comply with manufacturer's written instructions for temperature and relative humidity following installation.

END OF SECTION

SECTION 017329
CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. Related Sections include the following:
 - 1. Division 02 Section "Selective Demolition" for demolition of selected portions of the building.
 - 2. Divisions 02 through 49 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operating elements include the following:
 - 1. Air or smoke barriers.
 - 2. Fire-suppression systems.
 - 3. Mechanical systems piping and ducts.
 - 4. Control systems.
 - 5. Communication systems.
 - 6. Electrical wiring systems.

- C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Miscellaneous elements include the following:
1. Water, moisture, or vapor barriers.
 2. Membranes and flashings.
 3. Equipment supports.
 4. Piping, ductwork, vessels, and equipment.
 5. Noise- and vibration-control elements and systems.
- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and 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. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.
- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION

SECTION 017419
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous construction waste.
 - 2. Recycling nonhazardous construction demolition waste.
 - 3. Disposing of nonhazardous construction waste.
- B. Related Requirements:
 - 1. Division 02 Section "Selective Demolition" for disposition of waste resulting from partial demolition of site improvements.
 - 2. Division 31 Section "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- 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. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition and construction waste becomes property of Contractor.

1.5 ACTION SUBMITTALS

- A. Waste Management Plan: Submit Waste Management Plan within 30 days of date established for the Notice to Proceed indicating method of compliance with the California Green Building Standards Code.

1.6 INFORMATIONAL SUBMITTALS

- A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Use separate forms for construction waste and demolition waste. Include the following information:
 - 1. Material category.
 - 2. Generation point of waste.
 - 3. Total quantity of waste in tons.
 - 4. Quantity of waste salvaged, both estimated and actual in tons.
 - 5. Quantity of waste recycled, both estimated and actual in tons.
 - 6. Total quantity of waste recovered (salvaged plus recycled) in tons.
 - 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

1.7 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: Experienced firm, or individual employee assigned by the General Contractor, with a record of successful waste management coordination of projects with similar requirements. Individual of firm, or

Contractor's employee, shall be a LEED-Accredited Professional, certified by the USGBC, as waste management coordinator.

- B. Regulatory Requirements: Comply with transportation and disposal regulations of authorities having jurisdiction.
- C. Waste Management Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:
 - 1. Review and discuss waste management plan including responsibilities of waste management coordinator.
 - 2. Review requirements for documenting quantities of each type of waste and its disposition.
 - 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - 4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - 5. Review waste management requirements for each trade.

1.8 WASTE MANAGEMENT PLAN/REGULATORY REQUIREMENTS

- A. Construction Waste Management, General: Recycle and/or salvage for reuse a minimum of 65 percent of the non-hazardous construction and demolition waste in accordance with one of the following 2019 California Green Standards Code (GBSC) Sections, or meet a local construction and demolition waste management ordinance, whichever is more stringent:
 - 1. Construction Waste Management Plan (GBSC Section 5.408.1.1): Where a local jurisdiction does not have a construction and demolition waste management ordinance that is more stringent, provide Waste Management Plan that:
 - a. Identifies the construction and demolition waste materials to be diverted from disposal by efficient usage, recycling, reuse on the project or salvage for future use or sale.
 - b. Determines if construction and demolition waste materials will be sorted on-site (source separated) or bulk mixed (single stream).
 - c. Identifies diversion facilities where construction and demolition waste material collected will be taken.
 - d. Specifies the amount of construction and demolition waste materials diverted shall be calculated by weight or volume, but not by both.
 - 2. Waste Management Company (GBSC Section 5.408.1.2): Utilize a waste management company that can provide verifiable documentation that the percentage of construction and demolition waste material diverted from the landfill complies with CGBSC Section 5.408.1.
 - a. Exception 1: Excavated soil and land-clearing debris.

- b. Exception 2: Alternate waste reduction methods developed by working with local agencies if diversion or recycle facilities capable of compliance with this item do not exist.
 - c. Demolition waste meeting local ordinance or calculated in consideration of local recycling facilities and markets.
- 3. Waste Stream Reduction Alternative (GBSC Section 5.408.1.3): The combined weight of new construction disposal that does not exceed two pounds per square foot of building area may be deemed to meet the 65 percent minimum requirement as approved by the enforcing agency.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management procedures. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management procedures during the entire duration of the Contract.
 - 1. Comply with operation, termination, and removal requirements in Division 01 Section "Temporary Facilities and Controls."
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
 - 1. Distribute waste management procedures to everyone concerned within three days of submittal return.
 - 2. Distribute waste management procedures to entities when they first begin work on-site. Review procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 - 2. Comply with Division 01 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

- A. General: Contract Documents identify items to be salvaged for reinstallation and items to be salvaged to the Owner; items indicated to be removed become the Contractor's property, Contractor may salvage removed items and offer for sale and/or donation.
- B. Salvaged Items for Reuse/Reinstallion in the Work: Salvage items for reuse and handle as follows:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 - 3. Store items in a secure area until installation.
 - 4. Protect items from damage during transport and storage.
 - 5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
- C. Salvaged Items to Owner: Salvage items for Owner's use and handle as follows:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to Owner's storage area designated by Owner.
 - 5. Protect items from damage during transport and storage.
- D. Salvaged Items for Sale and/or Donation: Not permitted on Project site.
- E. Salvaged Items for Reinstallation or Owner's Use:
 - 1. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.
 - 2. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.
 - 3. Plumbing Fixtures: Separate by type and size.
 - 4. Lighting Fixtures: Separate lamps by type and protect from breakage.
 - 5. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Receivers and Processors: Refer to local county websites for the county in which the Project is located for listings of available recycling receivers and processors, and materials accepted.
- C. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.

- D. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- E. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
 - 1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.
 - 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 - 4. Store components off the ground and protect from the weather.
 - 5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.4 RECYCLING DEMOLITION WASTE

- A. Asphalt Paving: Break up and transport paving to asphalt-recycling facility.
- B. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.

3.5 RECYCLING CONSTRUCTION WASTE

- A. Packaging:
 - 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 - 2. Polystyrene Packaging: Separate and bag materials.
 - 3. Wood Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
 - 4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- B. Wood Materials:
 - 1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
 - 2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

- a. Comply with requirements in Division 32 Sections as applicable to planting for use of clean sawdust as organic mulch.
- C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

3.6 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
- C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION

SECTION 017700
CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Closeout procedures at completion.
 - 2. Final cleaning.
 - 3. Repair of the Work.
- B. Related Requirements:
 - 1. Division 01 Section "Operation and Maintenance Data" for operation and maintenance documentation requirements.
 - 2. Division 01 Section "Project Record Drawings" for preparing and submitting Project Record Drawings.
 - 3. Division 01 Section "Warranties" for submitting final warranty information.
 - 4. Division 01 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
 - 5. Divisions 02 through 33 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Submit the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.

2. Submit closeout documentation specified in other Division 01 Sections, including project record drawings, operation and maintenance data, construction photographic documentation, warranties, and similar final record information.
 3. Submit closeout documentation specified in individual Division 02 through 33 Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 4. Submit maintenance materials specified in individual Division 02 through 33 Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.
 5. Submit test/adjust/balance records.
 6. Submit sustainable design submittals not previously submitted.
 7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 3. Complete startup and testing of systems and equipment.
 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Division 01 Section "Demonstration and Training."
 6. Advise Owner of changeover in utilities.
 7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 8. Complete final cleaning requirements, including touchup painting.
 9. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection for Completion a minimum of 10 days prior to date the work will be completed and ready for inspection. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected.
1. Architect's Punch List: During inspection, Architect will prepare a list of items needing completion or correction (punch list), a copy of the punch list will be distributed to the Contractor and Owner.
 2. Reinspection: Request reinspection when the Work identified in previous inspection as incomplete is completed or corrected.
 3. Results of completed inspection will form the basis of requirements for final completion.

- E. Contractor's Cost for Reinspection: Architect will perform one inspection and one reinspection at no additional cost to the Contractor. The expense for the Architect's time for additional inspections will be paid by the Owner with the amount being deducted from the Contract Sum. The expense will be based on an hourly rate in accordance with the Architect's standard hourly rate schedule in effect at the time the work is performed with a minimum of \$400.00 dollars for each additional reinspection.

1.4 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
 - 1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
 - 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 - 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect (Company name).
 - d. Name of Contractor (Company Name).
 - e. Page number.
 - 4. Submit list of incomplete items in one of the following formats:
 - a. MS Excel electronic file. Architect will return annotated file.
 - b. PDF electronic file. Architect will return annotated file.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
 - 1. Use cleaning products that comply with the California Green Building Standards Code maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - g. Sweep concrete floors broom clean in unoccupied spaces.
 - h. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - i. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - j. Remove labels that are not permanent.
 - k. Wipe surfaces of mechanical, electrical, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - l. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - m. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - n. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.

- o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
 - p. Leave Project clean and ready for occupancy.
- C. Construction Waste Disposal: Comply with waste disposal requirements in Division 01 Section "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
 - 1. Comply with requirements of Division 02 through 33 Sections as applicable to the Work to be restored and/or repaired.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
 - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
 - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
 - 3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
 - 4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION

SECTION 017823
OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance documentation, including the following:
 - 1. Operation and maintenance documentation directory manuals.
 - 2. Emergency manuals.
 - 3. Systems and equipment operation manuals.
 - 4. Systems and equipment maintenance manuals.
 - 5. Product maintenance manuals.
- B. Related Sections:
 - 1. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 - 2. Division 01 Section "Demonstration and Training" for demonstration and training materials.
 - 3. Divisions 02 through 33 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 SUBMITTALS

- A. Closeout Submittal: Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as previously reviewed and approved at the time of individual Section submittals; where applicable, clarify and update previously reviewed content to correspond to revisions and field conditions. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Initial Submittal: Submit draft electronic copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether content of operations and maintenance submittal is acceptable.
 - a. Correct or revise each manual to comply with Architect's comments. Submit final submittal copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.
 - 2. Final Submittal: Submit in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Submit the following:
 - a. Paper Copy: Submit one paper-copy set of marked-up record prints that have been revised to address Architect's comments from the initial submittal.
 - b. Digital Data Files: Submit digital data files of Project Record Drawings as PDF files on a thumb-drive.
- B. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

1.4 FORMAT OF OPERATION AND MAINTENANCE MANUALS

- A. Electronic File Manuals: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
 - 1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 - 2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

B. Paper Copy Manuals: Submit manuals in the form of hard-copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf or post-type binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number(s) on bottom of spine. Indicate volume number for multiple-volume sets.
2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment. Enclose title pages and directories in clear plastic sleeves.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

1.5 REQUIREMENTS FOR OPERATION AND MAINTENANCE MANUALS

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials and in the order listed:
1. Title page.
 2. Table of contents.
 3. Manual contents.
- B. Title Page: Include the following information as applicable:
1. Subject matter included in the manual.
 2. Name and address of Project.

3. Name and address of Owner.
 4. Date of submittal.
 5. Name and contact information for the following:
 - a. Contractor.
 - b. Installer.
 - c. Architect.
 - d. Commissioning Authority if applicable.
 - e. Architect's major consultants that designed the systems contained in the manuals.
 6. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

1.6 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals. List items and their location to facilitate ready access to desired information. Include the following:
1. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
 2. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
 3. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

1.7 EMERGENCY MANUALS

- A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- B. Content: Organize manual into a separate section for each of the following:
 - 1. Type of emergency.
 - 2. Emergency instructions.
 - 3. Emergency procedures.
- C. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
 - 1. Fire.
 - 2. Flood.
 - 3. Gas leak.
 - 4. Water leak.
 - 5. Power failure.
 - 6. Water outage.
 - 7. System, subsystem, or equipment failure.
 - 8. Chemical release or spill.
- D. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- E. Emergency Procedures: Include the following, as applicable:
 - 1. Instructions on stopping.
 - 2. Shutdown instructions for each type of emergency.
 - 3. Operating instructions for conditions outside normal operating limits.
 - 4. Required sequences for electric or electronic systems.
 - 5. Special operating instructions and procedures.

1.8 SYSTEMS AND EQUIPMENT OPERATION MANUALS

- A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.
 - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

- B. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 2. Performance and design criteria if Contractor is delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Wiring diagrams.
 7. Control diagrams.
 8. Piped system diagrams.
 9. Precautions against improper use.
 10. License requirements including inspection and renewal dates.
- C. Descriptions: Include the following:
1. Product name and model number. Use designations for products indicated on Contract Documents.
 2. Manufacturer's name.
 3. Equipment identification with serial number of each component.
 4. Equipment function.
 5. Operating characteristics.
 6. Limiting conditions.
 7. Performance curves.
 8. Engineering data and tests.
 9. Complete nomenclature and number of replacement parts.
- D. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
 2. Equipment or system break-in procedures.
 3. Routine and normal operating instructions.
 4. Regulation and control procedures.
 5. Instructions on stopping.
 6. Normal shutdown instructions.
 7. Seasonal and weekend operating instructions.
 8. Required sequences for electric or electronic systems.
 9. Special operating instructions and procedures.
- E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- F. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

1.9 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of

a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds as described below.
- C. Source Information: List each system, subsystem, and piece of equipment included in manual, identify by product name and arrange to match table of contents. For each piece of equipment, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- D. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
1. Standard maintenance instructions and bulletins; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- E. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
 2. Troubleshooting guide.
 3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.

5. Aligning, adjusting, and checking instructions.
 6. Demonstration and training video recording, if available.
- F. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- G. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- H. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- I. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.
- J. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
1. Do not use original project record documents as part of maintenance manuals.

1.10 PRODUCT MAINTENANCE MANUALS

- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- C. Source Information: List each product included in data identified by product name and arranged to match table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- D. Product Information: Include the following, as applicable:
1. Product name and model number.
 2. Manufacturer's name.

3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

E. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 017836 WARRANTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for warranties required by the Contract Documents, including manufacturers' standard warranties on products and special warranties.
- B. Related Sections include but are not limited to the following:
 - 1. Division 01 Section "Closeout Procedures."
 - 2. Division 01 Section "Operation and Maintenance Data."
 - 3. Division 02 through 33 Sections for specific warranty requirements.

1.3 DEFINITIONS

- A. Standard product warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
- B. Special project warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1.4 WARRANTY REQUIREMENTS

- A. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.
- B. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.

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

1.5 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
- C. Warranties: Submit (2) copies of each required warranty properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 - 1. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
 - 2. Include copy of each warranty in operation and maintenance documentation.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 017839
PROJECT RECORD DRAWINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for Project Record Drawings:
- B. Related Sections:
 - 1. Division 01 Section "Use of Architect's Electronic Files" for requirements related to use of Architect's digital data files.
 - 2. Division 01 Section "Execution" for surveys of exterior accessible routes.
 - 3. Division 01 Section "Closeout Procedures" for general closeout procedures.
 - 4. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 RECORD DRAWING SUBMITTAL

- A. Closeout Submittal: Submit Record Drawings as follows:
 - 1. Submittal: Submit one paper-copy set of marked-up record prints.
 - a. Paper Copy: Submit one paper-copy set of marked-up record prints that have been revised to address Architect's comments from the initial submittal.
 - b. Digital Data Files: Submit digital data files of Project Record Drawings as PDF files on a thumb-drive.

1.4 PROJECT RECORD DRAWINGS

- A. Record Drawings: Maintain one set of paper copies of the Contract Drawings during the construction period for Project Record Drawing Purposes.
1. Project Record Drawing print sets shall include all drawings of the Contract Documents including original project Drawings, Shop Drawings, Supplemental Drawings, Coordination Drawings, Clarification Drawings, Change Orders, and similar drawings. Record Drawing set shall include all drawings of Contract Documents whether or not changes and additional information were recorded.
 2. Store Project Record Drawings in the field office apart from the Contract Documents used for construction; do not use Project Record Drawings for construction purposes.
 3. Maintain Record Drawings in good order and in a clean, dry, legible condition, protected from deterioration and loss.
 4. Provide access to Project Record Drawings for Architect's reference during normal working hours.
 5. Incorporate new and revised drawings into Project Record Drawings as modifications are issued; do not wait until the end of Project.
 6. Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an understandable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference record prints to corresponding archive photographic documentation.
 7. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations below first floor.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directive.
 - k. Changes made following Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.

8. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
 9. Mark record prints with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 10. Mark important additional information that was either shown schematically or omitted from original Drawings.
 11. Note Construction Change Directive numbers, Change Order numbers, and similar identification, where applicable.
- B. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing Record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
 2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared Record Drawings into Record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.
- C. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, submit marked-up record prints to Architect, following Architect's review and action, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
1. Format: PDF electronic file.
 2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
 3. Refer instances of uncertainty to Architect for resolution.
 4. Architect will furnish Contractor one set of digital data files of the Contract Drawings in PDF format for use in recording information.
 - a. Refer to Division 01 Section 011105 "Use of Architect's Electronic Files" for requirements related to use of Architect's digital data files.
- D. Format:
1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Record Digital Data Files:
 - a. Format: Annotated PDF electronic file.
 - b. Organize digital data information into separate electronic files corresponding with each building design discipline of the Contract Documents; name each file with the corresponding design discipline.

E. Identification: Include the following information on each Record Drawing:

1. "PROJECT RECORD DRAWING" designation located in a prominent location.
2. Project name if Project name is not included in a title block as part of the drawing.
3. Date.
4. Name of Architect if Architect's name is not included in a title block as part of the drawing.
5. Name of Contractor.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 017900
DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel in demonstration and training of operation and maintenance of systems, subsystems, and equipment.
- B. Related Sections:
 - 1. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manuals and data.
 - 2. Divisions 02 through 33 Sections for specific requirements for demonstration and training for products in those Sections.

1.3 SUBMITTALS

- A. Training materials in addition to Operation and Maintenance manuals required in Division 01 Section "Operation and Maintenance Data."
- B. Instruction Program Schedule: Submit outline schedule of instructional program that includes and coordinates programs for all products, equipment, and systems requiring demonstration and training. Schedule shall include a list of training sessions, proposed dates, times, length of instruction time.
 - 1. Schedule shall be coordinated and finalized with the Owner.

1.4 QUALITY ASSURANCE

- A. Instructor Qualifications: A factory-authorized service representative experienced in operation and maintenance procedures and training of Owner's personnel.

1.5 COORDINATION

- A. Coordinate instruction schedule with Owner, adjust schedule as required to minimize disrupting Owner's operations.

- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training sessions with content of approved operation and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Provide instruction programs that include training sessions for each system and for equipment not part of a system, as required by individual Specification Sections. Include instruction for the following as applicable to the system, equipment, or component:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Operating standards.
 - c. Regulatory requirements.
 - d. Equipment function.
 - e. Operating characteristics.
 - f. Limiting conditions.
 - g. Performance curves.
 - 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project record documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
 - 3. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
5. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
7. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
8. Repairs: Include the following:
 - a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction and training. Assemble training manuals organized in coordination with requirements in Division 01 Section "Operations and Maintenance Data."
- B. Coordinate with Owner for number of instruction times, location, and number of participants.
- C. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

- A. Instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 - 1. Owner will furnish Contractor with names and positions of participants.
- B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - 1. Schedule initial training with Owner, through Architect with at least 7 days' advance notice.
- C. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION

SECTION 018113
SUSTAINABLE DESIGN REQUIREMENTS, DSA CALGREEN

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general requirements and procedures for compliance with the 2019 California Green Building Standards Code (CGBSC) for Division of the State Architect (DSA) requirements.
- B. Related Sections:
 - 1. DSA Project Submittal Guideline GL-4.

1.3 SUBMITTALS

- A. Submit Sustainable Design Requirement submittals as required by Division 02 through 33 Specification Sections. Submittals may include, but are not limited to, the following:
 - 1. Construction Waste Management Plan and other submittals as required by Division 01 Section "Construction Waste Management and Disposal."
 - 2. Air Quality: Product data for filtration media.
 - 3. Product data for adhesives, sealants, and coatings indicating VOC content of each product used.
 - 4. Product data for products containing composite wood or agrifiber products or wood glues indicating that they do not contain urea-formaldehyde resin.

1.4 REGULATORY REQUIREMENTS

- A. DSA's "Project Submittal Guideline: CalGreen Code," form GL-4 (https://www.dgs.ca.gov/-/media/Divisions/DSA/Publications/guidelines/GL_4.pdf?la=en&hash=056C301E3592D09DC9C59DA146D04216AF108A9D). Contractor's responsibility with regard to sustainable design requirements shall include, but not be limited, to the following requirements of the 2019 California Green Building Standards Code).
- B. Outdoor Lighting: Outdoor lighting shall be designed and installed to comply with requirements of the 2019 CGBSC, Section 5.106.8.

- C. Energy Efficiency: Comply with requirements of the California Energy Code and as indicated on the Drawings.
- D. Plumbing Fixtures: Plumbing Fixtures shall comply with requirements of the 2019 CGBSC, Section 5.303.3.
- E. Moisture Control: Irrigation systems shall be designed and installed to prevent spray on buildings; per requirements of the 2019 CGBSC, Section 5.407.2.1.
- F. Construction Waste Management: Comply with requirements of the 2019 CGBSC, Section 5.408.1 and Division 01 Section "Construction Waste Management and Disposal." Construction Waste Management shall include, but not be limited to, the following:
 - 1. Construction Waste Management Plan.
 - 2. Recycling, reuse, and/or salvaging non-hazardous construction waste.
- G. Environmental Quality/Pollutant Control: Comply with requirements of the 2019 CGBSC, Sections as follows:
 - 1. Section 5.504.3, Covering of Duct Openings and Protection of Mechanical equipment. At the time of rough installation and during storage on the construction site until final startup of the heating, cooling and ventilating equipment, all duct and other related air distribution component openings shall be covered with tape, plastic, sheet metal or other methods acceptable to the enforcing agency to reduce the amount of dust, water and debris which may enter the system.
 - 2. Section 5.504.4.1, Adhesives and Sealants: Adhesives and sealants shall comply with the following VOC content limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - a. Adhesives: 2019 CGBSC Table 5.504.4.1 Adhesive VOC Limit:
 - 1) Indoor Carpet Adhesives: 50 g/L.
 - 2) Carpet Pad Adhesives: 50 g/L.
 - 3) Rubber Floor Adhesives: 60 g/L.
 - 4) Wood Flooring Adhesive: 100 g/L.
 - 5) Subfloor Adhesives: 50 g/L.
 - 6) Ceramic Tile Adhesives: 65 g/L.
 - 7) VCT and Asphalt Tile Adhesives: 50 g/L.
 - 8) Gypsum Board and Panel Adhesives: 50 g/L.
 - 9) Cove Base Adhesives: 50 g/L.
 - 10) Multipurpose Construction Adhesives: 70 g/L.
 - 11) Structural Glazing Adhesives: 100 g/L.
 - 12) Single-Ply Roof Membrane Adhesive: 250 g/L.
 - 13) Other Adhesives not specifically listed: 50 g/L.
 - 14) PVC Welding Compounds: 510 g/L.
 - 15) CPVC Welding Compounds: 490 g/L.
 - 16) ABS Welding Compounds: 325 g/L.
 - 17) Plastic Cement Welding Compounds: 250 g/L.
 - 18) Adhesive Primer for Plastic: 550 g/L.

- 19) Contact Adhesive: 80 g/L.
 - 20) Special-Purpose Contact Adhesive (contact adhesive that is used to bond melamine-covered board, metal, unsupported vinyl, rubber, or wood veneer 1/16 inch or less in thickness to any surface): 250 g/L.
 - 21) Structural Wood Member Adhesive: 140 g/L.
 - 22) Top and Trim Adhesive: 250 g/L.
 - 23) Metal-to-Metal Adhesives: 30 g/L.
 - 24) Plastic Foam Adhesives: 50 g/L.
 - 25) Adhesives for Porous Materials (Except Wood): 50 g/L.
 - 26) Wood Glues: 30 g/L.
 - 27) Fiberglass Adhesives: 80 g/L.
- b. Sealants: 2019 CGBSC Table 5.504.4.2, Sealant VOC Limit:
- 1) Architectural Sealants: 250 g/L.
 - 2) Nonmembrane Roof Sealants: 300 g/L.
 - 3) Paving Sealants: 250 g/L.
 - 4) Single-Ply Roof Membrane Sealants: 450 g/L.
 - 5) Other Sealants: 420 g/L.
 - 6) Sealant Primers for Nonporous Substrates: 250 g/L.
 - 7) Sealant Primers for Porous Substrates: 775 g/L.
 - 8) Modified Bituminous Sealant Primers: 500 g/L.
 - 9) Other Sealant Primers: 750 g/L.
3. Section 5.504.4.3, Paints and Coatings: Architectural Coatings shall comply with the following VOC content limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
- a. Paints and Coatings: 2019 CGBSC Table 5.504.4.3, VOC Content Limits for Architectural Coatings:
- 1) Flat Paints and Coatings: VOC not more than 50 g/L.
 - 2) Nonflat Paints and Coatings: VOC not more than 100 g/L.
 - 3) Nonflat High-Gloss Paints and Coatings: VOC not more than 150 g/L.
 - 4) Dry-Fog Coatings: VOC not more than 150 g/L.
 - 5) Floor Coatings: VOC not more than 100 g/L.
 - 6) Pretreatment Wash Primers: VOC not more than 420 g/L.
 - 7) Primers, Sealers, and Undercoaters: VOC not more than 100 g/L.
 - 8) Rust Preventative Coatings Applied to Ferrous Metals: VOC not more than 250 g/L.
 - 9) Shellacs, Clear: VOC not more than 730 g/L.
 - 10) Shellacs, Pigmented: VOC not more than 550 g/L.
 - 11) Stains: VOC not more than 250 g/L.
 - 12) Clear Wood Finishes, Varnishes: VOC not more than 275 g/L.
 - 13) Clear Wood Finishes, Lacquers: VOC not more than 275 g/L.
 - 14) Zinc-Rich Industrial Maintenance Primers: VOC not more than 340 g/L.
4. Section 5.504.4.3.1, Aerosol Paints and Coatings: Aerosol paints and coatings shall meet the PWMIR Limits for ROC in Section 94522(a)(3) and other requirements, including prohibitions on use of certain toxic compounds and

ozone depleting substances, in Sections 94522(c)(2) and (d)(2) of California Code of Regulations, Title 17, commencing with Section 94520; and in areas under the jurisdiction of the Bay Area Air Quality Management District additionally comply with the percent VOC by weight of product limits of Regulation 8 Rule 49. Comply with requirements of 2019 CGBSC, Table 5.504.4.3.

H. Carpet Systems: Comply with requirements of CGBSC, Section 5.504.4.4.

1. All carpet installed in the building interior shall meet the requirements of California Department of Public Health, "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers," Version 1.2, January 2017 (Emissions testing method for California Specification 01350).
 - a. See California Department of Public Health's website for certification programs and testing labs.
2. Carpet Adhesive: VOC content not exceeding 50 g/L per CGBSC Table 5.504.4.1 when calculated according to 40 CFR 59, Subpart D (EPA Method 24)

I. Composite Wood Products: Comply with requirements of CGBSC Section 5.504.4.5; hardwood plywood, particleboard, and medium density fiberboard composite wood products used on the interior or exterior of the building shall meet the requirements for formaldehyde as specified in ARB's Air Toxics Control Measure (ATCM) for Composite Wood (17 CCR 93120 et seq.) Those materials not exempted by the ATCM must meet the specified emission limits, as shown in CGBSC Table 5.504.4.5.

J. Resilient Flooring Systems: Comply with requirements CGBSC, Section 5.504.4.6.

1. Where resilient flooring is installed, at least 80% of floor area receiving resilient flooring shall meet the requirements of California Department of Public Health, "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers," Version 1.2, January 2017 (Emissions testing method for California Specification 01350).
2. Resilient Floor Adhesive: VOC content not exceeding 50 g/L per CGBSC Table 5.504.4.1 when calculated according to 40 CFR 59, Subpart D (EPA Method 24)

K. HVAC Filters: Comply with requirements CGBSC, Section 5.504.5.3; in mechanically ventilated buildings, provide regularly occupied areas of the building with air filtration media for outside and return air prior to occupancy that provides at least a Minimum Efficiency Reporting Value (MERV) of 13. MERV 13 filters shall be installed prior to occupancy and recommendations for maintenance with filters of the same value shall be included in the operation and maintenance manual.

1. Exception: Existing mechanical equipment.
2. Labeling: Installed filters shall be clearly labeled by the manufacturer indicating the MERV rating.

- L. Outside Air Delivery: Comply with requirements CGBSC, Section 5.506.1; for mechanically or naturally ventilated spaces in buildings, meet the minimum requirements of Section 120.1 (Requirements For Ventilation) of the 2019 California Energy Code, or the applicable local code, whichever is more stringent, and Division 1, Chapter 4 of CCR, Title 8.
- M. Acoustical Control: Comply with requirements CGBSC, Section 5.507.4, employ building assemblies and components with Sound Transmission Class (STC) values determined in accordance with ASTM E 90 and ASTM E 413 or Outdoor–Indoor Sound Transmission Class (OITC) determined in accordance with ASTM E 1332, using either the prescriptive or performance method in CGBSC Section 5.507.4.1 or 5.507.4.2.
 - 1. Exception:
 - a. Buildings with few or no occupants or where occupants are not likely to be affected by exterior noise, as determined by the enforcement authority, such as factories, stadiums, storage, enclosed parking structures and utility buildings.
 - b. Exception: For public schools and community colleges, the requirements of CGBSC Section 5.507.4, and all subsections, apply only to new construction.
- N. Interior Sound Transmission: Comply with requirements CGBSC, Section 5.507.4.3; wall and floor-ceiling assemblies separating tenant spaces and tenant spaces and public places shall have an STC of at least 40.
- O. Ozone Depletion and Greenhouse Gas Reductions: Comply with requirements CGBSC, Section 5.508.1; installation of HVAC, refrigeration, and fire suppression equipment shall comply with CGBSC Sections 5.508.1.1 and 5.508.1.2.
 - 1. Chlorofluorocarbons (CFCs): Install HVAC, refrigeration and fire suppression equipment that do not contain CFCs.
 - 2. Halons: Install HVAC, refrigeration and fire suppression equipment that do not contain Halons.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 023000
SUBSURFACE INVESTIGATION

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 information for the Geotechnical Investigation Report prepared for this Project.
- B. Related Sections:
 - 1. Division 31 Sections as applicable to site clearing, earthwork, excavations, fill, trenching, and paving.

1.3 QUALITY ASSURANCE

- A. A soil engineer will be retained by the Owner to observe performance of work in connection with excavating, trenching, filling, backfilling, and grading, and to perform compaction tests.
 - 1. Requirements for Field Quality Control are included in individual Sections as applicable to excavating, trenching, filling, backfilling, and grading.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 024119
SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Demolition and removal of selected portions of building or structure.
 - 2. Demolition and removal of selected site elements.
- B. Related Sections include the following:
 - 1. Division 01 Section "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for selective demolition operations.
 - 2. Division 01 Section "Photographic Documentation" for photographic documentation of pre-demolition conditions.
 - 3. Division 01 Section "Execution" for cutting and patching procedures, and for protection of existing construction.
 - 4. Division 01 Section "Construction Waste Management and Disposal" for salvaging, recycling, and disposing of nonhazardous demolition and construction waste.
 - 5. Division 31 Section "Site Clearing" for removing above and below-grade site improvements not part of selective demolition.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage to Owner: Detach item from existing construction in a manner to prevent damage and deliver to Owner ready for reuse.
- C. Remove and Salvage for Reinstallation: Detach item from existing construction in a manner to prevent damage, prepare for reuse, and securely store item until it is to be reinstalled at locations indicated.
- D. Existing to Remain: Existing items or improvements that are to remain and not be removed. Existing items to remain shall be protected from damage during the course of construction.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.5 SUBMITTALS

- A. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property, for physical damage, for dust control, and for noise control. Indicate proposed locations and construction of barriers.
- B. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
- C. Predemolition Photographs: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Comply with Division 01 Section "Photographic Documentation." Submit before Work begins.

1.6 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.
- B. Predemolition Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to selective demolition.

1.7 FIELD CONDITIONS

- A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- B. Survey of Existing Conditions: Record existing conditions that affect the Work by use of preconstruction photographs. Comply with requirements specified in Division 01 Section "Photographic Documentation."
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Utility Services: 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.

- E. Storage or sale of removed items or materials on-site is not permitted.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
 - 1. If unanticipated mechanical, electrical, or structural elements are encountered and found to be in conflict with intended function or design, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- C. Inventory and record the condition of items to be removed and salvaged or removed and reinstalled. Provide photographs of conditions that might be misconstrued as damage caused by salvage operations.

3.2 PREPARATION

- A. 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.
 - 1. Comply with requirements for access and protection specified in Division 01 Section "Temporary Facilities and Controls."
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. 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.

2. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.

3.3 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 01 Section "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. Protection of Existing Construction: Protect existing construction to remain with temporary protections and construction. Do not remove existing construction unless otherwise indicated.
- D. Remove temporary barricades and protections where hazards no longer exist.

3.4 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 Owner and/or 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.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
 - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.5 SELECTIVE DEMOLITION, GENERAL

- A. General: 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, to minimize disturbance of adjacent surfaces. 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 plasma or flame cutting torches without written approval from Architect. Where allowed, clear area of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations. Maintain fire watch during and for at least two hours after flame-cutting operations. Maintain adequate ventilation when using cutting torches.
 5. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 6. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 7. Dispose of demolished items and materials promptly, comply with requirements of Division 01 Section "Construction Waste Management and Disposal."

- B. Minor Accessories and Fixtures: Remove minor accessories and fixtures as required to accommodate removal of existing finishes or application new finishes whether items are indicated to be removed or not.
1. Minor accessories and fixtures shall include but not be limited to toilet room accessories; classroom accessories such as pencil sharpeners coat hooks, flag holders, and similar items.
 2. Where new replacement items are not indicated or specified in other sections, minor accessories and fixtures shall be considered to be items to be removed and reinstalled.
- C. Removed and Salvaged Items:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area.
 5. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.
1. Items removed, salvaged, and reinstalled for the Contractor's convenience shall be considered the same as items to be removed and salvaged for reinstallation.

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.
1. Where possible or feasible, cut concrete at existing joints.
- B. Reinforcing Steel: Where ends of reinforcing steel are exposed following cutting and removal of concrete and/or masonry, paint exposed ends of cut reinforcing steel with not less than two coats of zinc rich primer.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. Recycle or dispose demolition waste materials according to Division 01 Section "Construction Waste Management and Disposal." Remove demolition waste materials from Project site and legally 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 accordance with local regulations and in a manner that will prevent spillage on adjacent surfaces and areas.
- 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

SECTION 055000
METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Steel framing and supports for applications where framing and supports are not specified in other Sections.
 - 2. Steel framing and supports for mechanical and electrical equipment.
 - 3. Steel weld plates and angles for casting into concrete not specified in other Sections.
- B. Related Sections:
 - 1. Division 03 Section "Post Installed Concrete Anchors" for post installed anchors in concrete and/or masonry.
 - 2. Division 03 Section "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, wedge-type inserts and other items indicated to be cast into concrete.

1.3 SUBMITTALS

- A. Product Data: For the following:
 - 1. Fasteners.
 - 2. Shop primers.
 - 3. Shrinkage-resisting grout.
 - 4. Slotted channel framing.
- B. Shop Drawings: For metal fabrications, include plans, elevations, sections, and details of metal fabrications and their connections; show anchorage and accessory items. Show fabrication and installation details for metal fabrications.
- C. Welding certificates.
- D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- E. Research Reports: For post-installed anchors.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code--Steel."
 - 2. AWS D1.3, "Structural Welding Code--Sheet Steel."

1.5 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of in-place construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate contiguous construction to ensure that actual dimensions correspond to established dimensions.

1.6 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- C. Schedule installation so wall attachments are made only to completed walls. Do not support metal fabrications temporarily by any means that do not satisfy structural performance requirements.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg. F ambient; 180 deg F, material surfaces.

2.2 METAL PRODUCTS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Steel Tubing: ASTM A 500, cold-formed steel tubing.
- D. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.
 - 1. Provide galvanized finish for exterior installations where indicated.
- E. Slotted Steel Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
 - 1. Basis of Design: Unistrut Corporation; P1000 Channel Framing System.
 - 2. Size of Channels: 1-5/8 by 1-5/8 inches.
 - 3. Channel Material: Galvanized steel, ASTM A 653/A 653M, structural steel, Grade 33, with G90 coating; 0.108-inch (12 gage) nominal thickness.
 - 4. Material for Fittings: Steel conforming to ASTM A 575, A 576, A 36, or A635; with finish matching channels.
- F. Galvanized Steel Sheet: ASTM A 653/A 653M, G90 coating, structural steel, Grade 33, unless another grade is required by design loads.

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593; with hex nuts, ASTM F 594; and, where indicated, flat washers; Alloy Group 1.
- D. Anchor Bolts and Unheaded Rods: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.
 - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- E. Post Installed Concrete Anchors: Fabricated from corrosion-resistant materials; manufacturer, size, and type as indicated on Drawings and specified in Division 03 Section "Post Installed Concrete Anchors."

2.4 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Shop Primers: Provide primers that comply with Division 09 Section "Painting."
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- E. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- F. Concrete: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.

2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
- E. Weld connections, corners, and seams continuously, unless otherwise indicated, to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
 - 5. Cope ends of pipe or round tubing at connections to provide close fit.

- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and connections that will be exposed to weather in a manner that excludes water. Provide weep holes for drainage where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated on Drawings; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as indicated on the Drawings and as needed to complete the Work.
- B. Fabricate miscellaneous framing and supports from steel shapes, plates, and bars of welded construction to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by miscellaneous framing and supports.
 - 1. Drill, cut, and tap miscellaneous framing and supports to field bolted connections and to receive hardware, hangers, and similar items.
- C. Prime miscellaneous framing and supports used at interior applications.
- D. Galvanize miscellaneous framing and supports used for exterior applications or where indicated.

2.7 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with not less than two integrally welded steel strap anchors for embedding in concrete.

2.8 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize and prime exterior miscellaneous steel trim.

2.9 STEEL FINISHES

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.
- C. Galvanizing: Hot-dip galvanize exterior items and items indicated to be galvanized after fabrication to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.
 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
 2. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
- D. Shop Priming: Shop prime items not to be galvanized unless they are to remain unfinished or are embedded in concrete, or masonry, or unless otherwise indicated; shop prime galvanized items that are to receive field applied top coats.
 1. Preparation of Surfaces:
 - a. Cleaning of Galvanized Items for Shop Priming: Where galvanized items are to receive field applied top coats, prepare for priming after galvanizing by thoroughly cleaning galvanized surfaces of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.
 - b. Surface Preparation: Prepare surfaces to comply with the following:
 - 1) Non-Galvanized Items:
 - a) Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - b) Other Steel Items: SSPC-SP 3, "Power Tool Cleaning."
 - 2) Galvanized-Steel Items: SSPC-SP 16, "Brush-off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals."
 2. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
 - a. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing and conditions by other Specification Sections where reinforced to receive anchors, to verify that locations of concealed reinforcements are clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.3 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports as indicated on Drawings and to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor support framing securely to, and rigidly brace from, building structure.
- C. Railing and Post Connections, General: Use fully welded joints for permanently connecting components; comply with requirements for welded connections in Part 2

Articles "Fabrication, General" and "Railings and Guards" whether welding is performed in the shop or in the field.

1. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

D. Anchoring Posts in Concrete: Anchor posts as indicated on Drawings and as follows:

1. Sleeves: Clean holes of loose material, insert posts, and fill annular space between post and sleeve with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.
2. Cored Holes in Concrete: Core-drill holes not less than 6 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.

E. Attaching Railings to Walls: Locate brackets as indicated or, if not indicated, at spacing required to support structural loads; equally space brackets. Attach railings to walls with wall brackets as indicated on Drawings and as follows:

1. Crush Sleeves: Install crush sleeves between brackets and structural support where fastening brackets to walls through gypsum board, cement plaster, and similar finish materials.
2. Secure wall brackets as follows:
 - a. Concrete and Masonry Walls: Use post installed concrete anchors.
 - b. Wood Stud Walls: Use lag bolts set into studs or wood backing between studs; coordinate backing with carpentry work to locate backing members.
 - c. Metal Stud Framed Walls: Use self-tapping screws fastened to steel framing or to concealed steel reinforcements; coordinate backing with steel framed partition work.

3.4 REPAIRS

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

SECTION 079200
JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Silicone joint sealants including mildew resistant silicone joint sealants
 - 2. Urethane joint sealants.
 - 3. Latex joint sealants.
 - 4. Acoustical joint sealants.
 - 5. Joint sealant Backings

- B. Related Sections:

- 1. Division 32 Section "Concrete Paving Joint Sealants" for exterior concrete paving joint sealants.

1.3 SUBMITTALS

- A. Product Data: For each joint-sealant product, include documentation for VOC content of sealants and sealant primers.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.
- D. Warranties: Sample of special warranties.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An entity employing installers trained and experienced in installing joint sealants similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance.

1.5 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.6 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.
- C. Special warranties shall warrant that all exposed sealants will be guaranteed against any crazing developing on the surfaces of the material, any staining of adjacent surfaces by sealant or by primer (yellowing, etc.), chalking, or color changes on surface of cured sealant.
- D. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 - 1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 - 2. Disintegration of joint substrates from causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content: Sealants and primers applied at the Project site shall comply with VOC limits of authorities having jurisdiction; VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); and VOC limits of the California Green Building Standards Code (CGBSC), Section 5.504.4.1 and Table 504.4.2 as follows:
 - 1. Architectural Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.
- C. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- D. Stain-Test-Response Characteristics: Where sealants are indicated to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- E. Suitability for Contact with Food: Where sealants are used in areas of food preparation, use products that comply with 21 CFR 177.2600 and are USDA approved.
- F. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.
- G. Source Limitations: Obtain each kind of joint sealant from a single source from a single manufacturer.

2.2 SILICONE JOINT SEALANTS

- A. Silicone, S, NS, 100/50, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, non-traffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Use NT. neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Corning Corporation; 790.
 - b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
 - c. Tremco Incorporated; Spectrem 1.

2. Joint Sealant Application: Exterior joints where one or both joint faces are masonry, stone, concrete or other porous materials and are not to be painted.
- B. Silicone, Acid Curing, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Corning Corporation; 999-A.
 - b. GE Advanced Materials - Silicones; Contractors SCS1000.
 - c. Tremco Incorporated; Proglaze.
 2. Joint Sealant Application: Exterior joints where both joint faces are metal, glass, plastic, or other non-porous material and are not to be painted.
- C. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT; formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Corning Corporation; 786 Mildew Resistant.
 - b. GE Advanced Materials - Silicones; Sanitary SCS1700.
 - c. Tremco Incorporated; Tremsil 200 Sanitary.
 2. Joint Sealant Application: Interior joints between plumbing fixtures and floor or wall surfaces of non-porous materials and are not to be painted.

2.3 URETHANE JOINT SEALANTS

- A. Urethane, S, NS, 25, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Building Systems; Sonolastic NP1.
 - b. Pecora Corporation; Dynatrol I-XL.
 - c. Sika Corporation, Construction Products Division; Sikaflex - 1a.
 2. Joint Sealant Application: Exterior joints of hollow metal frames, exterior joints in concrete and masonry walls, and interior and exterior joints requiring painting.
- B. Urethane, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type S, Grade P, Class 25, Uses T and NT.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Building Systems; Sonolastic SL 1.
 - b. Pecora Corporation; Urexpan NR-201.
 - c. Sika Corporation. Construction Products Division; Sikaflex - 1CSL.
2. Joint Sealant Application: Interior concrete slab floor joints and exterior paving joints.

2.4 LATEX JOINT SEALANTS

- A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Building Systems; Sonolac.
 - b. Pecora Corporation; AC-20+.
 - c. Tremco Incorporated; Tremflex 834.
 2. Joint Sealant Application: Interior non-moving joints between gypsum board and adjacent materials, trim, or similar surfaces.

2.5 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Joint Sealant: Manufacturer's standard non-sag, paintable, non-staining latex acoustical sealant complying with ASTM C 834 that effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. GE Construction Sealants; RCS20 Acoustical.
 - b. Pecora Corporation; AC-20 FTR or AIS-919.
 - c. Tremco, Incorporated; Tremco Acoustical Sealant.
 - d. USG Corporation; SHEETROCK Acoustical Sealant.
 2. Joint Sealant Application: Interior joints of acoustically rated construction and where indicated on Drawings.

2.6 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) or Type B (bicellular material with a surface skin), as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.7 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting 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 and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 - d. Exterior insulation and finish systems.
 3. Remove laitance and form-release agents from concrete.
 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- B. Etch concrete and masonry joint surfaces as recommended by manufacturer to remove excess alkalinity, unless sealant manufacturer's printed instructions indicate that alkalinity does not interfere with sealant bond and performance. Etch with 5% solution of muriatic acid; neutralize with diluted ammonia solution, rinse thoroughly with water and allow to dry before sealant installation.
- C. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer. 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.
- D. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
1. Place sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Install sealant to depths as shown or, if not shown, as recommended by sealant manufacturer but within the following general limitations, measured at center (thin) section of bead:
1. For sidewalks, pavements and similar joints sealed with elastomeric sealants and subject to traffic and other abrasion and indentation exposures, fill joints to a depth equal to 75 percent of joint width, but neither more than 5/8 inch deep nor less than 3/8 inch deep.
 2. For normal moving joints sealed with elastomeric sealants but not subject to traffic, fill joints to a depth equal to 50 percent of joint width, but neither more than 1/2 inch deep nor less than 1/4 inch deep.
 3. For joints sealed with non-elastomeric sealants and caulking compounds, fill joints to a depth in range of 75 to 125 percent of joint width.
- G. Do not allow sealants or compounds to overflow or spill onto adjoining surfaces, or to migrate into voids of adjoining surfaces.
- H. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealant from surfaces adjacent to joints.
 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.

3.4 INSTALLATION OF ACOUSTICAL JOINT SEALANTS

- A. General: Comply with acoustical joint-sealant manufacturer's written installation instructions unless more stringent requirements apply.

- B. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical joint sealant. Install acoustical joint sealants at both faces of partitions, at perimeters, and through penetrations. Comply with ASTM C 919, ASTM C 1193, and manufacturer's written recommendations for closing off sound-flanking paths around or through assemblies, including sealing partitions to underside of floor slabs above acoustical ceilings.
- C. Acoustical Ceiling Areas: Apply acoustical joint sealant at perimeter edge moldings of acoustical ceiling areas in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.

3.5 FIELD QUALITY CONTROL

- A. General: Provide field adhesion testing when required by manufacturer and/or installer for warranties required of manufacturer and/or installer.
- B. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
 - 1. Extent of Testing: Test completed and cured sealant joints as follows:
 - a. Perform 10 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
 - b. Perform 1 test for each 1000 feet of joint length thereafter or 1 test per each floor per elevation.
 - 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - 3. Inspect tested joints and report on the following:
 - a. Whether sealants filled joint cavities and are free of voids.
 - b. Whether sealant dimensions and configurations comply with specified requirements.
 - c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
 - 4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.

5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
- C. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.6 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.7 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION

SECTION 099100 PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes surface preparation and field painting, of the following:
 - 1. Exposed exterior items and surfaces.
 - 2. Exposed interior items and surfaces.
 - 3. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
- B. Related Sections include but are not limited to the following:
 - 1. Division 26 through 28 Sections for additional requirements for painting of electrical items.

1.3 SPECIAL REQUIREMENTS

- A. Unauthorized removal or disconnecting of electrical fixtures, switches, or control devices may result in additional electrical work to comply with energy regulations of governing agencies. Contractor shall be financially responsible with no additional cost to the Owner for additional electrical work due to unauthorized removal or disconnecting of electrical fixtures, switches, or control devices.

1.4 DEFINITIONS

- A. Definitions of gloss levels below are from "MPI Architectural Painting Specification Manual" (hereafter, "MPI Manual").
 - 1. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
 - 2. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
 - 3. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
 - 4. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
 - 5. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

6. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.5 SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of finish-coat material indicated.
- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
 1. Submit Samples on 8 inch square samples of actual material to be painted or stained. For masonry surfaces, include a mortar joint.
 2. Step coats on Samples to show each coat required for system.
 3. Label each coat of each Sample.
 4. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 2. VOC content.
- E. Coating Maintenance Manual: Submit with Closeout/Maintenance Submittals a Coating Maintenance manual; manual shall include a floor plan with rooms identified by name and number, a finish schedule coordinated with the floor plan, designations of where each product/color/finish was used, product data pages, Material Safety Data Sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.6 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.
- B. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:
 1. Product name or title of material.
 2. Product description (generic classification or binder type).

3. Manufacturer's stock number and date of manufacture.
 4. Contents by volume, for pigment and vehicle constituents.
 5. Thinning instructions.
 6. Application instructions.
 7. Color name and number.
 8. VOC content.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F.
1. Maintain containers used in storage in a clean condition, free of foreign materials and residue.
 2. Keep storage area neat and orderly. Remove oily rags and waste daily.
 3. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.8 PROJECT CONDITIONS

- A. Apply paints only when the temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
- C. Protection:
1. Cover or otherwise protect finished work of other trades, work not to be painted concurrently, landscaping, and adjacent property from damage.
 2. When not in use, store paints in designated areas. Keep containers closed. At end of day's work, remove empty containers, paint soaked rags, and debris. Vent fumes. Take precautions to prevent fire.
- D. Sequencing, Scheduling:
1. Coordinate removal and replacement of hardware, electrical fixtures and trim, and related work of other Sections.
 2. Stain, prime, back paint, and pre-finish items before installation as required.
- E. Cleaning and Disposal:
1. Do not use Project plumbing fixtures or piping systems for:
 - a. Cleaning painting equipment and utensils.
 - b. Disposal of waste from cleaning or disposal of paints.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Scheduled Paint Systems: Provide paint systems as scheduled on the Drawings and listed in Part 3 Article "Paint Systems" to comply with requirements in this Section.
 - 1. Named Manufacturers' Products: Manufacturer and product designations indicated in the scheduled paint systems are for the purpose of establishing minimum requirements; unless otherwise indicated, paint products are based on products manufactured by the following:
 - a. Sherwin Williams Paints.
 - 1) Subject to compliance with requirements, provide the named products or comparable products by one of the following:
 - a) Dunn-Edwards Paints.
 - b) Glidden Professional.
 - c) PPG Paints.
 - d) Tnemec.

2.2 PAINT MATERIALS, GENERAL

- A. Material Compatibility: Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 1. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
- C. VOC Content: Paints and coatings applied at the Project site shall comply with VOC limits of authorities having jurisdiction; VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); and VOC limits of the California Green Building Standards Code (CGBSC), Section 5.504.4.3 and Table 504.4.3 as follows:
 - 1. Flat Paints and Coatings: VOC not more than 50 g/L.
 - 2. Nonflat Paints and Coatings: VOC not more than 100 g/L.
 - 3. Nonflat High-Gloss Paints and Coatings: VOC not more than 150 g/L.
 - 4. Dry-Fog Coatings: VOC not more than 150 g/L.
 - 5. Floor Coatings: VOC not more than 100 g/L.
 - 6. Pretreatment Wash Primers: VOC not more than 420 g/L.
 - 7. Primers, Sealers, and Undercoaters: VOC not more than 100 g/L.

8. Rust Preventative Coatings Applied to Ferrous Metals: VOC not more than 250 g/L.
 9. Shellacs, Clear: VOC not more than 730 g/L.
 10. Shellacs, Pigmented: VOC not more than 550 g/L.
 11. Stains: VOC not more than 250 g/L.
 12. Clear Wood Finishes, Varnishes: VOC not more than 275 g/L.
 13. Clear Wood Finishes, Lacquers: VOC not more than 275 g/L.
 14. Zinc-Rich Industrial Maintenance Primers: VOC not more than 340 g/L.
- D. Low-Emitting Materials: Interior paints and coatings shall comply with the testing and product requirements of the California Department of Public Health' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. Colors: Provide color selections made by the Architect. Colors shall be factory mixed and match approved samples.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
1. Concrete: 12 percent.
 2. Masonry (Clay and CMU): 12 percent.
 3. Wood: 15 percent.
 4. Portland Cement Plaster: 12 percent.
 5. Gypsum Board: 12 percent.
- C. Portland Cement Plaster Substrates: Verify that plaster is fully cured.
- D. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- E. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- F. Proceed with coating application only after unsatisfactory conditions have been corrected.
1. Application of coating indicates acceptance of surfaces and conditions.
- G. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify the Architect of anticipated problems using the materials specified over substrates primed by others.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" 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. Electrical Items: Remove only switch and outlet cover plates and similar items that do not require disconnecting wiring. Do not disconnect wiring or remove electrical fixtures, switches, or control devices unless otherwise indicated on Electrical Drawings.
 - a. Contractor may be subject to additional costs due to unauthorized removal of items, refer to Part 1 Article "Special Requirements."
 2. 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.
 2. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- D. Concrete and Masonry Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Perform appropriate tests to determine alkalinity and moisture content of surfaces; testing shall be performed or witnessed by a certified representative of the paint manufacturer. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
 1. Cracks and defects at concrete and masonry surfaces shall be filled with cement grout; match surface texture.
 2. Clean concrete floors to be painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting.
- E. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
 1. Steel Structures Painting Council's (SSPC), SSPC-SP 3, "Power Tool Cleaning."

2. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
- F. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
 - G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
 - H. Aluminum Substrates: Remove loose surface oxidation.
 - I. Wood Substrates: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required.
 1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
 2. Sand surfaces that will be exposed to view, and dust off.
 3. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and backsides of wood.
 - a. When transparent finish is required, backprime with spar varnish.
 - b. Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on backside.
 - c. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
 - J. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.
 - K. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
 1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
 2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
 3. Use only thinners approved by paint manufacturer and only within recommended limits.
 - L. Drywall: Fill any cracks or defects with drywall joint compound. Sand any rough spots smooth. Do not raise nap on paper covering.

3.3 APPLICATION

- A. General: Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual." Paint/stain exposed surfaces, except where schedules indicate that a surface or material is not to be painted/stained or is to remain natural. If schedules do not specifically mention an item or surface to be painted, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the Architect will select from standard colors and finishes available.
1. Use applicators and techniques suited for paint and substrate indicated.
 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
 3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
 4. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 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.
 7. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
 8. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned-tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
 9. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
 - a. Prefinished items include the following factory-finished components:
 - 1) Aluminum storefronts and entrances.
 - 2) Anodized aluminum gypsum board and plaster trim.
 - 3) Acoustical wall panels.
 - 4) Toilet and urinal partitions.
 - 5) Stainless steel items.
 - 6) Finished mechanical and electrical equipment.
 - 7) Light fixtures.
 - 8) Distribution cabinets.
 - b. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.
- B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.

- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
 - 1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
 - 2. Omit primer on metal surfaces that have been shop primed and touchup painted.
 - 3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 - 4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.
- F. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions and recommendations in "MPI Manual."
 - 1. Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.
 - 2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
 - 3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.
- G. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.
- H. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
- I. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.

- J. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- K. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.
 - 1. Provide satin finish for final coats.
- L. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface imperfections.
- M. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.
- N. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work: Paint the following work where exposed to view at applications indicated:
 - 1. Equipment rooms:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - 2. Occupied areas:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - 3. Exterior locations:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.

3.4 CLEANING AND PROTECTION

- A. At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the 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. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
- E. Correction of Defective Work:
 - 1. Repair abraded, damaged or incomplete paint surfaces by methods acceptable to Architect. Spot repairs to be well-blended into adjacent work. For large repairs, re-coat entire plane or building element in which damaged area occurs.
 - 2. Defaced surfaces of work not to be painted shall be cleaned and their original finish restored.
- F. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 PAINT SYSTEMS

(Interior and exterior paint systems are on the following pages)

A. Interior Paint Systems: Match Existing Paint System and Color

SURFACE		PAINT SYSTEM		COATS	MANUFACTURER'S DESIGNATION	
(1)	Gypsum Drywall	P12.A	Flat, Latex	First Coat Second Coat Third Coat	B28 B30 B30	ProMar 200 Zero Primer ProMar 200 Zero Flat ProMar 200 Zero Flat
		P12.B	Semi-Gloss Latex	First Coat Second Coat Third Coat	B28 B31 B31	ProMar 200 Zero Primer ProMar 200 Zero SG ProMar 200 Zero SG
		P12.C	Eggshell Enamel Latex	First Coat Second Coat Third Coat	061 B20 B20	ProMar 200 Zero Primer ProMar 200 Zero EG ProMar 200 Zero EG
	(Textured)	P12.D	Flat	One Coat	A44	Tuff Surface

(3)	Ferrous Metal	P14.A	Flat Latex	First Coat Second Coat Third Coat	B66310 A74 A74	ProCryl Metal Primer Solo Flat SoloFlat
		P14.B	Semi-Gloss Latex	First Coat Second Coat Third Coat	B66310 A76 A76	ProCryl Metal Primer Solo SG Solo SG
	Ferrous Metal (Cont.)	P14.C	Eggshell Latex	First Coat Second Coat Third Coat	B66310 A75 A75	ProCryl Metal Primer Solo EG Solo EG
(4)	Galvanized Metal/ Aluminum	P15.A	Flat Latex	First Coat Second Coat Third Coat	B66310 A74 A74	ProCryl Metal Primer Solo Flat Solo Flat
		P15.B	Semi-Gloss Latex	First Coat Second Coat Third Coat	B66310 A76 A76	ProCryl Metal Primer Solo SG Solo SG
		P15.C	Eggshell Latex	First Coat Second Coat Third Coat	B66310 A75 A75	ProCryl Metal Primer Solo EG Solo EG
(9)	Ceiling and Wall w/ misc. Pipes & Conduit Exposed, Trusses & Beams w/Spray-on Fire Insulation	P20.A	Latex Dry Fall	One Coat	B42	PI Waterbased Dryfall White or Black

(Exterior Paint Systems start on the following page)

B. Exterior Paint Systems: Match Existing Paint System and Color

SURFACE		PAINT SYSTEM		COATS	MANUFACTURER'S DESIGNATION	
(1)	Plaster, Concrete	P50.A	Flat, Acrylic	First Coat Second Coat Third Coat	LX02 A6 A6	Loxon A-100 A-100
		P50.B	Low Sheen Enamel Acrylic	First Coat Second Coat Third Coat	LX02 126 126	Loxon A-100 A-100
		P50.C	Elastomeric (Smooth) 5 year labor warranty	First Coat Second Coat Third Coat (Spray App.)	LX02 CF12 CF12	Loxon Masonry Primer Conflex XL Conflex XL
		P50.D	Elastomeric (Medium Aggregate) 5 year labor warranty	First Coat Second Coat Third Coat	LX02 CF12 CF12	Loxon Masonry Primer Conflex XL Conflex XL
(4)	Ferrous Metal	P55.D	Gloss, High Perform.	First Coat Second Coat Third Coat	646 B65 B65	Macropoxy Epoxy Acrolon 100 Acrolon 100
		P55.E	Semi-Gloss High Perform.	First Coat Second Coat Third Coat	B66-310 B66 B66	ProCryl Primer Pro Ind DTM Acrylic Pro Ind DTM Acrylic
(5)	Galv. Metal & Aluminum	P56.A	Gloss	First Coat	B66-310	ProCryl Primer
				Second Coat Third Coat	A77 A77	Solo GL Solo GL
		P56.B	Flat, Acrylic	First Coat Second Coat Third Coat	B66-310 A74 A74	ProCryl Primer Solo Flat Solo Flat
		P56.C	Semi-Gloss Enamel Acrylic	First Coat Second Coat Third Coat	B66-310 B53 B53	ProCryl Primer PI WB Urethan Enamel PI WB Urethan Enamel
		P56.D	Gloss	First Coat Second Coat Third Coat	B66-310 A77 A77	ProCryl Primer Solo GL Solo GL
		P56.E	Semi Gloss	First Coat Second Coat Third Coat	B66-310 A76 A76	ProCryl Primer Solo S/G SoloS/G
(6)	Galv. Metal &	P57.C	Gloss High	First Coat Second Coat	646 B65	Marcopoxy Epoxy Acrolon 100 High Gloss

SURFACE		PAINT SYSTEM		COATS	MANUFACTURER'S DESIGNATION	
	Aluminum		Perform.	Third Coat	B65	Acrolon 100 High Gloss
	High Perf.	P57.D	Semi-Gloss High Perform.	First Coat Second Coat Third Coat	B71Y1 B66 B66	DTM Wash Primer Pro Ind DTM Acrylic Pro Ind DTM Acrylic

END OF SECTION

SECTION 101400
SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Interior and exterior panel signs for room or space identification.

- B. Related Sections:

- 1. Division 01 Section "Temporary Facilities and Controls" for Project identification signage.
 - 2. Division 10 Section "Dimensional Sign Characters" for individual character signs.
 - 3. Division 10 Section "Cast Metal Plaques" for cast metal dedication plaques.
 - 4. Division 10 Section "Photoluminescent Exit Signs" for photoluminescent signs.
 - 5. Division 22, 23, and 26 Sections as applicable to Plumbing, Mechanical, and Electrical Work for tags and nameplates for equipment.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data including construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of sign.
- B. Shop Drawings: Include plans, elevations, and full-scale template layout of characters and other components. Show mounting methods, grounds, mounting heights, layout, spacing, reinforcement, accessories, and installation details.
 - 1. Provide message list for each sign, including large-scale details of wording, lettering, and Braille layout.
- C. Schedule: Schedule indicating sign locations, type, other pertinent data, and referenced to rooms or doors with the same referencing as used on the Drawings.
- D. Braille Text Certification: Provide certification from the sign manufacturer that Braille text complies with regulatory requirements indicated (Contracted (Grade 2) per 2019 CBC Section 11B-703.3).
- E. Braille Text Translation Confirmation: Provide confirmation of Braille text translations.

- F. Samples for Initial Selection: Manufacturer's color charts consisting of actual units or sections of units showing the full range of colors available for each type of sign and material indicated.
- G. Samples for Verification: Provide 2 full size sample signs showing edge and corner condition, border, text characters of height specified, Braille text, and selected colors, of each type of sign indicated. Sample will be retained by Architect.
- H. Maintenance Data: For signage cleaning and maintenance requirements to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain each sign type through one source from a single manufacturer.

1.5 FIELD CONDITIONS

- A. Field Measurements: Where sizes of signs are determined by dimensions of surfaces on which they are installed, verify dimensions by field measurement before fabrication and indicate measurements on Shop Drawings.

1.6 WARRANTY

- A. Warranty: Manufacturer's standard form in which manufacturer agrees to replace signs that fail in materials or workmanship within specified warranty period.
 - 1. Damage from deliberate destruction and vandalism is excluded.
 - 2. Warranty Period for Interior Signs: Building lifetime.
 - 3. Warranty Period for Exterior Signs: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 REGULATORY REQUIREMENTS FOR SIGNS

- A. Regulatory Requirements: Comply with requirements of the following:
 - 1. 2010 ADA Standards for Accessible Design.
 - 2. ANSI A117.1.
 - 3. 2019 California Building Code, Sections 11B-216 and 11B-703.
- B. Room or Space Identification Signs, CBC 11B-216.2: Where provided, signs identifying permanent rooms and spaces shall comply with CBC Sections 11B-703.1, 11B-703.2, 11B-703.3, and 11B-703.5. Where pictograms are provided as designations of permanent rooms and spaces, the pictograms shall comply with CBC Section 11B-703.6 and shall have text descriptors complying with CBC Sections 11B-703.2 and

11B-703.5. Exterior signs that are not located at the door to the space they serve shall not be required to comply with CBC Section 11B-703.2.

- C. Directional and Informational Signs, CBC 11B-216.3: Signs that provide direction to or information about spaces and facilities shall comply with CBC Section 11B-703.5.
- D. Means of Egress Signs, CBC 11B-216.4: Tactile exit signs required by CBC Section 1013.4 at doors to exit passageways, exit discharge, and exit stairways shall comply with CBC Sections 11B-703.1, 11B-703.2, 11B-703.3, and 11B-703.5.
- E. Inspection, CBC 11B-703.1.1.2: Signs and identification devices shall be field inspected after installation and approved by the enforcing agency prior to the issuance of a final certificate of occupancy per Chapter 1, Division II, Section 111, or final approval where no certificate of occupancy is issued. The inspection shall include, but not be limited to, verification that Braille dots and cells are properly spaced and the size, proportion and type of raised characters are in compliance with the regulations of CBC Section 11B-703.
- F. Raised Characters, CBC 11B-703.2: Raised characters shall comply with CBC Section 11B-703.2 and shall be duplicated in Braille complying with CBC Section 11B-703.3. Raised characters shall be installed in accordance with CBC 11B-703.4.
 - 1. Depth: Raised characters shall be raised 1/32-inch minimum above their background.
 - 2. Case: Raised characters shall be upper case.
 - 3. Style: Raised characters shall be sans serif. Characters shall not be italic, oblique, script, highly decorative, or other unusual forms.
 - 4. Character Proportions: Raised characters (Text) on signs shall be selected from fonts where the width of the uppercase letter "O" is 60 percent minimum and 110 percent maximum of the height of the uppercase letter "I".
 - 5. Character Height: Character height measured vertically from the baseline of the character shall be of 5/8-inch minimum and 2-inches maximum based on the height of the uppercase letter "I".
 - 6. Stroke Thickness: Stroke thickness of the uppercase letter "I" shall be 15 percent maximum of the height of the character.
 - 7. Character Spacing: Character spacing shall be measured between the two closest points of adjacent raised characters within a message, excluding word spaces. Where characters have rectangular cross sections, spacing between individual raised characters shall be 1/8 inch minimum and 4 times the raised character stroke width maximum. Where characters have other cross sections, spacing between individual raised characters shall be 1/16 inch minimum and 4 times the raised character stroke width maximum at the base of the cross sections, and 1/8 inch minimum and 4 times the raised character ma stroke width maximum at the top of the cross sections. Characters shall be separated from raised borders and decorative elements 3/8 inch minimum.
 - 8. Line Spacing: Spacing between the baselines of separate lines of raised characters within a message shall be 135 percent minimum and 170 percent maximum of the raised character height.
 - 9. Format: Text shall be in a horizontal format.
 - 10. Finish and Contrast: Characters and their background shall have a non-glare finish. Characters shall contrast with their background with either light characters

on a dark background or dark characters on a light background. Requirement applies to all signs.

G. Braille, CBC 11B-703.3: Braille shall be contracted (Grade 2) and shall comply with CBC Sections 11B-703.3 and 11B-703.4.

1. Dimensions and Capitalization (CBC 11B-703.3.1): Braille dots shall have a domed or rounded shape and shall comply with CBC Table 11B-703.3.1. The indication of an uppercase letter or letters shall only be used before the first word of sentences, proper nouns and names, individual letters of the alphabet, initials, and acronyms. Braille dot physical requirements shall be per CBC Table 11B-703.3.1 as indicated below; dimensions for distances are measured from center to center of Braille dots:
 - a. Dot Base Diameter: 0.059 inch minimum, 0.063 inch maximum.
 - b. Distance between Two Dots in the same Cell: 0.100 inches.
 - c. Distance between corresponding Dots in adjacent Cells: 0.300 inches.
 - d. Dot Height: 0.025 inch minimum, 0.037 inch maximum.
 - e. Distance between corresponding Dots from one cell directly below: 0.395 inch minimum, 0.400 inch maximum.
2. Position (CBC 11B-703.3.2): Braille shall be positioned below the corresponding text in a horizontal format, flush left, or centered. If text is multi-lined, Braille shall be placed below the entire text. Braille shall be separated 3/8 inch minimum and 1/2 inch maximum from any other tactile characters and 3/8 inch minimum and from raised borders and decorative elements.

H. Sign Installation Height and Location, CBC 11B-703.4:

1. Height Above Ground or Floor: Tactile characters on signs shall be located 48 inches minimum above the finish floor or ground surface, measured from the baseline of the lowest Braille cells and 60 inches maximum above the finish floor or ground surface, measured from the baseline of the highest line of raised characters.
2. Location: Where a tactile sign is provided at a door, the sign shall be located alongside the door at the latch side. Where a tactile sign is provided at double doors with one active leaf, the sign shall be located on the inactive leaf. Where a tactile sign is provided at double doors with two active leaves, the sign shall be located to the right of the right hand door. Where there is no wall space at the latch side of a single door or at the right side of double doors, signs shall be located on the nearest adjacent wall. Signs containing tactile characters shall be located so that a clear floor space of 18 inches minimum by 18 inches minimum, centered on the tactile characters, is provided beyond the arc of any door swing between the closed position and 45 degree open position. Where provided, signs identifying permanent rooms and spaces shall be located at the entrance to, and outside of the room or space. Where provided, signs identifying exits shall be located at the exit door when approached in the direction of egress travel.

I. Visual Characters, CBC 11B-703.5: Visual characters are considered to be intended for signage that is not accompanied by Braille. (The requirements of this Section do not apply to room identification signage).

1. Finish and Contrast: Characters and their background shall have a non-glare finish. Characters shall contrast with their background with either light characters on a dark background or dark characters on a light background. Requirement applies to all signs.
2. Case: Characters shall be upper case or lower case or a combination of both.
3. Style: Characters shall be conventional in style. Characters shall not be italic, oblique, script, highly decorative, or other unusual forms.
4. Character Proportions: Characters shall be selected from fonts where the width of the uppercase letter "O" is 60 percent minimum and 110 percent maximum of the height of the uppercase letter "I".
5. Character Height: Minimum character height shall be based on the uppercase letter "I" and shall comply with CBC Table 11B-703.5.5 as follows:
 - a. Height of baseline of character from finish floor:
 - 1) 40 inches minimum to less than or equal to 70 inches with a horizontal viewing distance of:
 - a) Less than 72 inches: Minimum character height to be 5/8 inch.
 - b) 72 inches and Greater: Minimum character height to be 5/8 inch plus 1/8 inch for each foot of viewing distance beyond 72 inches.
 - 2) Greater than 70 inches to less than or equal to 120 inches with a horizontal viewing distance of:
 - a) Less than 180 inches: Minimum character height to be 2 inches.
 - b) 180 inches and Greater: Minimum character height to be 2 inches plus 1/8 inch for each foot of viewing distance beyond 180 inches.
 - 3) Greater than 120 inches, with a horizontal viewing distance of:
 - a) Less than 21 feet: Minimum character height to be 3 inches.
 - b) 21 feet and Greater: Minimum character height to be 3 inches plus 1/8 inch for each foot of viewing distance beyond 21 feet.
6. Height from Finish Floor or Ground: Visual characters shall be 40 inches minimum above the finish floor or ground measured to the baseline of the character.
7. Stroke Thickness: Stroke thickness of the uppercase letter "I" shall be 10 percent minimum and 20 percent maximum of the height of the character.
8. Character Spacing: Character spacing shall be measured between the two closest points of adjacent raised characters, excluding word spaces. Spaces between individual characters shall be 10 percent minimum and 35 percent maximum of character height.
9. Line Spacing: Spacing between the baselines of separate lines of characters within a message shall be 135 percent minimum and 170 percent maximum of the raised character height.
10. Format: Text shall be in a horizontal format.

J. Pictograms, CBC 11B-703.6:

1. Pictogram Field: Pictograms shall have a field height of 6 inches minimum. Characters and Braille shall not be located in the pictogram field.
2. Finish and Contrast: Pictograms and their field shall have a non-glare finish. Pictograms shall contrast with their field with either a light pictogram on a dark field or a dark pictogram on a light field.
3. Text Descriptors: Pictograms shall have text descriptors located directly below the pictogram field. Text descriptors shall comply with CBC Sections 11B-703.2, 11B-703.3, and 11B-703.4.

K. Symbols of Accessibility, CBC 11B-703.7:

1. Finish and Contrast: Symbols of accessibility and their background shall have a non-glare finish. Symbols of accessibility shall contrast with their background with either a light symbol on a dark background or a dark symbol on a light background.
2. Symbols:
 - a. International Symbol of Accessibility (ISA): ISA symbols shall comply with CBC Figure 11B-703.7.2.1. The symbol shall consist of a white figure on a blue background. The blue shall be Color No. 15090 in Federal Standard 595B.
 - b. International Symbol of Teletypewriter (TTY): The International Symbol of Teletypewriter (TTY) shall comply with CBC Figure 11B-703.7.2.2.
 - c. Volume Control Telephones: Telephones with a volume control shall be identified with a pictogram complying with CBC Figure 11B-703.7.2.3.
 - d. Assistive Listening Systems: Assistive listening systems shall be identified by the International Symbol of Access for Hearing loss complying with CBC Figure 11B-703.7.2.4.
 - e. Toilet and Bathing Facilities, Geometric Symbols: Doorways leading to toilet and bathing rooms shall be identified by a geometric symbol complying with CBC Section 11B-703.7.2.6. The symbol shall be mounted at 58 inches minimum and 60 inches maximum above the finish floor measured from the centerline of the symbol. Where a door is provided, the symbol shall be mounted within 1 inch of the vertical centerline of the door.
 - 1) Men's Toilet and Bathing Facilities: Men's toilet and bathing facilities shall be identified by an equilateral triangle, 1/4 inch thick, with edges 12 inches long and a vertex pointing upward. The triangle symbol shall contrast with the door, either light on dark background or dark on a light background.
 - 2) Women's Toilet and Bathing Facilities: Women's toilet and bathing facilities shall be identified by a circle, 1/4 inch thick and 12 inches in diameter. The circle symbol shall contrast with the door, either light on dark background or dark on a light background.

- 3) Unisex Toilet and Bathing Facilities: Unisex toilet and bathing facilities shall be identified by a circle, 1/4 inch thick and 12 inches in diameter with a 1/4 inch thick triangle with a vertex pointing upward superimposed on the circle and within the 12 inch diameter. The triangle symbol shall contrast with the circle symbol, either light on dark background or dark on a light background, the circle symbol shall contrast with the door, either light on dark background or dark on a light background.
- 4) Edges and Corners: Edges of geometric symbols shall be rounded, chamfered, or eased. Corners of geometric symbols shall have a minimum radius of 1/8 inch.

2.2 MANUFACTURERS

- A. Manufacturers, Basis-of-Design Products: In other Articles where named manufacturer's products are indicated, Drawings and Specifications are based on products manufactured by:
 1. Best Sign Systems Inc.
 - a. Subject to compliance with requirements, provide products indicated or comparable products by one of the following:
 - 1) ASI-Modulex, Inc.
 - 2) Gemini Incorporated.

2.3 PANEL SIGNS

- A. General: Provide smooth panel sign surfaces constructed to remain flat under installed conditions within tolerance of plus or minus 1/16 inch measured diagonally from corner to corner complying with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
- B. Design Requirements: Panel signs shall comply with Part 2 Article "Regulatory Requirements for Signs."
- C. Scheduled Signs: Provide signs as indicated on Drawings and as scheduled in Part 3 Article "Sign Schedule."
- D. Interior Panel Signs: Basis of Design: Best Sign Systems, Inc., HC 300 Series signs complying with the following requirements:
 1. Material: Best Sign Systems Inc., MP Plastic, phenolic-backed melamine plastic laminate faced sheet, 0.25-inch thick.
 2. Material: Best Sign Systems Inc., fiberglass Sheet, 0.25-inch thick.
 3. Edge Condition: Beveled.
 4. Corner Condition: Rounded to radius of 1/2 inch.
 5. Border: 3/8-inch wide.

6. Text Font: Standard Medium.
 7. Text Height: As indicated on Drawings.
 8. Mounting: Unframed, wall mounted.
 9. Color: As selected by Architect from manufacturer's full range, text and border shall contrast with background.
- E. Exterior Panel Signs: Basis of Design: Best Sign Systems, Inc., HC 300 Series signs complying with the following requirements:
1. Material: Fiberglass Sheet, 0.25-inch thick.
 2. Edge Condition: Beveled.
 3. Corner Condition: Rounded to radius of 1/2 inch.
 4. Border: 3/8-inch wide.
 5. Text Font: Standard Medium
 6. Text Height: As indicated on Drawings.
 7. Mounting: Unframed, wall mounted.
 8. Color: As selected by Architect from manufacturer's full range, text and border shall contrast with background.
- F. Sign Backs/Blanks: Provide matching sign blanks for signs mounted to transparent and/or semi-transparent glazed surfaces to conceal exposed sign backs.
1. Where sign backs/blanks are located within the interior of the building, signs shall be of the same material as other interior signs.
 2. Where sign backs/blanks are located on the exterior of the building, signs shall be of the same material as other exterior signs.

2.4 ACCESSORIES

- A. Mechanical Fasteners: Use tamper resistant fasteners fabricated from materials that are not corrosive to sign material and mounting surface.
- B. Adhesives: As recommended by sign manufacturer and with a VOC content of 70 g/L or less for adhesives used inside the weatherproofing system and applied on-site when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch thick, with adhesive on both sides.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. General: Locate signs and accessories where indicated, using mounting methods of types described and in compliance with manufacturer's written instructions.
 - 1. Install signs level, plumb, and with sign surfaces free from distortion and other defects in appearance.
 - 2. Install signs at locations required by regulatory requirements, as indicated on the Drawings, and per this Specification section.
- B. Height: Install signs at heights indicated on Drawings and to comply with regulatory requirements indicated in Part 2 Article "Regulatory Requirements for Signs" of this specification Section.
 - 1. Sign mounting height shall be consistent for the Project.
- C. Location Relative to Door Openings: Install signs relative to door openings as indicated on Drawings and to comply with regulatory requirements indicated in Part 2 Article "Regulatory Requirements for Signs" of this specification Section.
 - 1. Sign location relative to door openings shall be consistent for the Project.
- D. Wall-Mounted Panel Signs: Attach panel signs to wall surfaces using methods indicated below:
 - 1. Vinyl-Tape Mounting: Use double-sided foam tape to mount signs to smooth, nonporous surfaces that cannot be drilled or screwed. Do not use this method for vinyl-covered or rough surfaces.
 - 2. Silicone-Adhesive Mounting: Use liquid-silicone adhesive recommended in writing by sign manufacturer to attach signs to irregular, porous, or vinyl-covered surfaces. Use double-sided vinyl tape where recommended in writing by sign manufacturer to hold sign in place until adhesive has fully cured.
 - 3. Mechanical Fasteners: Use non-removable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.
 - 4. Where panel signs are mounted on glass, provide matching plate on opposite side of glass to conceal mounting materials.

3.3 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.
- B. Clean per manufacturer's recommendation prior to final inspection.

3.4 SIGN SCHEDULE

- A. Interior Room Identification Signs: Provide interior room identification signage adjacent to doors as indicated and scheduled on the Drawings.

1. Text Content: Identify rooms by number and name unless otherwise indicated. Room names and numbering shall comply with Owner's instructions (not Architect's referencing or numbering as indicated on the Drawings).
 2. Text Height: As indicated on Drawings and in compliance with referenced CBC and ADA requirements.
 3. Sign Size: As indicated on drawings.
- B. Tactile Exit Signs: Provide tactile exit signs at locations indicated on Drawings, as required to comply with regulatory requirements, and as follows:
1. Exterior Doors: Each grade level exterior exit door from a room or space having an illuminated exit sign shall be identified by a tactile exit sign with the word "EXIT".
 2. Interior Rooms to Exits: Each exit door to a corridor, exit enclosure, or exit passageway, from a room having an illuminated exit sign shall be identified by a tactile exit sign with the words "EXIT ROUTE".
- C. Toilet Room Identification Signs: Signage shall consist of door mounted geometric symbols and wall mounted identification signs to comply with regulatory requirements and as indicated on the Drawings.
- D. Exterior Room/Space Identification Signs: Provide exterior identification signage at exterior public access doors to each usable or occupied space of the building.
1. Text Content: Identify building areas by functional use. Text content shall comply with Owner's instructions.
 2. Text Height: As indicated on Drawings and in compliance with referenced CBC and ADA requirements.
 3. Sign Size: As indicated on drawings.

END OF SECTION

SECTION 101405
DIMENSIONAL SIGN CHARACTERS

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 cast aluminum dimensional sign characters.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data including construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of sign.
- B. Shop Drawings: Include plans, elevations, and large-scale layout of characters and other components. Show mounting methods, layout, spacing, reinforcement, accessories, and installation details.
- C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
- D. Maintenance Data: For signage cleaning and maintenance requirements to include in maintenance manuals.

1.4 FIELD CONDITIONS

- A. Field Measurements: Where sizes of signs are determined by dimensions of surfaces on which they are installed, verify dimensions by field measurement before fabrication and indicate measurements on Shop Drawings.

1.5 COORDINATION

- A. Coordinate location of backing for dimensional character anchorage with wall framing.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Castings: ASTM B 26/B 26M, of alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated.

2.2 DIMENSIONAL CHARACTERS

- A. Manufacturer: Subject to compliance with requirements, provide products manufactured by one of the following:
 - 1. ASI-Modulex, Inc.
 - 2. Gemini Incorporated.
 - 3. Metal Arts; Div. of L&H Mfg. Co.
- B. Fabricated Metal Letters: Produce characters with smooth flat faces, sharp corners, and precisely formed lines and profiles, free of pits, scale, sand holes, and other defects. Attach lugs into back of characters and tap to receive threaded mounting studs. Comply with the following requirements.
 - 1. Character Material: Aluminum.
 - 2. Character Finish: Clear anodized.
 - 3. Character Height: As indicated on Drawings.
 - 4. Text Style: As selected by Architect from manufacturer's standard font styles.
 - 5. Text/Message: As indicated on Drawings.
 - 6. Mounting: Concealed studs, noncorroding for substrates encountered.

2.3 DIMENSIONAL CHARACTER MATERIALS

- A. Aluminum Castings: ASTM B 26/B 26M, of alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated.

2.4 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following:
 - 1. Use concealed fasteners and anchors unless indicated to be exposed.
 - 2. For exterior exposure, furnish nonferrous-metal or stainless-steel devices unless otherwise indicated.
 - 3. Sign Mounting Fasteners, Through Fasteners: Exposed metal fasteners matching sign finish, with type of head indicated, installed in predrilled holes.
- B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.5 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.
- D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.6 ALUMINUM FINISHES

- A. Clear Anodic Finish: Manufacturer's standard Class 1 clear anodic coating, 0.018 mm or thicker, over a nonspecular as fabricated mechanical finish, complying with AAMA 611.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Examine supporting members to ensure that surfaces are at elevations indicated or required to comply with authorities having jurisdiction and are free from dirt and other deleterious matter.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Locate characters where indicated on Drawings, install characters using mounting methods indicated and according to manufacturer's written instructions.
 - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
 - 3. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

- B. Provide paper template showing proper character layout spacing and connection points for installation.
- C. Mounting Method:
 - 1. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.

3.3 CLEANING AND PROTECTION

- A. Remove and replace damaged or deformed characters that do not comply with specified requirements. Replace characters with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION

SECTION 260000
SUMMARY OF ELECTRICAL WORK

PART 1 - GENERAL

1.1 SCOPE

- A. In general, the Electrical Work described herein consists of the modification of existing electrical, lighting and signal systems in place and the installation of new electrical, lighting and signal systems equipment. All work shall be completed as directed by the Owner's authorized representative, in accordance with the Contract, Specifications and Construction Documents listed below.

1. General Conditions of Contract
2. Specifications:

Section	Title
260000	Summary of Electrical Work
260100	General Conditions for Electrical Work
260500	Basic Electrical Materials and Methods
260526	Grounding
269500	Electrical Acceptance Tests
272000	Telecommunication System
283100	Fire Alarm System

3. Electrical Construction Drawings as listed on the Drawing Index of the Construction Drawing set.
- B. This Section includes all necessary and required work to complete the construction as indicated in the Drawings, called for by notes or schedules, or specified herein. This work includes the furnishing of all permits, labor, supervision, services, materials, tools, equipment, testing, transportation and miscellaneous expenses, and the performance of all operations necessary to or incidental to completion of lawful and operating electrical power, lighting and signal systems, whether or not specifically mentioned.
- C. All work not shown in complete detail shall be installed per the CEC and in conformance with the best standard practice for the trade. Any deviation from the approved Drawings shall be submitted in writing to the Engineer and Owner for approval prior to the installation of the work in question.
- D. This work shall include, but not necessarily be limited to, the following elements:
1. Electrical Distribution:
 - a. Trenching, conduits and feeders for electrical power including connections to relocatable buildings.
 2. Grounding
 - a. Grounding system including installations of ground rods, ufer grounds, and ground rings, as shown. Connections to water and/or gas piping and building steel.
 - b. Provide the following grounding electrodes at the new building, bonded together to form the grounding electrode system:

- 1) Metal underground water pipe in direct contact with the earth for ten feet or more and electrically continuous to the points of connection of the grounding electrode conductor and the bonding conductors.
 - 2) The metal frame of the building, where effectively grounded.
 - 3) Concrete encased electrode (Ufer ground) consisting of a minimum of 20 feet of bare copper conductor (size 4 minimum) encased by a minimum of 2 inches of concrete, located within and near the bottom of a concrete foundation or footing that is in direct contact with the earth.
 - 4) Ground rod of copper clad steel, minimum $\frac{3}{4}$ inch diameter, minimum 10 feet long, driven full length into the earth. If a maximum resistance to ground of 5 ohms cannot be obtained with a single ground rod, provide additional ground rods installed not closer than 6 feet apart until a maximum resistance to ground of 5 ohms is obtained.
- c. Bonding of adjacent modular buildings.
 - d. Testing of grounding system as outlined in Section 269500.
3. Signal Distribution:
 - a. Trenching, conduits and conductors for signal systems.
 4. Data Distribution System
 - a. Extension of existing data distribution system for new relocatable buildings per Specification Section 272000 including Category 6 Data Cable and Jacks, access panels, terminal cabinets, conduit, wiring and terminations for a complete working system.
 5. Fire Alarm System:
 - a. Pre-testing of existing Fire Alarm system prior to initiation of Fire Alarm work or other work that may affect Fire Alarm system.
 - b. Connection to existing campus Fire Alarm system per Specification Section 283100 including initiation devices, notification devices, control devices, conduit, wiring and terminations and equipment for a complete working system.
 6. Equipment Connections
 - a. Provide equipment connections and coordination in accordance with manufacturer's recommendations and product submittals.
- E. It shall be understood that the existing conduit with its wiring is presently active (hot), in operation with its pertinent equipment.
 - F. It shall be noted that this construction work will be planned and executed during ongoing operation of the facility. Any modifications to the existing equipment currently in operation shall be done during scheduled shutdowns and coordinated with the Owner's authorized representative and facility operating personnel to assure minimum downtime.
 - G. In order to avoid disruption to facility operations, certain items of work must be completed before other items of work can be started. Contractor shall coordinate with the Owner's authorized representative as to the sequence of construction activities.

- H. Drawings showing equipment layout, conduit runs, conduit sizes, number of wires, wire types, wire groupings and size will not be furnished. It shall be the Contractor's responsibility to prepare such drawings in accordance with specifications, project requirements and code to facilitate the installation.
- I. Furnish, install and connect an underground grounding system, specifically mentioned on drawings as part of this contract, including all necessary materials and connections as required by code and/or as shown on the construction drawing.
- J. Furnish, install and connect all above grade grounding materials and make aboveground connections of underground cables to equipment and/or structural steel as shown on the construction drawings and as required by code.
- K. Size, furnish, install and connect new conduit, conduit fittings, and seal fittings, expansion fittings and supports. This includes above grade as well as underground.
- L. Size, furnish, and install junction, pull and terminal boxes, in accordance to code requirements and as shown on the construction drawings.
- M. Size, furnish and install all supports required for conduit installation, supports required for the installation of the equipment furnished by this Contractor and equipment furnished by others but installed by this Contractor.
- N. Size and field cut the openings for conduits passing through building walls and/or floors. Close and seal all openings after conduits have been installed and/or removed. Closing shall be compatible with, or of the same material as wall and/or floor.
- O. Furnish and install wire tags in accordance with the specifications indicating wire number as shown on electrical schematics, one line, three line diagrams and specifications.
- P. Perform all testing per the Specifications and report to Owner's field representative in a timely manner so as not to impede the scheduled completion of the Contract.
- Q. Prime paint all uncoated carbon steel items furnished by Contractor.
- R. Energize low voltage services after testing equipment and wiring in accordance with manufacturer instructions and specifications.

PART 2 - NOT USED

PART 3 - NOT USED

END OF SECTION 260000

SECTION 260100
GENERAL CONDITIONS FOR ELECTRICAL WORK

PART 1 - GENERAL

1.1 GENERAL CONDITIONS

- A. The general provisions of the Contract, including General Conditions and Specification Division 01, General Requirements, shall form a part of this Section, with the same force and effect as though repeated here. The provisions of this Section shall apply to all of the following Sections of Divisions 26-28 of these Specifications and shall be considered a part of these Sections.

1.2 QUALITY ASSURANCE

- A. All work and materials shall fully comply with current rules and regulations of all applicable codes. Nothing in these Drawings or Specifications shall be interpreted as to permit any work not in compliance with these codes. Where work is detailed and/or specified to a more restrictive standard or higher requirement, that standard or requirement shall govern such work. Applicable codes include, but are not limited to, the following:
1. California Code of Regulations (CCR)
 - a. Title 8, Industrial Relations
 - b. Title 17, Public Health
 - c. Title 24, Building Standards
 2. 2019 California Building Code.
 3. 2019 California Fire Code.
 4. 2019 California Electrical Code.
 5. Local Codes.
- B. All electrical components, devices and accessories shall be listed with Underwriters Laboratories, Inc. (or other testing agency acceptable to authorities having jurisdiction), shall meet their requirements, shall bear their label wherever standards have been established and label service is regularly furnished by that agency, and shall be marked for intended use.

1.3 PERMITS, FEES AND TAXES

- A. The Contractor shall secure all necessary permits and pay all required fees and taxes. He shall notify the proper authorities and have the work inspected and tested as required by jurisdictional requirements, pay all charges in connection therewith, and shall present to the Owner properly signed certificates of inspection. Acceptance of the work will not be considered until such certificates have been delivered.

1.4 TEMPORARY UTILITIES

- A. The Contractor shall fulfill utility requirements for and pay all one-time and monthly charges for temporary construction utility usage.

1.5 EXISTING CONDITIONS

- A. The Contractor shall carefully examine the site and existing buildings, compare them with Drawings and Specifications, and shall have satisfied himself as to the conditions to be encountered during the performance of the work. No subsequent allowance shall be made on his behalf for any additional expense he may incur due to failure or neglect of Contractor to examine site and to include existing conditions in bid.
- B. Any work done as an addition, expansion, or remodel of an existing system shall be compatible with that system.
- C. The Contractor shall examine all record drawings made available by the Owner to locate existing underground systems, utilities, conduits, and pipes prior to installing the electrical distribution system. The Contractor shall also examine the site for possible locations of sprinkler pipes. Any damage done to the existing systems during the course of the electrical work, whose locations could be reasonably determined, shall be repaired to the satisfaction of the Owner and the utility or agency involved, at the expense of the Contractor.

1.6 CONDUCT OF THE WORK

- A. The Contractor shall maintain on the job a competent foreman or a superintendent at all times to superintend the Work.

1.7 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS

- A. The Engineer's decision will be final on interpretation of the Drawings and Specifications. Whenever the words "AS MAY BE DIRECTED", "SUITABLE", or "APPROVED EQUAL", or other words of similar intent and meaning are used, implying that judgment is to be exercised, it is understood that it is in reference to the judgement of the Engineer.

1.8 SUBMITTALS

- A. Shop Drawings and Product Data
 - 1. **Shop Drawings and Product Data** shall comply with the following requirements:
 - a. The Contractor shall submit for review, complete sets of Shop Drawings and Product Data brochures for materials and equipment as required by each section of the Specifications.
 - b. All Shop Drawings and Product Data shall be submitted at one time in a neat and orderly fashion in a suitable binder with a Title Sheet including Project, Engineer and Contractor, Table of Contents, and indexed tabs dividing each group of materials or item of equipment. The Specification paragraph number for which they are proposed shall identify all items.

The mark number as indicated on Drawings shall also identify all equipment and fixtures.

- c. Shop Drawings and Product Data submittal shall include manufacturer's name and catalog numbers, dimensions, loads, and all other characteristics and accessories as listed in the Specifications or on the Drawings. All loads, characteristics, and accessories called for in the Specifications or on the Drawings shall be highlighted, circled or underlined on the Shop Drawings and Product Data. Descriptive literature shall be current factory brochures and submittal sheets.
- d. FAX submittals are not acceptable.
- e. Material or equipment shall not be ordered or installed until the Engineer processes the written review. Any item omitted from the submittal shall be provided as specified without substitution.
- f. Prior to submission of the Shop Drawings and Project Data, Contractor shall review and certify that they meet the requirements of the Contract Documents.
- g. A minimum period of two weeks, exclusive of transmittal time, will be required each time Shop Drawings and/or Product Data are submitted or resubmitted for review. The Contractor shall consider this time when scheduling a submittal date.

B. Submittal Review

- 1. Submittals will be reviewed for general conformance with the design concept, but this review does not guarantee quantity shown, nor does it supersede the responsibility of the Contractor to provide all materials, equipment and installation in accordance with the Drawings and Specifications.
- 2. The Contractor shall agree that Shop Drawings and Product Data submittals processed by the Engineer are not Change Orders and that the purpose of Shop Drawings and Product Data submittals by the Contractor is to demonstrate to the Engineer that the Contractor understands the design concept. The Contractor demonstrates his understanding by indicating which equipment and material he intends to furnish and install and by detailing the fabrication and installation methods he intends to use.
- 3. It shall be clearly understood that the noting of some errors, but the overlooking of others, **does not** grant the Contractor permission to proceed in error or in conflict with Contract Documents. The Contractor shall agree that if deviations, discrepancies or conflicts between Shop Drawings and Design Drawings and Specifications are discovered either prior to or after Shop Drawing submittals are processed by the Engineer, the Design Drawings and Specifications shall control and shall be followed.
- 4. If a resubmittal is required, submit a complete copy of the Engineer's review letter requiring such with the resubmittal.

C. Substitutions

- 1. **Substitutions** shall comply with the following requirements:
 - a. Manufacturers, model numbers and other pertinent information listed in the Specifications or on the Drawings are intended to establish minimum standards of performance, function and quality. Unless otherwise noted, the Contractor may submit equivalent compatible UL-listed equipment

from other manufacturers for review, as long as the minimum standards are met.

- b. Calculations and other detailed data indicating how the item was selected shall be included for items that are not specified. Data must be complete enough to permit detailed comparison of every significant feature, function, performance, and quality characteristic that is specified, scheduled or detailed. The comparison must prove that the substituted item equals or exceeds the requirements of the specified item.
- c. The Contractor shall assume full responsibility that substituted items or procedures will meet the Specification and job requirements and shall be responsible for the cost of redesign and modifications to the work caused by these items.
- d. At the Engineer's request, the Contractor shall furnish locations where equipment similar to the substituted equipment is installed and operating along with the user's phone numbers and contact person. Satisfactory operation and service history will be considered in the acceptance or rejection of the proposed substitution.

D. Record Drawings

1. **Record Drawings** shall comply with the following requirements:

- a. At the beginning of the Project, one print of each applicable Drawing will be issued to the Contractor specifically for use in preparing Record Drawings. As the work progresses, the Contractor shall maintain a record of all deviations in the work from that indicated on the Drawings. Final locations of all underground work shall be recorded by depth from finished grade and by offset distance from permanent surface structures, e.g. building, curbs, walks. The original Drawings will be made available to the Contractor, from which he shall have made, a set of reproducible Drawings. The Contractor shall then transfer the changes, notations, etc. from the marked-up prints to the reproducible Drawings. The Record Drawings (marked-up prints and reproducibles) shall be submitted to the Engineer for review, after first securing the Inspector's verification by signature.

E. Operations and Maintenance Instructions

1. **Operations and Maintenance Instructions** shall comply with the following requirements:

- a. Three copies of Operation and Maintenance Instructions and Wiring Diagrams for all equipment shall be submitted to the Engineer. All instructions shall be clearly identified by marking them with the same designation as the equipment item to which they apply (e.g. UPS-1). All Wiring Diagrams shall agree with reviewed Shop Drawings and indicate the exact field installation.
- b. All instructions shall be submitted at the same time and shall be bound in a suitable binder with tabs dividing each type of equipment (e.g. MCC, UPS, etc.). Each binder shall be labeled indicating "Operating and Maintenance Instructions, Project Title, Contractor, Date" and shall have a Table of Contents listing all items included.
- c. The Contractor shall verbally instruct the Owner's maintenance staff in the operation and maintenance of all equipment and systems. The Engineer's office shall be notified 48 hours prior to this meeting.

- d. The Contractor shall prepare a letter indicating that all Operation and Maintenance Instructions (printed and verbal) have been given to the Owner, to the Owner's satisfaction. This letter shall be acknowledged (signed) by the Owner and submitted to the Engineer.

1.9 COORDINATION

- A. Electrical Drawings are essentially diagrammatic, unless specifically dimensioned. Some work may be shown offset for clarity. The actual locations of all materials, conduits, fixtures, supports, etc. shall be carefully planned prior to installation of any work in order to avoid all interferences with each other, or with architectural, civil, mechanical, plumbing, structural or other elements.
- B. While the size and location of equipment are shown to scale wherever possible, all dimensions and conduit/conductor data shall be verified in the field.
- C. Where the work requires connections to be made to equipment furnished and set in place by others, the Contractor shall obtain exact rough-in dimensions from the manufacturer of such equipment and he shall install the connections in a neat and workmanlike manner.
- D. If discrepancies are discovered between Drawings and Specifications requirements, the more stringent requirement shall apply.
- E. All conflicts shall be called to the attention of the Architect and the Engineer prior to the installation of any work or the ordering of any equipment.
- F. No work shall be prefabricated or installed prior to this coordination. No additional compensation will be considered to the Contractor for any prefabrication or installation performed prior to this coordination.

1.10 SCHEDULING

- A. All work shall be scheduled subject to the review of the Architect, Engineer and the Owner. No work shall interfere with the operation of the existing facilities on or adjacent to the site. The Contractor shall have at all times, as conditions permit, a sufficient force of workmen and quantity of materials to install the work for which contracted, as rapidly as possible consistent with good work, and shall cause no delay to other Contractors engaged upon this project or to the Owner.

1.11 WARRANTY

- A. Guarantee shall be in accordance with the General Conditions. These Specifications may extend the period of the guarantee for certain items. Where such extension are called for, or where items are normally provided with guarantee periods in excess of that called for in the General Conditions, the Certificate of Guarantee shall be furnished to the Owner through the Engineer.
- B. Contractor shall deliver to the Owner a written guarantee on all workmanship, materials and equipment for a period of one (1) year from the date of acceptance by the Owner. Any work found to be faulty during that period of time shall be corrected at once, upon written notification, at the expense of the Contractor. This shall include repair or

replacement of the premises that may be damaged as a result of faulty work and materials furnished.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Materials and equipment shall be new unless otherwise noted.
- B. Materials and equipment of a given type shall be by the same manufacturer.
- C. Materials and equipment shall be covered or otherwise protected during construction as required to maintain the material and equipment in new factory condition until project acceptance. Upon completion of work and prior to final inspection, Contractor shall thoroughly clean all exposed fixtures, trim and equipment, and shall leave the entire installation in neat, clean, and useable condition. Materials and equipment shall be free of dents, scratches, marks, shipping tags, and all defacing features at time of project acceptance.
- D. The Contractor shall order materials and equipment in a timely manner to prevent any delay in the construction schedule, and he shall bear any penalty by vendors to meet schedules.
- E. Verify all dimensional information to ensure proper clearance for installation of equipment. Check all materials and equipment after arrival on the jobsite and verify compliance with the Contract Documents.

PART 3 - EXECUTION

3.1 DEMOLITION

- A. The Contractor shall protect existing electrical equipment and installations that are not indicated to be removed. If damaged or disturbed in the course of the Work, remove damaged portions and install new products of equal capacity, quality, and functionality.
- B. Exposed electrical equipment and installations, indicated to be demolished, shall be removed in their entirety.
- C. Buried raceway and wiring, indicated to be abandoned in place, shall be cut 2 inches below the surface of adjacent construction and removed in its entirety. Raceways abandoned in place shall be capped and disturbed surfaces shall be patched to match existing finish.
- D. Demolished material shall be removed from Project site.
- E. Components indicated for relocation shall be removed, stored, cleaned, reinstalled, reconnected, and made operational.

3.2 CUTTING AND PATCHING

- A. The Contractor shall perform all cutting and drilling, or other work, required to provide openings in walls, ceilings, floors, footings, foundations or other structures necessary to accomplish work under this Specification Division. The cutting shall be performed by skilled mechanics of the trades involved.
- B. Cutting or coring shall not impair the strength of the structure. Any damage resulting from this work shall be repaired at the Contractor's expense to the satisfaction of the Architect.
- C. Wherever possible, work shall be done in a concealed and neat workmanlike manner requiring the least amount of cutting of studs, plates and woodwork. Such cutting or notching is allowed only after consultation with and by permission of the Engineer.
- D. The Contractor shall repair and refinish disturbed finish materials and other surfaces to accurately match adjacent undisturbed new or existing structures and surfaces and shall install new fireproofing where existing fire-stopping has been disturbed. The repair and refinishing of materials and other surfaces shall be by skilled mechanics of the trades involved.
- E. All cuts are to be clean with no chipping. Where chipping occurs as a result of work in a cut area, a new clean cut shall be made immediately prior to patching.

3.3 EXCAVATION AND BACKFILL

- A. The Contractor shall provide excavation and backfilling required to complete work detailed in the Drawings and Specifications. Unless otherwise noted, minimum earth cover above top of conduit outside building walls shall be 24", not including base and paving in paved areas.
- B. The location of all underground facilities shall be verified with the Owner and utility companies prior to the commencement of any excavation.
- C. The Contractor shall contact Underground Service Alert (USA), at 1-800-642-2444, ten (10) days prior to doing any excavation or trenching, and shall advise USA of the work schedule and comply with their requirements.
- D. The Contractor shall notify the Owner 72 hours prior to any excavation.
- E. Provide all shoring required by site conditions. Where over-excavation occurs, provide compacted sand backfill. Where groundwater is encountered, remove to keep excavation dry, using well points and pumps as required.
- F. The conduit shall be laid on firm soil cut true and even to afford bearing for the full length of the barrel of the conduit.
- G. When the bottom uncovered at sub-grade is soft and, in the opinion of the Engineer, cannot support the conduit, a further depth shall be excavated and refilled to conduit foundation grade as required by the Engineer.
- H. Backfill (where concrete encasement is not required):

1. Material 3" below, 3" around, and to 6" above conduit shall be sand. Place carefully around and on top of conduit, taking care not to disturb conduit. Consolidate with vibrator.
 2. Material from 6" Above Conduit to Grade shall be sandy or silty loam, free of lumps, laid in 6" layers, uniformly mixed to proper moisture and compacted to required density. If backfill is determined to be suitable and required compaction is demonstrated by laboratory test, water compaction in 6" layers may be used, subject to review by Engineer.
- I. No excavation below the level of, or adjacent to, foundations of footings shall be made except in a manner approved by the Structural Engineer.
- J. Compaction
1. Prior to compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
 2. Under **Structures, Building Slabs, Walkways, and Steps**, compact top 6" of sub-grade and each layer of backfill or fill material at 92% maximum relative compaction. Compact upper 2' of backfill in utility trenches or other excavations to 92% minimum relative compaction.
 3. In **Lawns and Unpaved Areas**, compact top 6" of sub-grade material to 85% relative compaction.
 4. Under **Pavement**, compact top 8" of sub-grade immediately beneath the base course at 95% minimum relative compaction.

3.4 SEISMIC ANCHORAGE AND BRACING

A. Equipment Anchorage

1. All electrical equipment and components shall be anchored and installed per the details on the DSA approved construction documents. Where no detail is indicated, the following components shall be anchored or braced to meet the force and displacements requirements prescribed in the 2019 CBC, Sections 1616A.1.18 through 1616A.1.26. and ASCE 7-10 Chapter 13, 26, and 30:
 - a. All permanent equipment and components
 - b. Temporary or movable equipment that is permanently attached (e.g. hard wired) to building utility electrical service.
 - c. Movable equipment which is stationed in one place for more than 8 hours and heavier than 400 pounds are required to be anchored with temporary attachments.
2. The attachment of the following electrical components shall be positively attached to the structure, but need not be detailed on the plans. These components shall have flexible connections provided between the components and associated conduit.

- a. Components weighting less than 400 pounds and have a center of mass located 4 feet or less above the adjacent floor or roof level that directly support the components.
- b. Components weighting less than 20 pounds, or in the case of distributed systems, less than 5 pounds per foot, which are suspended from a roof or floor or hung from a wall.

For those elements that do not require details on the approved drawings, the installation shall be subject to the approval of the Structural Engineer of Record and the DSA Structural Engineer. The project inspector will verify that all components and equipment have been anchored in accordance with above requirements.

B. Electrical Distribution System Bracing

- 1. Electrical distribution systems shall be braced to comply with the forces and displacements prescribed in ASCE 7-10 Section 13.3 as defined in ASCE 7-10 Section 13.6.8, 13.6.7, 13.6.5.6, and 2019 CBC, Sections 1616A.1.23, 1616A.1.24, 1616A.1.25, and 1616A.1.26.
- 2. The bracing and attachments to the structure shall be detailed on the approved drawings or they shall comply with one of the OSHPD Pre-Approvals (OPM#).
- 3. Copies of the manual shall be available on the jobsite prior to the start of hanging and bracing of the electrical distribution systems.
- 4. The Structural Engineer of Record shall verify the adequacy of the structure to support the hanger and brace loads.

3.5 CLEANING AND PROTECTION

- A. The Contractor shall, progressively and at completion of the job, thoroughly clean all of his work including outlets, fittings, and devices, and inspect exposed finishes. The Contractor shall remove all burrs, dirt, grease, paint spots, stains, labels, tags, rust, foreign material, and construction debris resulting from his work.
- B. The Contractor shall protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END OF SECTION 260100

SECTION 260500

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SCOPE

- A. See Section 260000

1.2 STANDARDS

- A. NEMA 250 Standard for Enclosures for Electrical Equipment
(1000 Volts Maximum)

PART 2 - PRODUCTS

2.1 CONCRETE PADS, PULL BOXES AND MANHOLES

- A. At the Contractor's option, he shall provide cast-in-place or pre-cast structures.
- B. Weatherproof concrete pull boxes, junction boxes and telephone boxes shall be manufactured by Christy Concrete Products or equal. All boxes shall have lids marked "Power", "Signal", "Fiber Optic", "Danger-High Voltage", etc. and be traffic-rated per CalTrans drawing ES-8 minimum where pull box occurs in vehicular traffic areas.

2.2 RACEWAYS AND FITTINGS

- A. Galvanized rigid steel conduit (GRC) shall meet ANSI C80.1, and be heavy wall, hot dipped galvanized inside and out, with threaded ends, for use with threaded type fittings.
- B. Galvanized intermediate metallic conduit (IMC) shall meet ANSI C80.6, be zinc-coated steel and have threaded fittings.
- C. Galvanized electrical metallic tubing (EMT) shall meet ANSI C80.3, and be continuous, seamless steel tubing, galvanized or sherardized on exterior, coated on interior with smooth hard finish of lacquer, varnish or enamel, with **steel set-screw, steel compression or die-cast compression** type fittings. Provide concrete type fittings where required **or water-tight compression fittings for wet locations**.
- D. Rigid non-metallic conduit (RNC) shall meet NEMA TC 2, be Schedule 40 PVC, suitable for 90°C, with solvent cemented type NEMA TC3 fittings.
- E. Flexible metallic conduit (FMC) shall be single strip, continuous, flexible interlocked double-wrapped steel, hot dip galvanized inside and out forming smooth internal wiring channel, with steel, compression type fittings.

- F. Liquid-tight flexible metallic conduit (LFMC) shall be same as FMC except with inert sunlight-resistant, mineral-oil-resistant watertight plastic outer jacket. Fittings shall be cast malleable iron body and gland nut, cadmium plated with one-piece brass grounding bushings threaded to interior of conduit. Spiral molded vinyl-sealing ring between gland nut and bushing and nylon-insulated throat.
- G. All raceway fittings shall be specifically designed for the raceway type with which used.

2.3 CONDUCTORS

- A. All conductors shall be delivered to the site in their original unbroken packages, plainly marked or tagged with UL labels, size, type of wire, type of insulation, name of the manufacturing company and trade name of the wire.
- B. All conductors shall be minimum of 98% conductivity soft drawn copper. Conductors #8 AWG and larger shall be stranded type "THWN/THHN", 600 Volt insulation. Conductors #10 AWG and smaller shall be solid copper "THWN/THHN", 600 Volt insulation.
- C. Insulation shall be Thermoplastic Type rated at 75 degrees C. minimum.

2.4 PULL BOXES AND WIREWAYS

- A. Pullboxes and Enclosures for outdoor use shall be NEMA 250, Type 3R or Type 4, unless otherwise noted.
- B. Pullboxes and Enclosures for indoor use shall be NEMA 250, Type 1, unless otherwise noted.
- C. Wireways shall be constructed in accordance with UL 870 for wireways, auxiliary gutters and associated fittings. Every component including lengths, connectors and fittings shall be UL Listed.
- D. Wireways and auxiliary gutters shall have continuous removable cover secured with screws and keyhole slots. Hinged cover shall be provided where installed above suspended ceiling.
- E. Fabricated sheet steel pull boxes shall be installed only in dry, protected locations and shall be furnished with knockouts and removable screw cover. Box shall be finished with one coat of zinc chromate and a coat of primer sealer and where exposed to public view shall be painted to match the surrounding surface.
- F. Weatherproof sheet steel pull boxes shall be fabricated of code gauge galvanized sheet steel with two coats of rust resistant finish and shall be furnished with gasket and made completely weathertight.

2.5 WIRING DEVICES AND MATERIALS

- A. Outlet Boxes shall meet NEMA OS1 and be galvanized code gauge steel. Boxes in masonry shall be square cornered. Boxes exposed to weather or in wet locations shall be Type FD cast metal with external threaded hubs and gasketed cover and shall meet NEMA FB1.

- B. Outlet box extensions shall be U.L. listed and shall be attached to box with threaded metal screws. "Flash Guards" are not permitted to be used as box extensions.
- C. Approved manufacturers of metal boxes are Circle AW, Crouse-Hinds, Steel City or equal.
- D. Receptacles:
 - 1. Duplex Receptacles:
 - a. Duplex Receptacles shall be full gang size, polarized duplex, parallel blade, U-grounding slot, specification grade, rated at 20 amperes, 125 volts and designed for split feed service.
 - b. Receptacles served by normal power circuits shall be ivory, grey, white or brown, dependent upon room wall finish and as direct by Architect. Receptacles served by emergency power circuits shall be red.
 - c. Duplex receptacles shall be Hubbell or Leviton 5352 series.
 - 2. GFCI Receptacles:
 - a. GFCI receptacles shall be duplex, feed-through type, with integral NEMA WD 6, Configuration 5-20R duplex receptacle arranged to protect connected downstream receptacles on same circuit. Design units for installation in a 2-3/4-inch deep outlet box without an adapter.
 - b. Duplex GFCI receptacles shall be Hubbell or Leviton #GF5352 to match regular duplex receptacle.
 - 3. Receptacles for Owner-furnished equipment shall match that equipment's plug configuration.
 - 4. Other Receptacles: Other receptacles shall match the plug configuration and ratings required for the utilization equipment that is served.
- E. Device plates shall be provided and installed at all wiring devices, switches, outlets, and similar applications, and shall be as directed by architect. Pull boxes and junction to which no fixture is to be attached shall be fitted with blank cover plates painted to match surrounding.

2.6 PANELBOARDS

- A. Furnish panelboards shown on plans and described herein. All cans shall be a minimum of 20" wide and 5.75" deep unless otherwise shown. They shall be totally flat or equal with flush keyed locks.
- B. Fronts shall be cold rolled sheet steel painted with ANSI 61 gray enamel over a rust inhibitor. They shall be equipped with door, flush hinges, and flush proper cylinder tumbler lock, metal circuit card holder, and quarter turn adjustable trim clamps. Panel locks shall be keyed alike.
- C. Panel shall consist of reinforced corrosion resistant galvanized sheet steel frame with silver plated copper bus bars and circuit breakers properly supported to prevent vibration breakage in handling. All terminals shall be solderless type suitable for specified conductors of size indicated.

- D. Neutral bus shall be full size. Provide an equipment ground bus in each panelboard. In addition to the equipment ground bus, provide an isolated ground bus when supplied from a feeder which includes an isolated grounding conductor.
- E. Branch circuit breakers shall be molded case, bolt-on, and fully interchangeable without disturbing adjacent units. All 2-pole and 3-pole breakers shall have common trips. Circuit breakers supplying Class 1 transformers shall be lockable in the off position.
- F. Branch panelboards and overcurrent protection devices shall have a minimum short circuit rating of 10,000 RMS symmetrical AIC (120/208V).
- G. Distribution panelboards and overcurrent protection devices shall have a minimum short circuit rating of 42,000 RMS symmetrical AIC (120/208V).
- H. All Panelboards shall be fully rated as shown on Drawings; series-rating shall not be allowed.
- I. Panelboards shall bear an Arc-Flash Hazard Warning label in accordance with CEC Article 110.16.
- J. Breakers for switching lights shall be type SWD, rated for switching duty. Breakers for mechanical equipment shall be HACR type.
- K. All spaces shall have hardware.

2.7 TERMINAL CABINETS AND CLOSETS

- A. Cabinets and fronts shall be in accordance with NEMA Standard Publication No. PB1-1971 and UL Standards No. 67. Fronts shall include doors and have flush, brushed stainless steel, cylinder tumbler-type locks with catches and spring loaded door pulls. The flush lock shall not protrude beyond the front of the door. All locks shall be keyed like the panel board locks. Fronts shall have adjustable indicating trim clamps that shall be completely concealed when the doors are closed. Doors shall be mounted by completely concealed steel hinges. Fronts shall not be removable with the door in the locked position. A frame and card with a clear plastic covering shall be provided on the inside of the door. Fronts shall be of code gauge full finished steel with rust inhibiting primer and baked enamel finish.

2.8 SUPPORTING DEVICES

- A. Supporting devices shall be constructed of cold-formed steel, with a corrosion-resistant coating acceptable to authorities having jurisdiction.
- B. Metal items for use outdoors or in damp locations shall be hot-dipped galvanized steel.
- C. Slotted-steel channel supports shall have flanged edges turned toward the web, and 9/16-inch diameter slotted holes at a maximum of 2 inches on center, in the web.
 - 1. Channel thickness shall be selected to suit structural loading.
 - 2. Fittings and accessories shall be products of the same manufacturer as the channel supports.

- D. Raceway and cable supports shall be manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.
- E. Pipe sleeves shall be ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, with plain ends.
- F. Cable supports for vertical conduit shall be a factory-fabricated assembly consisting of threaded body and insulating wedging plug for non-armored electrical cables in riser conduits. Plugs shall have number and size of conductor gripping holes as required to suit individual risers. Body shall be constructed of malleable-iron casting with hot-dip galvanized finish.
- G. Concrete anchors shall be steel bolts with expansion anchors requiring a drilled hole. Powder driven anchors are not acceptable.
- H. Toggle bolts shall be all-steel springhead type.

2.9 ELECTRICAL IDENTIFICATION

- A. Identification devices shall be a single type of product for each application category. Colors shall be as prescribed by ANSI A13.1, CEC, and these Specifications.
- B. Raceway and cable labels shall comply with ANSI A13.1, Table 3, for minimum size of letters for legend and minimum length of color field for each raceway and cable size.
 - 1. Pre-tensioned, wraparound plastic sleeves shall be a flexible, preprinted, color-coded, acrylic band sized to suit the diameter of the item it identifies.
 - 2. Preprinted, flexible, self-adhesive, vinyl labels shall have a legend, over-laminated with a clear, weather- and chemical-resistant coating.
 - 3. Color shall be black letters on orange background.
 - 4. Legend shall indicate voltage.
- C. Self-adhesive colored marking tape for raceways, wires and cables shall be vinyl tape, not less than 1 inch wide by 3 mils thick.
- D. Underground Warning Tape shall be vinyl tape, compounded for permanent direct-burial service, not less than 6 inches wide by 4 mils thick, embedded with a continuous metallic strip or core, brightly-colored, continuously-printed with a legend that indicates the type of underground line.
- E. Tape markers for wire shall be vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.
- F. Color-coding cable ties shall be made of Type 6/6 nylon, be self-locking type and of colors to suit coding scheme.
- G. Engraved plastic labels, signs and instruction plates shall be made from black (or red as noted) Bakelite laminate engraving stock with a white core, punched or drilled for mechanical fasteners. It shall have a minimum thickness of 1/16-inch for signs up to 20 sq. in. and a minimum thickness of 1/8-inch for larger sizes.

- H. Interior Warning and Caution signs shall comply with 29 CFR, Chapter XVII, Part 1910.145 and shall be preprinted, aluminum, baked-enamel-finish signs, punched or drilled for mechanical fasteners, with colors, legend, and size appropriate to the application.
- I. Exterior Warning and Caution signs shall comply with 29 CFR, Chapter XVII, Part 1910.145 and shall be weather-resistant, non-fading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch, galvanized-steel backing, with colors, legend, and size appropriate to the application. They shall be equipped with 1/4-inch grommets in each corner for mounting.
- J. Fasteners for nameplates and signs shall be self-tapping, stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.
- K. Arc-Flash Hazard Warning labels shall be provided at electrical equipment such as switchboards and panelboards in accordance with CEC 110.16.
- L. Circuit Identification – A typewritten circuit directory shall be provided at each panelboard and switchboard in accordance with CEC Article 408.4(A). The Contractor shall develop and prepare the circuit identification description based on the as-built condition.
- M. Source of Supply Identification – All switchboards, panelboards and transformers shall have a typewritten label applied indicating the device or equipment where the power supply originates per CEC Article 408.4(B).

2.10 TOUCHUP PAINT

- A. Touch-up paint shall be equipment manufacturer's paint selected to match installed equipment finish.
- B. Touch-up paint on galvanized surfaces shall be zinc-rich paint recommended by item manufacturer.

PART 3 - EXECUTION

3.1 ELECTRICAL INSTALLATION

- A. All material, equipment, devices, etc., shall be installed in accordance with the recommendations of the manufacturer of the particular item. The Contractor shall be responsible for all installations contrary to the manufacturer's recommendations. The Contractor shall make all necessary changes and revisions to achieve such compliance. Manufacturer's installation instructions shall be delivered to and maintained at the job site throughout the construction of the project.
- B. The layout and installation of electrical work shall be coordinated with the overall construction schedule to prevent delay in completion of the project.
- C. Dimensions and information regarding accurate locations of equipment and structural limitations and finish shall be verified with other sections.

- D. The drawings do not show all raceway, wiring, offsets, bends, special fittings, junction or pull boxes necessary to meet job conditions. Items not shown as indicated, where are clearly necessary for proper operation or installation of systems shown, shall be provided as required, at no increase in contract price.
- E. Materials and Components shall be installed level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.
- F. Electrical equipment, outlets, junctions and pull boxes shall be installed in accessible locations, avoiding obstructions, preserving maximum headroom, and keeping openings and passageways clear.
- G. Equipment shall be installed to facilitate service, maintenance, and repair or replacement of components. It shall be connected for ease of disconnecting, with minimum interference with other installations. Minor adjustments in the locations of equipment shall be made where necessary providing such adjustments do not adversely affect function of the equipment. Major adjustments for the location of equipment shall be previously approved and detailed on the Record Drawings.
- H. Right of Way shall be given to raceways and piping systems installed at a required slope.

3.2 PRECAST CONCRETE PULL BOXES AND MANHOLES

- A. Contractor shall provide a minimum of 3-6" of sand base material suitable to receive the pullbox or manhole. The base material shall be compacted and graded level at proper elevation to receive the pullbox or manhole in relation to the conduit grade or ground cover requirements as designated in the plans.
- B. Sealants used between the joints of the pullbox or manhole are at the Contractor's discretion unless otherwise specified. If grout is used, it should consist of two parts plaster sand to one part cement with sufficient water added to make the grout flow under its own weight. The grout should be poured into a water soaked groove and filled to the top of the groove unless a double amount is to be used as a further precaution against leakage. In this case, the mastic sealant should be placed on the two shoulders of the groove. The next section of pullbox or manhole should be placed while the foaming action is in process. Contractor shall verify grades with the Engineer and shall set holes and boxes level at proper grades.
- C. All conduits penetrating the pull box or manhole shall have seals to prevent water from entering the raceway.

3.3 RACEWAY APPLICATION

- A. Galvanized Rigid Steel Conduit (GRC) **may** be used in all locations. Where installed in direct contact with earth, conduit shall be wrapped with two layers of half-lapped 10-mil PVC tape for a total thickness of 40-mil or have a factory applied 40-mil PVC coating.
- B. Galvanized Rigid Steel Conduit (GRC) **shall** be used where exposed to physical damage, indoors where exposed to moisture, exposed outdoor installations, in systems higher than 600 volts, and where required by code.
- C. Galvanized Intermediate Metallic Conduit (IMC) **may** be used in indoor locations not in direct contact with earth.

- D. Galvanized Electrical Metallic Tubing (EMT) may be used in dry indoor locations according to the following criteria:
1. It is not subject to physical damage.
 2. It is not in direct contact with earth.
 3. It is not in concrete slabs.
 4. It is not in a hazardous area.
- E. Rigid Non-Metallic Conduit (RNC) Schedule 40 PVC **may** be used underground or below concrete slabs on grade. Rigid Non-Metallic Conduit (RNC) Schedule 80 PVC **may** be used to pass through concrete slabs. Rigid Non-Metallic Conduit (RNC) **may** be used in compliance with utility company requirements for utility service conduits. Rigid Non-Metallic Conduit (RNC) **shall not** be installed above grade or above finished floor level.
- F. Liquid-tight Flexible Metallic Conduit (LFMC) **may** be used in all locations to make final connections to motors, transformers, or other mechanical equipment (not to exceed 24 inches in length) or lighting fixtures (not to exceed 72 inches in length). Where specifically approved by the Engineer, LFMC may be used to facilitate wiring in tight locations or in other conditions that make the use of other conduit impracticable.
- G. Flexible Metallic Conduit (FMC) **may** be used in dry locations to make final connections to motors, transformers, or other mechanical equipment (not to exceed 24 inches in length) or lighting fixtures (not to exceed 72 inches in length). Where specifically approved by the Engineer, FMC may be used to facilitate wiring in tight locations or in other conditions that make the use of other conduit impracticable.

3.4 RACEWAY INSTALLATION

A. General

1. Expansion joints shall be provided at building expansion joints or as required due to length of run or difference in temperatures.
2. All fittings that are exposed or in damp areas shall have sealing glands and proper gasket.
3. In general, all conduits shall be sloping to drain. Bends that place a trap in a conduit shall be avoided. Provided drip fitting as required. Dux-Seal high ends of all underground raceways.
4. All conduit runs shall be mechanically and electrically continuous from outlet to outlet. Conduit size or type shall not be changed between outlets.
5. All empty raceways shall be equipped with pull lines, capped and labeled. Pull lines shall be 3/16" polypropylene, No. 14 AWG zinc-coated steel or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 24 inches of slack with identification tag at each end of the pull wire.
6. Minimum size of any conduit for lighting, power and signal shall be 3/4" conduit unless shown otherwise.
7. Use temporary raceway caps to prevent foreign matter from entering. Immediately prior to installation of conductors, conduit shall be blown and swept free of foreign materials. All conduit stubs for future, both above and below

grade, shall be capped. Run conduits for spare panelboard circuits to attic or accessible spaces.

8. Make conduit bends and offsets so ID is not reduced. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise indicated.
9. Make bends in exposed parallel or banked runs from same centerline to make bends parallel. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for exposed parallel raceways.
10. There shall be no more than the equivalent of four quarter bends (360-degrees total) between pull points such as pull boxes, outlet boxes or conduit bodies, in one run of conduit.
11. Install raceways and cables at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Locate horizontal raceway runs above water and steam piping.
12. Conduits shall be securely fastened to building structure at intervals not greater than ten feet.
13. Conduit shall be square cut and reamed if required to full size, with thread full cut and true.
14. Conduits shall be jointed by approved couplings with ends of conduits tightly butted. Non-insulating compound shall be used in making up joints below grade or inside on grade to insure a watertight system.
15. Conduit connections to outlet boxes or cabinets shall be made with approved connectors, using locknuts and insulated throat bushings.
16. Complete raceway installation before starting conductor installation.
17. Contractor shall provide rubber grommets to fasten galvanized conduit to exterior structures made of dissimilar metals at all exterior locations to prevent galvanic corrosion.
18. Contractor shall provide rubber grommets to fasten galvanized conduit to supports which are also used by other systems utilizing piping of dissimilar metals to prevent galvanic corrosion.

B. Interior

1. Conceal raceways and cables, unless otherwise indicated, within finished walls, ceilings, and floors.
2. All concealed conduits shall be installed in as direct a line as possible between outlets. No more than four quarter bends, or their equivalent, will be allowed between outlets. Feeder conduits shall follow arrangement shown on plans unless a change is authorized. Branch circuit conduits shall, in general, follow arrangement as shown as far as structural conditions permit. All exposed runs shall parallel buildings, walls, or partitions, and be supported on Kindorf Hangers to meet Title 24, Part 6, CAC.

C. Exterior

1. Exterior conduit including the sweep below grade and the vertical riser shall be galvanized rigid steel conduit, except where rigid non-metallic conduit is required for utility service conduits by the serving utility company.

2. No rigid non-metallic conduit (RNC) shall be installed above grade.

D. Underground

1. Two or more power **or** telecommunications conduit runs installed in a common trench shall be separated horizontally by a minimum of four inches (4").
2. Two or more power **and** telecommunications conduit runs installed in a common trench shall be separated horizontally by a minimum of twelve inches (12").
3. **All** electrical conduit runs installed in a common trench with other utility company lines, plumbing pipes, or heating pipes shall be separated horizontally from such lines by a minimum of twelve inches (12").
4. Conduits installed underground and not under buildings shall have a minimum of 24" of cover over the top of the conduit.
5. Utility service conduits shall be installed according to the serving utility's requirements for material, depth of cover, and separation.
6. Rigid non-metallic conduit shall be laid on excavated firm bed, sealed watertight and unless with 24 inch earth cover, shall have 3 inch minimum concrete encasement unless under concrete. Plastic conduit without encasement shall be random lay, "snaked", not pulled tight. Plastic conduit laid in areas of reinforcing steel shall be supported independently at each threaded fitting. Plastic conduit joints shall be full solvent welded.
7. Rigid non-metallic conduit installed underground and not below a building slab shall have a galvanized rigid steel long radius elbow installed at the terminating end where the transition from horizontal to vertical occurs.

E. In Concrete Slabs

1. Conduit installed within concrete slabs shall be Schedule 80 PVC rigid non-metallic conduit or full weight galvanized rigid steel conduit.
2. Conduits in concrete slabs 3 inches thick or less shall not be of size larger than 3/4" inch nominal trade size, and wired to top of reinforcing steel.
3. Conduit installed in concrete slabs shall be installed in the middle third of the slab thickness where practical, and have at least 1-inch concrete cover.
4. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
5. Conduit installed in concrete slabs shall be installed side-by-side horizontally and shall have no less than 1" spacing between each conduit to allow for concrete consolidation to prevent voids in the concrete. Conduits that are installed in concrete slabs shall be arranged such that they do not cross over other conduits within the concrete slab. Where crossing of conduits is unavoidable the crossing sets of conduits shall be installed below the slab. No more than 3 conduits shall be installed side-by-side in a concrete slab without special permission from the structural engineer.
6. Install conduit larger than 1-inch trade size parallel to or at right angles to main reinforcement. Where conduit is at right angles to reinforcement, place conduit close to slab support.
7. Contractor shall be responsible for damages to membrane and shall repair it.

F. Below Grade Level Concrete Building Slab

1. All conduits below the building slab shall be Schedule 40 PVC rigid nonmetallic conduit or full weight galvanized rigid steel conduit, and shall have a 6" minimum cover below the floor slab measured from the bottom of the floor slab to the top of the conduit.
2. Rigid non-metallic conduits that are less than 1 1/4" trade size that are installed below the building slab shall transition from Schedule 40 PVC below the building slab to Schedule 80 PVC rigid nonmetallic conduit or galvanized rigid steel conduit, before passing into the concrete building slab and shall transition to galvanized rigid steel conduit or IMC within the concrete building slab before exiting and rising above the building slab.
3. Rigid non-metallic conduits that are 1 1/4" trade size or larger that are installed below the building slab shall have a galvanized rigid steel long radius elbow installed at the terminating end where the transition from horizontal to vertical occurs and the vertical riser shall be galvanized rigid steel conduit rising above the building slab.
4. Rigid non-metallic conduit installed underground and not below a building slab.
5. Where conduits rise through the building slab they shall be installed at sufficient depth so that the curved portion of any bends, sweeps, or 90's are not visible above the finished slab.
6. Contractor shall be responsible for damages to membrane and shall repair it.

G. Signal Systems

1. Install telephone and signal system raceways in maximum lengths of 150 feet and with a maximum of two 90-degree bends or equivalent.
2. Separate lengths with pull or junction boxes where necessary to comply with these requirements.

H. In Beams and Footings

1. Conduit in concrete beam and footings shall be perpendicular to direction of beams unless otherwise indicated on structural drawings.
2. Conduit shown in concrete beam parallel to beams shall be installed at approximate mid-depth of beam.

I. Flexible Conduit

1. LFMC or FMC shall be used to connect motors and equipment subject to vibration, noise transmission, or movement to junction boxes, with a maximum length of 24-inches.
2. Install separate ground conductor across flexible connections.
3. Flexible conduits shall be independently suspended.

3.5 CONDUCTOR APPLICATION

- A. Feeders and branch circuits shall be Type THHN/THWN insulated conductors in raceway.
- B. Underground feeders and branch circuits shall be Type THWN or single-wire, Type UF insulated conductors in raceway.
- C. Branch circuits shall be Type THW or THHN/THWN insulated conductors in raceway where exposed and metal-clad cable where concealed in ceilings and gypsum board partitions.
- D. Branch circuits shall be Type THW or THHN/THWN insulated conductors in raceway where exposed and armored or nonmetallic sheathed cable where permitted by authorities having jurisdiction and where concealed in ceilings and gypsum board partitions.
- E. Minimum conductor size shall be #12 for power and lighting, #14 for 120V control circuits and #18 for 24V control circuits.
- F. Remote control, signaling and power-limited circuits shall be Type THHN/THWN insulated conductors in raceway for Classes 1, 2, and 3, unless otherwise indicated.

3.6 CONDUCTOR INSTALLATION

- A. Conductors shall be continuous from outlet to outlet, no splices shall be made except within outlet or junction boxes.
- B. Wiring at outlets shall be installed with at least 12 inches of slack conductor at each outlet.
- C. Outlet and component connections shall be made to wiring systems and to ground. Electrical connectors and terminals shall be tightened according to manufacturer's published torque-tightening values. Torque values specified in UL 486A shall be used where manufacturer's torque values are not indicated.
- D. Wire in panels, cabinets, pull boxes, and wiring gutters shall be squared, labeled, and neatly grouped with cable ties and fanned out to the terminals.
- E. All branch circuits, fixture wiring joints, splices, and taps for conductors #10 and smaller shall be made with 3M "Scotchlock" connectors, or approved equal.
- F. All branch circuits, fixture wiring joints, splices, and taps for conductors #8 and larger shall be made with two-bolt type solderless connectors or T & B "color keyed" compression lugs.
- G. Bolt-type solderless connectors shall be torqued with a torque wrench according to the manufacturer's recommendations, and then retightened after 24-48 hours before taping. Owners' inspector shall be informed of this procedure during the waiting period and shall witness the act of retightening.
- H. Connectors and lugs for terminating stranded conductors #8 and larger shall be machine crimp compression type.

I. All splices shall be taped with Scotch #88 plastic electrical tape with "Scotch Fill" where necessary for a smooth joint. Scotch #27 or #2520 shall be used for other than normal temperatures or conditions. All connections and splices shall be electrically perfect and in strict accordance with all code requirements.

J. No splices shall be made below grade in a manhole or pullholes without Engineer's written approval, and then shall be encapsulated with 3M potting kits per 3M Specifications. For larger gauge wire where 3M potting kits are prohibited Contractor shall use submersible UL listed Polaris connectors by NSi.

3.7 WIREWAY AND AUXILIARY GUTTER APPLICATION

A. Wireways and auxiliary gutters shall be used above and below panelboards, lighting relay cabinets, and terminal cabinets to accommodate large concentrations of wires.

3.8 PULL BOXES AND WIREWAYS:

A. Boxes shall be installed square and plumb. An engraved nameplate shall be installed on each box indicating its function. Nameplate shall be installed on the exterior of each box in unfinished areas and on the interior of each box in finished areas.

B. Wireways shall be installed with strip-type connectors with self-retained mounting screws. Hangers with two piece, hook together features shall be used to permit preassembly of wireway and hanger bottom plate before hanging on a preinstalled upper bracket.

C. Pull and junction boxes shall be installed as shown to ease the pulling of wire and to comply with CEC requirements.

3.9 PANELBOARDS

A. All panels shall be installed with the top of the trim at 6'-0" above finished grade, unless otherwise indicated on the drawings.

B. A typewritten directory shall be mounted behind plastic in a metal holder welded to the inside of each panel door showing circuit numbers and complete description of all outlets on each circuit and an Arc-Flash Hazard Warning label shall be applied to each panelboard, switchboard and service entrance in accordance with CEC 110.16.

3.10 WIRING DEVICES AND MATERIALS

A. Outlets shall be mounted at 18" minimum above finished floor unless otherwise noted.

B. The locations of outlets shown on drawings shall be located with respect to work of others and to be symmetrical with room layout.

C. Outlets in architectural patterned surfaces such as tile and finish panels shall be centered on intersections of four panels or in exact center of panels, unless otherwise shown on architectural plans or directed by Architect.

D. Outlet boxes for concealed work shall be one-piece steel knock out type with zinc coating. Boxes shall not be smaller than 4" square nominal size, unless otherwise

indicated. Extension rings, plaster rings, and covers shall be provided as necessary for flush finish.

- E. The Contractor shall inform himself of wall thickness throughout the building and shall provide outlet boxes of suitable depth that can be flush mounted and yet will be deep enough to contain the particular apparatus involved. Location of exposed pull or junction boxes will be subject to the Architect's approval.
- F. Outlet boxes on opposite sides of walls shall not be placed back-to-back, nor shall "through" boxes be employed (except where specifically permitted on the drawings by note).
- G. Switches shall be mounted 48" to top of device box above finished floor unless otherwise noted.
- H. Where more than one switch occurs at the same location, use multiple gang outlet boxes covered by a single plate; provide box partitions as required by the N.E.C.
- I. Bar hangers shall be used to support outlet boxes in stud or furred partitions and ceilings. Attachment screws, devices, etc., shall be of the proper type to secure boxes to metal studs complemented by expansion shields to concrete and masonry.
- J. All outlet boxes and particularly those supporting fixtures shall be securely anchored in place in an approved manner. Support outlet boxes and fixtures in acoustic ceiling areas from building structures, not from acoustic ceilings. All lighting fixture outlets shall be coordinated with mechanical, architectural, or other equipment to eliminate conflicts and provide a workable, neat installation.
- K. Approved knock out holes shall be provided. Outlet boxes from which light fixtures will be suspended shall be equipped with 3/8" fixture studs fastened through from back of box.
- L. Surface boxes of the cast metal threaded hub type with suitable gasketed covers shall be used for exposed conduit runs less than 5' above a finished floor or where waterproof boxes are required.
- M. Floor boxes shall be adjustable, brass trimmed with carpet flanges where carpet is indicated on architectural drawings.
- N. Set floor boxes level and trim after installation to fit flush to finished floor surface.
- O. Masonry boxes shall have conduit entrances to rear of box with depth as required to clear masonry.
- P. Boxes shall be sized for number of conductors entering box.
- Q. Wiring devices shall be securely fastened to the outlet box. Where the outlet box covers are back from the finished walls, the device shall be built out with washers so that it is rigidly held in place to the box. Metal extenders shall be provided in flammable construction per CEC.
- R. All device screw slots shall be left in a vertical orientation.
- S. Connect wiring device grounding terminal to branch-circuit equipment grounding conductor and to outlet box with bonding jumper.

- T. Connect ground terminal of isolated-ground receptacles to isolated-ground conductor routed to designated isolated equipment ground terminal of electrical system.

3.11 TERMINAL CABINETS AND CLOSETS

- A. Terminal cabinets shall be installed level and identified with nameplate per schedule.
- B. All conductors in terminal cabinets or closets shall be squared, labeled and secured neatly with wire ties.
- C. All terminal cabinets shall be installed with the top of the trim at 6'-0" above the finished floor, unless otherwise indicated on the drawings.
- D. Where space permits, terminal cabinets shall be surface mounted where they are not visible to the public.
- E. A typewritten directory shall be mounted behind plastic in a metal holder welded to the inside of each terminal cabinet door showing a complete description of terminations in each cabinet.

3.12 SUPPORTING DEVICE APPLICATION

- A. Hot-dip galvanized materials or nonmetallic channel and angle system components shall be used in damp locations and outdoors.
- B. Steel materials shall be used in dry locations.
- C. Support clamps for PVC raceways shall be click-type clamp system.
- D. Strength of supports shall be adequate to carry present and future loads, times a safety factor of at least four with a minimum of 200-lb design load.

3.13 SUPPORT INSTALLATION

- A. Install support devices to securely and permanently fasten and support electrical components.
- B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.
- C. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.
- D. Size supports for multiple raceway installations so capacity can be increased by a 25 percent minimum in the future.
- E. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.
- F. Install 1/4-inch diameter or larger threaded steel hanger rods, unless otherwise indicated.

- G. Spring-steel fasteners specifically designed for supporting single conduits or tubing may be used instead of malleable-iron hangers for 1-1/2-inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings and for fastening raceways to slotted channel and angle supports.
- H. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.
- I. Simultaneously install vertical conductor supports with conductors.
- J. Separately support cast boxes that are threaded to raceways and used for fixture support. Support sheet-metal boxes directly from the building structure or by bar hangers. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 24 inches from the box.
- K. Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.
- L. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.
- M. Securely fasten electrical items and their supports to the building structure, according to the following criteria, unless otherwise noted:
 - 1. Wood – wood screws or screw-type nails.
 - 2. Masonry – toggle bolts on hollow masonry units, expansion bolts on solid masonry units.
 - 3. New Concrete – concrete inserts with machine screws and bolts.
 - 4. Existing Concrete – expansion bolts.
 - 5. Steel – welded threaded studs or spring-tension clamps on steel. Field welding shall comply with AWS D1.1. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or other items.
 - 6. Light Steel – sheet-metal screws.
 - 7. Fasteners shall be selected so the load applied to each fastener does not exceed 25 percent of its proof-test load.

3.14 ELECTRICAL IDENTIFICATION

- A. Each conductor of every system shall be permanently tagged in each panelboard, pull box, J-box, etc., in compliance with the Occupational Safety and Health Administration (OSHA).
- B. Brady labels shall be used to identify terminals and destination of feeders, branch circuits, signal and control circuits, etc., at all terminations, junction boxes and pull boxes, and shall be coordinated with the nameplates in all boxes and equipment.

- C. All terminals in the switchboards, panels, relays, switches, devices, starter terminals, etc., shall have Brady labels for identification to identify both ends of all wiring.
- D. The Contractor shall furnish and install 1" x 3" x 3/32" thick laminated black Bakelite nameplates with a white core (unless specifically shown as red) engraved to produce white letters on black background for all items of electrical equipment, including 2-pole and 3-pole circuit breakers, panelboards, starters, relays, time switches and disconnect switches.
- E. All devices shall have their branch circuit identified on the back side of device plate with a permanent type black marker, i.e. CT A-21. Identify panelboard and circuit number from which receptacles are served. Use machine-printed, pressure-sensitive, abrasion-resistant label tape on face of plate and durable wire markers or tags within outlet boxes.
- F. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Use consistent designations throughout Project.
- G. Panels having single-pole circuit breakers shall be provided with typed schedules mounted in welded metal holders behind plastic.
- H. Clean surfaces that are to receive self-adhesive identification products before applying.
- I. Where three or more switches are ganged, and elsewhere as indicated, identify each switch with approved legend engraved on wall plate.
- J. Identify raceways and cables with color banding as follows:
 - 1. Bands: Pretensioned, snap-around, colored plastic sleeves or colored adhesive marking tape. Make each color band 2 inches wide, completely encircling conduit, and place adjacent bands of two-color markings in contact, side by side.
 - 2. Band Locations: At changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
 - 3. Colors: As follows:
 - a. Fire Alarm System: Red.
 - b. Security System: Blue and yellow.
 - c. Telecommunication System: Green and yellow.
- K. Tag and label circuits designated to be extended in the future. Identify source and circuit numbers in each cabinet, pull and junction box, and outlet box. Color-coding may be used for voltage and phase identification.
- L. Install continuous underground plastic markers during trench backfilling, for exterior underground power, control, signal, and communication lines located directly above power and communication lines. Locate 6 to 8 inches below finished grade. If width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches, overall, use a single line marker.
- M. All power conductors shall be identified in accordance with the following schedule:
 - 1. 277/480V, 3 Phase, 4 Wire System.

- a. Phase A: Brown.
 - b. Phase B: Orange.
 - c. Phase C: Yellow.
 - d. Neutral: White with a colored stripe or gray.
 - e. Ground: Green.
 - 2. 120/208V, 3 Phase, 4 Wire System.
 - a. Phase A: Black.
 - b. Phase B: Red.
 - c. Phase C: Blue.
 - d. Neutral: White.
 - e. Ground: Green
- N. Install warning, caution, and instruction signs where required to comply with 29 CFR, Chapter XVII, Part 1910.145, and where needed to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.

3.15 FIRESTOPPING

- A. Seal all penetrations for work of this section through fire rated floors, walls and ceilings to prevent the spread of smoke, fire, toxic gas or water through the penetration, either before, during, or after the fire. The fire **and** temperature ratings of the penetration assembly shall be at least that of the floor, wall, or ceiling into which it is installed so that the original fire rating of the floor or wall is maintained as required by Article 300.21 of the California Electrical Code (CEC).
- B. Where applicable, provide OZ Type CFSF/I and CAFSF/I fire seal fittings for conduit and cable penetrations through concrete and masonry walls, floors, slabs and similar structures. Where applicable, provide 3M fire barrier sealing penetration system, and/or Thomas and Bett Flame Safe Fire Stop System, and/or Chase Foam fire stop system, including wall wrap, partitions, caps and other accessories as required. All manufacturers' instructions and recommendations for installation of sealing fittings and barrier sealing systems.
- C. The Contractor shall repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed new structures, surfaces and shall install new fireproofing where existing firestopping has been disturbed. The repair and refinishing of materials and other surfaces shall be by skilled mechanics of the trades involved.

3.16 REFINISHING AND TOUCHUP PAINTING

- A. The Contractor shall clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location. He shall follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.

- B. Damage to galvanized finishes shall be repaired with zinc-rich paint recommended by manufacturer.
- C. Damage to PVC or paint finishes shall be repaired with matching touchup coating recommended by manufacturer.

3.17 SYSTEM TESTING AND STARTUP

- A. Refer to Specification Section 269500 "Electrical Acceptance Tests" for minimum required systems testing and startup.

END OF SECTION 260500

SECTION 260526
GROUNDING

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 shall form a part of this Section, with the same force and effect as though repeated here.

1.2 SUMMARY

- A. This Section includes grounding of electrical systems and equipment and basic requirements for grounding for protection of life, equipment, circuits, and systems. Grounding requirements specified in this Section may be supplemented in other Sections of these Specifications.

1.3 SUBMITTALS

- A. Submittals for this Section shall be made according to the Conditions of the Contract, Division 01 Specification Sections and Specification Section 260100.
- B. Product Data for grounding rods, connectors and connection materials, and grounding fittings.
- C. Qualification data for firms specified in "Quality Assurance" Article to demonstrate their capabilities and experience.
- D. Field tests and observation reports certified by the testing organization and indicating and interpreting the test reports for compliance with performance requirements.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7, or a full member company of the InterNational Electrical Testing Association (NETA).
 - 1. Testing Agency Field Supervision: Use persons currently certified by NETA or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.
- B. Comply with UL 467.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Chance: A. B. Chance Co.
 - 2. Erico Inc.; Electrical Products Group.
 - 3. Galvan Industries, Inc.
 - 4. Lyncole XIT Grounding.
 - 5. Raco, Inc.
 - 6. Thomas & Betts, Electrical.

2.2 GROUNDING AND BONDING PRODUCTS

- A. Where types, sizes, ratings, and quantities indicated are in excess of California Electrical Code (CEC) requirements, the more stringent requirements and the greater size, rating, and quantity indications govern.

2.3 WIRE AND CABLE GROUNDING CONDUCTORS

- A. Conform to CEC Table 8, except as otherwise indicated, for conductor properties, including stranding.
 - 1. Material: Copper.
- B. Equipment Grounding Conductors: Insulated with green color insulation.
- C. Grounding-Electrode Conductors: Stranded cable.
- D. Isolated Grounding Conductors: Insulated with green color, yellow striping insulation.
- E. Bare Copper Conductors: Conform to the following:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Assembly of Stranded Conductors: ASTM B 8.
 - 3. Tinned Conductors: ASTM B 33.

2.4 MISCELLANEOUS CONDUCTORS

- A. Grounding Bus: Bare, annealed-copper bars of rectangular cross section.
- B. Braided Bonding Jumpers: Copper tape, braided No. 3/0 AWG bare copper wire, terminated with copper ferrules.

- C. Bonding Straps: Soft copper, 0.05 inch thick and 2 inches wide, except as indicated.

2.5 CONNECTOR PRODUCTS

- A. Grounding connections shall be exothermic welded, bolted clamp terminal, or pressure connector type.
- B. Exothermic-Welded Connections shall be provided in kit form and selected per manufacturer's written instructions for specific types, sizes, and combinations of conductors and connected items.
- C. Bolted Clamp connectors shall be heavy-duty type.
- D. Pressure connectors shall be high-conductivity-plated units.

2.6 GROUNDING ELECTRODES AND TEST WELLS

- A. Grounding Rods shall be sectional type; copper-clad steel.
 - 1. Size: 3/4 inch by 120 inches.
- B. Test Wells shall consist of a Christy Concrete Products F8 Box, or equal.

PART 3 - EXECUTION

3.1 GENERAL

- A. The conduit system, supports, cabinets, switchboards, etc., and neutral conductors must be permanently and effectively grounded by means of approved ground clamps, in accordance with Title 24 of the California Code of Regulations. The neutral shall only be grounded at the main service location unless specifically noted otherwise on the drawings or required by the California Electrical Code.
- B. This Contractor shall exercise every precaution to obtain good contacts at all panel boxes, pull boxes, etc. Where it is not possible to obtain good contacts, the conduits shall be bonded around the boxes with a #6 AWG gauge, THWN wire with ground clamps.
- C. Where there is more than one building supplied from a common service, provide a grounding electrode system at each building per CEC 250.50 and connect per CEC 250.32(B)(1).

3.2 APPLICATION

- A. General
 - 1. All equipment cases, motor frames, etc. shall be completely grounded to satisfy applicable code requirements.
 - 2. The interior hot and cold water piping and the interior above ground gas piping shall be bonded to the building service equipment per CEC #250.104.

3. Do not use underground gas piping as a grounding electrode.
- B. Equipment Grounding Conductor
1. Pull an Equipment Grounding Conductor, insulated green, in **ALL** conduits, both metallic and non-metallic, unless they are designated for telephone or data cables.
 2. Each disconnect switch shall have an Equipment Grounding Conductor (lay in wire type) which shall be used for grounding the disconnect enclosure. The ground wire shall continue and be connected to the enclosure of the equipment served.
 3. Feeders and branch circuits shall be provided with an insulated grounding conductor run with the circuit conductors. This grounding conductor shall be in addition to the ground path provided by the continuously grounded metallic raceway system that encloses the phase and neutral conductors.
 4. Comply with CEC Article 250 for types, sizes, and quantities of Equipment Grounding Conductors, except where specific types, larger sizes, or more conductors than required by CEC are indicated.

3.3 INSTALLATION

- A. General: Ground electrical systems and equipment according to CEC requirements, except where Drawings or Specifications exceed CEC requirements.
- B. Grounding Rods: Locate a minimum of 1-rod length from each other and at least the same distance from any other grounding electrode.
1. Drive until tops are 2 inches below finished floor or final grade, except as otherwise indicated.
 2. Interconnect with grounding-electrode conductors. Use exothermic welds, except at test wells and as otherwise indicated. Make these connections without damaging copper coating or exposing steel.
- C. Grounding Conductors: Route along the shortest and straightest paths possible, except as otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- D. Underground Grounding Conductors: Use bare copper wire. Bury at least 24 inches below grade.
- E. Metal Water Service Pipe: Provide insulated copper grounding conductors, sized as indicated, 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 by grounding-clamp connectors. Where a dielectric main water fitting is installed, connect grounding conductor to street side of fitting. Do not install a grounding jumper across dielectric fittings. Bond grounding-conductor conduit to conductor at each end.
- F. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with grounding-clamp connectors.

- G. Bond interior metal piping systems and metal air ducts to equipment grounding conductors of associated pumps, fans, blowers, electric heaters, and air cleaners. Use braided-type bonding straps.
- H. Test Wells: One for each driven grounding electrode, except as otherwise indicated. Set top of well flush with finished grade or floor. Fill with 1-inch- maximum-size crushed stone or gravel.
- I. Ufer Ground (Concrete-Encased Grounding Electrode): Fabricate according to CEC Paragraph 250.52(A)(3), using a minimum of 20 feet of bare copper conductor not smaller than No. 4 AWG. Where base of concrete foundation is less than 20 feet in length, coil excess conductor within base of concrete foundation. Bond grounding conductor to reinforcing steel to at least 4 locations, and to anchor bolts. Extend grounding conductor below grade and connect to building grounding grid or to a grounding electrode external to concrete.

3.4 CONNECTIONS

- A. General: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
 - 1. Use electroplated or hot-tin-coated materials to assure high conductivity and to make contact points closer in order of galvanic series.
 - 2. Make connections with clean, bare metal at points of contact.
 - 3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
 - 4. Make aluminum-to-galvanized steel connections with tin-plated copper jumpers and mechanical clamps.
 - 5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
- B. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections, except those at test wells. Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.
- C. Equipment Grounding-Wire Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.
- D. Non-contact Metal Raceway Terminations: Where metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically non-continuous conduits at both entrances and exits with grounding bushings and bare grounding conductors, except as otherwise indicated.
- E. Connections at Test Wells: Use compression-type connectors on conductors and make bolted-and clamped-type connections between conductors and grounding rods.

- F. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. Where these requirements are not available, use those specified in UL 486A and UL 486B.
- G. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by manufacturer of connectors. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.
- H. Moisture Protection: Where insulated grounding conductors are connected to grounding rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

3.5 FIELD QUALITY CONTROL

- A. Refer to Specification Section 269500 "Electrical Acceptance Tests" for minimum required testing of Grounding System.

3.6 ADJUSTING AND CLEANING

- A. Restore surface features, including vegetation, at areas disturbed by work of this Section. Reestablish original grades, except as otherwise indicated. Where sod has been removed, replace it as soon as possible after backfilling is completed. Restore areas disturbed by trenching, storing of dirt, cable laying, and other activities to their original condition. Include topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching. Comply with Division 02 Section "Landscaping." Maintain restored surfaces. Restore disturbed paving as indicated.

END OF SECTION 260526

SECTION 269500
ELECTRICAL ACCEPTANCE TESTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section defines the Electrical Acceptance Tests and checks that shall be made on all electrical equipment and wiring to ensure compliance with all applicable Codes and Standards, and with the requirements of the Contract Documents.
- B. All electrical equipment testing and related costs shall be included in the Contractor's bid.

1.2 GENERAL REQUIREMENTS

- A. The Contractor shall test equipment of all kinds installed on this project to determine whether it fulfills the requirements of these Specifications. The Contractor shall furnish all labor necessary to adjust the operation of the apparatus and make the connections for the tests. After the tests have been completed, the Contractor shall restore all connections, apparatus, etc., to their original condition.
- B. The Contractor shall retain the services of a qualified Independent Testing Agency holding a valid current C-10 License to perform **certain** tests and prepare reports, as enumerated in the following Articles. The Independent Testing Agency shall be a company that specializes in electrical equipment testing and shall be NETA or NICET certified.
- C. Contractor shall obtain approval from the architect of proposed independent testing agency(s) before any testing is started.
- D. Electrical systems, equipment and materials shall be tested prior to final acceptance of the work.

1.3 INDEPENDENT TESTING AGENCY REQUIREMENTS

- A. The Independent Testing Agency shall furnish personnel acceptable to Engineer to conduct testing. Supervising engineer shall have a minimum of five years experience in testing of equipment of the type to be tested on this Project.
- B. The Independent Testing Agency shall furnish all labor required for and incidental to testing.
- C. The Independent Testing Agency shall provide minor field repairs, adjustments, and wiring modifications at the time of inspection and testing.
- D. The Independent Testing Agency shall furnish all necessary test equipment to satisfactorily perform all tests specified herein.
- E. The Independent Testing Agency shall check all devices for proper operation - checking for wear, tightness, dirt, etc.

- F. The Independent Testing Agency shall check for conformance to published curves.
- G. The Independent Testing Agency shall notify and coordinate with the Owner's representative at least 3 working days prior to the commencement of any Electrical Acceptance Testing. Tests shall be witnessed by the Owner's representative unless such witnessing is waived in writing by the Owner's Representative.

1.4 CODES AND STANDARDS

- A. Current California Electrical Code (CEC).
- B. National Electrical Manufacturer's Association (NEMA).
- C. Manufacturer's Instructions and Maintenance Manual applicable to each particular apparatus.
- D. OSHA Rules and Regulation.
- E. National Electrical Testing Association (NETA) "Acceptance Testing Specifications".
- F. Procedures as directed by Engineer.

1.5 CARE AND PRECAUTIONS

- A. Contractor shall be responsible for any damage to equipment or material due to improper test procedures or test apparatus handling, and shall replace or restore to original condition, any damaged equipment or material.
- B. Contractor shall furnish and use safety devices such as rubber gloves and blankets, protective screens, barriers, and danger signs to adequately protect and warn all personnel in the vicinity of the tests.

1.6 EQUIPMENT TO BE TESTED BY CONTRACTOR

- A. Perform the visual inspections, manual operations and tests on systems and equipment as described in Part 3, "Execution".
- B. Molded Case Circuit Breakers Rated Less Than 100A
- C. Power Cable
- D. Fire Alarm System
- E. Communication System
- F. Fire Alarm System

1.7 EQUIPMENT TO BE TESTED BY INDEPENDENT TESTING AGENCY

- A. Circuit Breakers Rated 100A and Greater
- B. Grounding System

1.8 SUBMITTALS

- A. Submittals for this Section shall be made according to the Conditions of the Contract, Division 01 Specification Sections and Specification Section 260100.
- B. Test Reports
 - 1. Provide written test reports, signed and dated, for all tests prior to acceptance of the tested equipment by the Owner.
 - 2. Submit certified reports of Independent Tests and Observations indicating and interpreting test results specified in Part 3 of this Section.
 - a. The Test Report shall include the following:
 - 1) Description of equipment tested.
 - 2) Description of test procedure.
 - 3) Calibration record for all testing devices used.
 - 4) Test results.
 - 5) Recommendations.
 - 6) Appendix, including all field test reports.
 - b. Furnish six copies of completed report to the Electrical Engineer no later than ten days after test completion unless requested otherwise by Owner.
 - c. Instrumentation-Traceability: The testing agency shall provide calibration labels for all relays and circuit breakers tested.
 - d. Labels shall be self-adhesive and placed on covers or frames so as not to obscure nameplate, tap block or time dial. Label shall indicate date tested and firm name.

PART 2 - PRODUCTS

2.1 TESTING EQUIPMENT

- A. Furnish suitable electrical instruments including voltmeters, ammeters, wattmeters, tachometers and all other equipment necessary to perform tests specified.
- B. Make necessary openings in circuits for testing instruments and place and connect all instruments, equipment and devices necessary for the tests. Upon completion of tests, remove instruments and instrument connections and restore all circuits to permanent condition.

2.2 TESTING COORDINATION

- A. Coordinate activities and cooperate with others on the Project to ensure that systems are energized when required, when loads are applied, and that other requirements of this Section of the Specifications are carried out in a timely, coordinated basis.
- B. Conduct tests in the presence of the Construction Manager. Notify the Construction Manager seven calendar days or more in advance when any test is to be performed, and do not start tests without the permission of the Construction Manager.
- C. Make up no permanent connections until correct phase sequence of all equipment is determined.

PART 3 - EXECUTION

3.1 GENERAL

- A. The Contractor shall provide Acceptance Testing on the entire Electrical System. Certain of this testing shall be performed by an Independent Testing Agency as indicated.
- B. Acceptance Testing shall include Visual Inspections, Manual Operations, Electrical Tests, and Functional Testing.
- C. Whenever possible, all Visual Inspections, Manual Operations and Electrical Tests shall be made just prior to energizing the equipment or circuits, and shall be coordinated with the field schedule and field conditions.
- D. Test reports on megger, dielectric absorption and high potential tests shall include the ambient temperature and relative humidity existing at the time of the tests.
- E. Should any piece of apparatus or any material or work fail during any of these Tests, it shall be immediately removed and be replaced by perfect material by this Contractor at his expense and the portion of the work replaced be again tested by the Contractor.
- F. Before testing and energizing a system, all necessary precautions shall be taken to ensure the safety of personnel and equipment. All conductors and all electrical equipment shall be properly insulated and enclosed. All enclosures for conductors and equipment shall be properly grounded. Insulation resistance measurements must have been made and approved on all conductors and energized parts of electrical equipment.
 - 1. During actual testing, the Contractor or Independent Testing Agency shall:
 - a. Ensure that temporary power terminations are connected in such a manner that commercial power may be restored in forty-five minutes upon request.
 - b. Place temporary power cables out of the way in a safe manner that provides no hazard to personnel or equipment in the area.
 - c. Provide all special connections required.

- d. Conduct all tests in presence of the representative except where advised this would not be necessary.
- G. The entire installation shall be free from short circuits and improper grounds. Panels and circuits shall be tested for grounds and shorts with mains disconnected from the feeder, branches connected, lamps removed or omitted from the sockets and all wall switches closed. Each individual circuit shall be tested at the panel with the equipment connected for proper operation
- H. The following minimum tests are required, but shall not be limited to this list. Tests will be supervised and witnessed by the Construction Manager:
 - 1. Proper phase rotation.
 - 2. Short circuits.
 - 3. Improper grounds.
 - 4. Power and control electrical circuits for circuit continuity and function test.
- I. Furnish all personnel, labor, meters, instruments, cable, connections, equipment and apparatus necessary for making all tests.
- J. Check and test all switchboards, transformers, panelboards, feeders, power and control cables, communication system devices and wiring, and all connections to all equipment.
- K. After wires and cables are in place and connected to devices and equipment, the system shall be tested for short circuits, improper grounds, and other faults. If fault condition is present, the trouble shall be rectified and the wiring system shall be retested.
- L. A voltage test shall be made at each lighting panel, distribution panel and at the last outlet on each circuit. If drop in potential exceeds one percent, correct the condition by locating the ground or high resistance splice or connection and retest.
- M. Any wiring device, electrical apparatus, or lighting fixture grounded or shorted on any integral "live" part, shall be removed and the trouble rectified by replacing the defective parts or materials.
- N. All final tests shall be witnessed by the Construction Manager and three copies of the verified test results shall be given to the Architect/Engineer and Construction Manager promptly upon completion of a test.
- O. Provide assistance to the various equipment manufacturers' field engineers as required in the testing and adjusting of the electrical power and control equipment. Cooperation shall be such that a minimum of time is required for equipment testing.
- P. A log shall be maintained for all tests. This log shall be certified before completion of the project, both as to test value and date of test. All major equipment such as the switchboard and panelboards shall be energized initially in the presence of the Construction Manager.
- Q. The Owner reserves the right to operate any system or equipment prior to final completion and acceptance of the work. Such preliminary operation shall not be construed as an acceptance of any work. Each piece of equipment and all of the systems shall be adjusted to insure proper functioning and shall be left in first class operating condition.

3.2 VISUAL INSPECTIONS

- A. Prior to Manual Operation and Electrical Testing, perform Visual Inspections to verify the following:
 - 1. The equipment is completely and properly installed.
 - 2. The equipment is free from damage and defects.
 - 3. Shipping blocks and restraints have been removed.
 - 4. Electrical terminations have been properly tightened.
 - 5. The equipment has been properly aligned.
 - 6. The equipment has been properly lubricated.
 - 7. The ventilation louvers are open and unobstructed.
 - 8. Voltages and phases have been properly identified.
 - 9. Terminations in control panels have been properly identified.
 - 10. The equipment is ready to be tested

3.3 MANUAL OPERATION

- A. Prior to any Electrical Testing, mechanical devices shall be exercised or rotated manually to verify that they operate properly and freely.

3.4 ELECTRICAL TESTS BY CONTRACTOR

- A. Molded Case Circuit Breakers rated less than 100A
 - 1. Circuit breakers will be operated manually several times to ensure smooth operation.
 - 2. Molded case will be inspected for cracks.
 - 3. Rated current will be passed through each phase and millivolt readings taken across contacts.
 - 4. Time current characteristic tests will be performed by passing 300% rated current through each phase and monitoring trip time.
 - 5. Instantaneous pickup current will be determined by finding the current level at which the breaker trips out in less than 2 cycles.
 - 6. Insulation resistance tests will be performed at 1000 Volts DC.
 - 7. Circuit breaker covers will be removed on unsealed units and checked for cracks. Interphase barriers and arc chutes to be inspected. All bolts and lugs will be tightened. All internal auxiliary devices will be inspected.

8. Contacts, shunts, etc., will be visually inspected for wear and alignment.
9. Inverse trip time, instantaneous pickup current and millivolt drop across contacts, insulation resistance values, as well as deficiencies causing breaker to function outside published limits will be recorded. Times will then be compared with manufacturer's or NEMA published values.

B. Power Cable

1. The 600-volt insulated wires and cables shall be factory tested prior to shipment in accordance with ICEA Standards for the insulation specified.
2. Perform a continuity check and a 1,000 volt DC megger test on 600 volt power cables No. 6 AWG and larger.
 - a. The megger test shall be performed between each pair of conductors and from each conductor to ground.
 - b. The megger test shall be performed for 15 seconds or until the insulation resistance value stabilizes.
 - c. The insulation resistance between conductors and from each conductor to ground shall be 100 megohms minimum in one minute or less. In addition, the lowest insulation resistance value shall not differ from the highest value by more than 20 percent.
3. Phase conductors, if shorted, grounded or at fault shall be removed, shall be replaced and the wiring system shall be retested.

C. Fire Alarm System

1. Perform testing in accordance with NFPA 72-2016 and Specification Section 283100.

D. Communication System

1. Refer to Division 27 Sections of these Specifications for testing.

3.5 INDEPENDENT AGENCY TESTING

A. Circuit Breakers rated 100A or greater

1. All circuit breakers, 100 amps or more, shall be tested by an independent testing agency in accordance with NETA specifications and a report submitted to the architect. Any circuit breaker that does not pass the test shall be replaced.
2. Circuit breakers will be operated manually several times to ensure smooth operation.
3. Molded case will be inspected for cracks.
4. Rated current will be passed through each phase and millivolt readings taken across contacts.
5. Time current characteristic tests will be performed by passing 300% rated current through each phase and monitoring trip time.
6. Instantaneous pickup current will be determined by finding the current level at which the breaker trips out in less than 2 cycles.

7. Insulation resistance tests will be performed at 1000 Volts DC.
8. Circuit breaker covers will be removed on unsealed units and checked for cracks. Interphase barriers and arc chutes to be inspected. All bolts and lugs will be tightened. All internal auxiliary devices will be inspected.
9. Contacts, shunts, etc., will be visually inspected for wear and alignment.
10. Inverse trip time, instantaneous pickup current and millivolt drop across contacts, insulation resistance values, as well as deficiencies causing breaker to function outside published limits will be recorded. Times will then be compared with manufacturer's or NEMA published values.
11. The testing agency shall provide calibration labels for all relays and circuit breakers tested. Labels shall be self-adhesive and placed on covers or frames so as not to obscure nameplate, tap block or time dial. Label shall indicate date tested and firm name.

B. Grounding System

1. Test shall be performed for every new separately derived AC system.
2. Ground tests shall meet the requirements of the California Electrical Code and comply with UL 467. The grounding electrode system at the main electrical service equipment shall be tested by an Independent Testing Agency in accordance with the three point fall of potential method as specified in IEEE Standard 81-1983. Maximum ground resistance shall be 5 OHMS. A copy of the test report shall be submitted to the architect and engineer of record.
3. Tests: Subject the completed grounding system to a megger test at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Measure ground resistance not less than 2 full days after the last trace of precipitation, and without the 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. Perform tests by the 2-point method according to IEEE 81.
4. The test agency shall remove the test link between the ground and neutral, and test the neutral for any parallel and/or superfluous ground paths. If any are found, a report should be given to the Engineer. No grounds are to be removed unless authorized in writing.
5. Ground electrode resistance shall be taken using a Biddle ground resistance meter and readings given to the report.
6. All ground connections in switchboard as well as that to cold water pipes shall be check for tightness and adequacy.
7. Measure the resistance to ground of each ground rod [in a ground mat] before connection to the other ground rods. The resistance shall not exceed 10 ohms.
8. Measure the resistance to ground of the total ground system with all connections completed. The resistance shall not exceed 2 ohms for primary services or 5 ohms for secondary services.
9. Tests of the resistance to ground shall be made using either the three point method or the fall-of-potential method.

10. Perform a continuity check from equipment ground bus bars and ground lugs to the ground system.
11. Ground rods for manholes and light poles need not be tested.
12. Excessive Ground Resistance: Where resistance to ground exceeds specified values, notify Owner promptly and include recommendations to reduce ground resistance and to accomplish recommended work.
13. Report: Prepare test reports, certified by the testing organization, of ground resistance at each test location. Include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

3.6 FUNCTIONAL TESTING

- A. All automatic and manual functions shall be checked for proper operation.
- B. All indicating circuits, lights and alarms shall be tested for correct operation. Burned out indicators shall be re-lamped.
- C. Upon completion of the Work, place the entire installation in operation, test for proper function, and show systems and equipment to be free of defects.

END OF SECTION 269500

SECTION 272000
TELECOMMUNICATION SYSTEM

PART 1 - GENERAL

1.1 SCOPE

- A. Furnish and install a system of horizontal cable links between new relocatable building's data outlets and the existing IDF as shown on the Drawings. Furnish and install outlet boxes, conduits and raceways, jack modules for terminating both ends of each cable, and coverplates.
- B. The Contractor shall provide termination, testing and certification of each cable.
- C. The furnishing of network servers and switches is specifically excluded from this section.

PART 2 - PRODUCTS

2.1 TELECOMMUNICATION BACKBONE CABLING

- A. OSP Rated Copper Cable (Voice Backbone)
 - A. Materials – 24-gauge, twisted pair, solid conductor, black polyethylene sheath, shielded of corrugated aluminum, 25-pair.
 - B. Manufacturer - Essex (SEALPIC-F, Type REA PE39) or equal.
- B. OSP Rated Optical Fiber Cable (Data Backbone)
 - A. Materials – Flame-retardant, UV-stabilized, fully water blocked for use in indoor/outdoor applications. Dielectric jacketed 6-strand multimode (50um) OM4 optical fiber cable. Note: All loose tube cables must be provided with the appropriate fan-out kits to transition from loose tube construction to tight buffered (900 micron) fiber for termination.
 - B. Manufacturer – Optical Cable Corporation.
- C. OSP Rated Optical Fiber Innerduct
 - A. Materials – 1" corrugated PE type Innerduct with ¼" pre-installed pull rope. Color: orange.
 - B. Manufacturer – Carlon (type Optic-Gard) or equal.

2.2 TELECOMMUNICATION HORIZONTAL CABLING

- A. Horizontal Data Cable
 - A. Materials – 23 AWG solid copper UTP, 4-pair, CMP rated, premium Category 6 cable. Color: Blue.
 - B. Manufacturer – Berk-Tek

- C. Model: 10163780; Description: type LANmark-2000 series.
- B. J Hooks
 - A. J hook cable supports shall provide a bearing surface of sufficient width to comply with required bend radii of high-performance cables; cULus Listed. J hook cable supports shall have flared edges to prevent damage while installing cables. J hook cable supports shall be 1 5/16" minimum and have a cable retainer strap to provide containment of cables within the hanger. The cable retainer strap shall be removable and reusable and be suitable for use in air handling spaces. J hook cable supports shall have an electro-galvanized or G60 finish and shall be rated for indoor use in non-corrosive environments.
 - B. Manufacturer – Erico (Caddy Cablecat Series Non-continuous Support Cable System).

2.3 TELECOMMUNICATION BACKBONE CABLE TERMINATIONS

- A. OSP Rated Copper Cable Termination Blocks (Voice Backbone)
 - A. Materials – Siemon 66 type punch down block w/50 pair capacity (66M1-50), wall mounted. Punch down blocks shall be of high impact flame-retardant thermoplastic, which secure and organize groups of 25 UTP pairs of 22-26 gauge each.
 - B. Manufacturer – The Siemon Company (66-Type), Allen Tel.
- B. OSP Rated Optical Fiber Cable Termination Hardware (Data Backbone)
 - A. Materials – 19" Rack-mountable patch panels, 2U high, with built-in cable management, and smoked Plexiglass removable doors. Complete with universal adapter strips, fully loaded with duplex SC (SC568) type couplings.
 - B. Manufacturer – The Siemon Company (RIC3 type).
- C. Fiber Optic Connectors
 - A. Materials – SC-type, with ceramic ferrule, ANSI/TIA/EIA 604-3 compliant
 - B. Manufacturer – The Siemon Company.

2.4 TELECOMMUNICATION HORIZONTAL CABLE TERMINATIONS

- A. Station Jack Modules
 - 1. Voice and Data: Materials – 8-position RJ45, Category 6 rated jack modules. Color: Blue. Manufacturer – Panduit or equivalent. Quantity – as indicated by symbol subscript.
 - 2. Outlet Box and Faceplate - Materials – 2-port, single-gang flat faceplate shall be mounted to a two-gang outlet box fitted with a single-gang reducer. Blanks shall be installed in each unused port. Manufacturer – Panduit or equivalent

2.5 LABELS

- A. Materials: Vinyl plastic type that meet UL 969 requirements, preprinted or laser printed type, and easily distinguishable.
- B. Manufacturers – Panduit, W.H. Brady, Ideal.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. The Contractor shall install all cables, trays, supports, racks, cabinets, frames, backboards, blocks, cable management, connectors, manhole cable rack hardware, and all appropriate termination and mounting hardware.
- B. The Contractor shall utilize J-hooks for the support of horizontal voice and data cables. Cables shall be routed above the ceiling and shall be supported by J-hooks that are attached to the structure independently from ceiling or lighting fixture supports.
- C. Where penetrations through fire rated walls, acoustical or other walls are made for cable pass-thru, such penetrations shall be sealed by the Contractor in compliance with code requirements.

3.2 BONDING AND GROUNDING

- A. The Contractor shall provide ground continuity by properly bonding all appropriate cabling, closures, cabinets, service boxes, conduit, cable trays, and framework. All grounds shall consist of #6 AWG stranded copper wire and shall be attached to an approved building ground, which is bonded to the main electrical ground. Grounding shall be in accordance with J-STD-607-A, NEC, NFPA and all local codes and practices.

3.3 IDENTIFICATION & LABELING

- A. The Contractor shall obtain the room numbers that will appear on door signage prior to assigning origin and destination identification for labels.
 - A. Horizontal cables shall be labeled at each endpoint. Labels shall indicate origination and destination identification.
 - B. All label printing will be machine generated by system software using indelible ink ribbons or cartridges. Self-laminating labels will be used on cable jackets, appropriately sized to the OD of the cable, and placed within view at the termination point on each end.

3.4 ACCEPTANCE TESTING AND CERTIFICATION

- A. All distribution cables shall meet or exceed all performance specifications designated by ANSI/EIA/TIA-568-B.1, and IEEE for telephone and data communications.

- B. Copper Cables: Testing of all copper wiring shall be performed prior to system cut-over. 100 percent of the OSP and horizontal wiring pairs shall be tested for opens, shorts, polarity reversals, transposition and presence of AC voltage. Test shall include length, mutual capacitance, characteristic impedance, attenuation, and near-end and far end cross-talk. The Contractor, at no charge shall bring any pairs not meeting the requirements of the standard into compliance with the standards and specifications. Complete, end to end test results must be submitted to the College. Test results for each of the above tests and associated cable lengths shall be generated by an automated testing device. Test results must be permanently recorded and presented for review in both hardcopy and in a computer-readable format.
- C. Fiber Optic Cables - No later than five days after testing, Contractor shall furnish the Owner with a documentation binder and electronic disks of all test results from OTDR and power meter test equipment. Electronic copies of test results must be presented in a readable format (runtime software application included in necessary). The content requirements for these forms are described in the following sections.

A. OTDR Test Results

1. Contractor shall furnish on disc with application software, electronic strip charts and/or tracer recordings on each and every fiber strand in each and every cable in one direction at both 850 and 1300 nanometer wavelengths for multimode fiber, 1310 and 1550 for singlemode, with the following information:
 - 1) Date of test
 - 2) Name of test personnel
 - 3) Test wavelength
 - 4) Pulse duration(s) and scale range(s)
 - 5) Index of refraction
 - 6) Fiber cable type and part number
 - 7) Fiber tube and/or fiber strand number
 - 8) Direction of test
 - 9) Overall distance in meters
 - 10) Attenuation in dB or dBm

B. Power Meter Test Results

1. Contractor shall furnish attenuation assessments for both 850 and 1300 nanometer wavelengths for multimode fiber and 1310 and 1550 for singlemode on each and every fiber in each and every cable, in both directions with the following information:
 - 1) Date of test
 - 2) Name of test personnel
 - 3) Fiber cable type and part number
 - 4) Fiber number
 - 5) TX wavelength
 - 6) TX location
 - 7) RX location

- 8) TX model and serial number
 - 9) RX model and serial number
 - 10) Attenuation dB or dBm
- C. Contractor may be required to perform additional testing as required by Owner to ensure compliance with mated pair connection loss, splice loss and overall link loss. Any cables failing to meet above indicated standards must be removed and replaced, at no cost to the Owner, with cables, which prove, in testing, to meet the standards. The installation will not be accepted until testing has reported that all pairs meet the appropriate standards.

3.5 PROJECT RECORD DOCUMENTATION

- A. The Contractor shall provide a database of cable records, both hard copy and electronic format, using Owner approved format (Excel spreadsheet or otherwise specified) for use by the Owner for cable and facilities management. The cable records format must include, at a minimum, the following information about each cable:
 - A. Distribution Cable Pair Assignments.
 - B. Test Results.
- B. Three (3) sets of reproducible as-built floor plans plus vertical rack elevations and wall mounted termination field details in digital format (AutoCAD) showing all installed cables, pair and strand assignments, routing, terminal and outlet locations, patch panels and labeling conventions.
- C. These documents shall be delivered to the Owner no more than 20 working days after completion and acceptance of the Contractor's work.

END OF SECTION 272000

SECTION 283100
FIRE ALARM SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section of the specifications includes the furnishing, installation, and connection of the microprocessor controlled, addressable reporting fire alarm and emergency voice communication equipment required to form a complete coordinated system ready for operation. It shall include, but not be limited to booster power panels, alarm initiating devices, alarm notification appliances, auxiliary control devices, and voice evacuation systems.
- B. This Section includes the furnishing of all labor, equipment, materials, and performance of all operations associated with the installation of the networked Fire Alarm System as required by the drawings and specified herein.
- C. The intent of drawings and specifications is to result in a complete and functional networked Fire Alarm System as described herein.

1.2 SCOPE:

- A. The Contractor shall furnish and install control panels, booster power panels, initiation devices and circuits, notification appliances and circuits, control relays, monitor modules and supervisory devices, as required to accomplish this intent whether or not specifically shown or specified.
- B. The complete installation shall conform to the applicable sections of the 2019 California Building Code, 2019 California Fire Code, 2016 NFPA 72, and the 2019 California Electrical Code with particular attention to Article 760.
- C. The work specified herein shall be coordinated with the related work as specified elsewhere under the project specifications.

1.3 SUBMITTALS

- A. Submittals for this Section shall be made according to the Conditions of the Contract, Division 1 Specification Sections and Specification Section 260100.
- B. General:
 - 1. Five copies of all submittals shall be submitted to the Architect/Engineer for review.
 - 2. For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment.

C. Shop Drawings:

1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
2. Include manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.
3. Show remote annunciator(s) layout, configurations, and terminations.

D. Manuals:

1. Submit simultaneously with the shop drawings, complete operating and maintenance manual listing the manufacturer's name(s) including technical data sheets.
2. Wiring diagrams shall indicate internal wiring for each item of equipment and the interconnections between the items of equipment.
3. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system.

E. Certifications:

1. Together with the shop drawing submittal, submit a certification from the major equipment manufacturer indicating that the proposed supervisor of installation and the proposed performer of contract maintenance is an authorized representative of the major equipment manufacturer. Include names and addresses in the certification.

1.4 WARRANTY

- A. All work performed and all material and equipment furnished under this Contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance. The full cost of maintenance, labor and materials required to correct any defect during this one-year period shall be included in the submittal bid and is part of this Contract.

1.5 APPLICABLE STANDARDS:

- A. The specifications and standards listed below form a part of this specification. The system shall fully comply with these standards.
1. 2016 NFPA 72 National Fire Alarm Code
 2. 2019 California Electrical Code (CEC)
 3. 2019 California Fire Code (CFC)
 4. 2019 California Mechanical Code (CMC)
 5. 2019 California Building Code (CBC)
 6. Underwriters Laboratories Inc. (UL) - USA:
 - a. No. 268 Smoke Detectors for Fire Protective Signaling Systems

- b. No. 864 9th Edition Control Units for Fire Protective Signaling Systems
 - c. No. 268A Smoke Detectors for Duct Applications.
 - d. No. 521 Heat Detectors for Fire Protective Signaling Systems
 - e. No. 464 Audible Signaling Appliances.
 - f. No. 38 Manually Actuated Signaling Boxes.
 - g. No. 346 Waterflow Indicators for Fire Protective Signaling Systems.
 - h. No. 1971 Visual Notification Appliances for the hearing impaired.
 - i. No. 1480 Fire Protective Service
- 7. California State Fire Marshal
 - 8. Federal Codes and Regulations
 - 9. Americans with Disabilities Act (ADA)
 - 10. American National Standards Audible Emergency Evacuation Signal ANSI S3.41
 - 11. Local and State Building Codes
 - 12. All requirements of the Authority Having Jurisdiction (AHJ).

1.6 APPROVALS:

- A. The system shall have proper listing and/or approval from the following nationally recognized agencies:
 - 1. UL Underwriters Laboratories Inc.
 - 2. FM Factory Mutual Systems
 - 3. CSFM California State Fire Marshal

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- 1. This Fire Alarm System design is based on the use of microprocessor-based addressable fire alarm control equipment manufactured by Hochiki America. All fire alarm components electrically connected to the system shall be CSFM listed.

2.2 TERMINAL BOXES, JUNCTION BOXES AND CABINETS:

- A. All boxes and cabinets shall be UL listed for their use and purpose.

2.3 VOICE EVACUATION SYSTEM

- A. The existing Fire Alarm Control Panel is the Hochiki #FN-4127.
- B. The existing Voice Evacuation System Master Control Panel is Hochiki #FNV-MP.

2.4 INITIATION DEVICES

A. Smoke Detectors

1. Addressable Photoelectric Smoke Detectors

- a. Smoke detectors shall be addressable and shall connect with two wires to the Fire Alarm Control Panel Signaling Line Circuit.
- b. The detectors shall use the photoelectric (light-scattering) principal to measure smoke density.
- c. The detectors shall be low profile ceiling-mount and shall include a twist-lock base.
- d. The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a switch) or initiated remotely on command from the control panel.
- e. The detectors shall store an internal identifying code that the control panel shall use to identify the type of detector.
- f. The detectors shall provide an alarm and power LED. The LED shall flash under normal conditions, indicating that the detector is operational and in regular communication with the control panel. The LED is placed into steady illumination by the control panel indicating that an alarm condition has been detected. An output connection shall also be provided in the base to connect an external remote alarm LED.

B. Heat Detectors

1. Attic Heat Detectors

- a. Attic Heat Detectors shall be addressable fixed high temperature (194-deg F) type.

2.5 ADDRESSABLE MODULES, CONTROL RELAYS, AND AUXILIARY DEVICES

A. Addressable Monitor Module

1. Addressable Monitor modules shall be provided to connect one supervised IDC (zone) of conventional Alarm Initiating Devices (any N.O. dry contact device) to the Fire Alarm Control Panel Signaling Line Circuit (SLC) Loop.
2. The monitor module shall be mounted in a 4-inch square, 2-1/8" deep electrical box.
3. The IDC (zone) may be wired for Style D (Class A) or Style B (Class B) operation. The Monitor module shall provide address-setting means using decimal switches and shall also store an internal identifying code that the Fire Alarm Control Panel shall use to identify the type of device. An LED shall be provided that shall flash under normal conditions, indicating that the Monitor module is operational and in regular communication with the control panel.

B. Addressable Control Module

1. Addressable Control Modules shall be provided to supervise and control the operation of one conventional Notification Appliance Circuit (NAC) of compatible, 24 VDC powered, polarized Audio/Visual appliances or audio speakers.
2. The Control Module shall be mounted in a standard 4-inch square, 2-1/8" deep electrical box.
3. The NAC shall wire in a Class B (Style Y) or Class A (Style Z) fashion. Each control module shall support up to 1 Amp of Inductive or 2 Amps of Resistive Audible/Visual signals.
4. Audible/Visual power shall be provided by a separate notification appliance circuit from the main Fire Alarm Control Panel or from a fire alarm expander panel.
5. The Control Module shall provide address-setting means using decimal switches and shall also store an internal identifying code that the Control Panel shall use to identify the type of device. An LED shall be provided that shall flash under normal conditions, indicating that the Control Module is operational and is in regular communication with the control panel.
6. A magnetic test switch shall be provided to test the module without opening or shorting its NAC circuit wiring.

C. Addressable Control Relay Module

1. Addressable Relay Modules shall be provided to allow the fire alarm control panel to switch discrete contacts by code command.
2. The Relay Module shall be mounted in a standard 4-inch square, 2-1/8" deep electrical box.
3. The Relay Module shall provide two isolated sets of Form-C contacts for fan shutdown and other auxiliary control functions, as well as facilitate the interruption of branch circuits supplying fire/smoke dampers when used in conjunction with an auxiliary control relay.
4. The Relay Module contact ratings shall support up to 1 Amp/30 VDC of Inductive load or 2 Amps/30VDC (coded) of Resistive load (up to 3 Amps in non-coded applications). The relay coil shall be magnetically latched to reduce wiring connection requirements and to insure that 100% of all auxiliary relays may be energized at the same time on the same pair of wires.
5. The Control Module shall provide address-setting means using decimal switches and shall also store an internal identifying code that the Control Panel shall use to identify the type of device. An LED shall be provided that shall flash under normal conditions, indicating that the Control Module is operational and is in regular communication with the control panel.
6. A magnetic test switch shall be provided to test the module without opening or shorting its NAC circuit wiring.

D. Auxiliary Relays

1. Auxiliary relay coils shall be rated at 120V and contacts shall be rated for 120V, 20A.

2. Auxiliary relays shall be listed with the California State Fire Marshal (CSFM).

2.6 NOTIFICATION APPLIANCES

A. Strobes

1. Strobes are visual notification appliances for the hearing impaired.
2. Strobes shall operate on 24 VDC nominal.
3. Strobes shall meet the requirements of the ADA (Americans with Disabilities Act) as well as UL Standard 1971.
4. Strobes shall be flush mounted in an electrical box in accordance with the manufacturer's installation instructions.

B. Speakers

1. Speakers shall operate at 25VRMS nominal. Speakers shall be rated for operation from 1/8W to 2W, field-selectable. Speakers shall be set to no more than 2W.
2. Speakers shall meet the requirements of UL Standard 1480 for fire protective service.
3. The speaker (audible notification appliance) shall provide live and/or recorded messages with an output sound level of not less than 75 dBA measured at 10 feet from the device and shall have a sound level of no more than 110 dBA at the minimum hearing distance from the device.
4. Speakers shall have a listed frequency response of 400Hz to 4000Hz.
5. Speakers shall be flush mounted in an electrical box in accordance with the manufacturer's installation instructions.
6. Speakers mounted on the exterior of a building shall be weatherproof and shall be in a weatherproof box.

C. Combination Speaker/Strobes

1. Combination speaker/strobes are audible and visual notification appliances that combine the features of live voice message notification appliances and visual notification appliances in a single device.
2. The speaker (audible notification appliance) shall provide live and/or recorded messages with an output sound level of not less than 75 dBA measured at 10 feet from the device and shall have a sound level of no more than 110 dBA at the minimum hearing distance from the device.
3. The strobe (visual notification appliance) shall meet the requirements of the ADA (Americans with Disabilities Act) as well as UL Standard 1971.
4. Speaker/Strobes shall be flush mounted in an electrical box in accordance with the manufacturer's installation instructions.

PART 3 - EXECUTION

3.1 PRE-CONSTRUCTION TESTING

- A. The Contractor shall perform pre-construction testing at the existing Hochiki #FN-4127 FACP to be re-located and re-installed in the Administration Building.
- B. Pre-construction testing shall be witnessed by: (1) the Owner or his authorized representative; (2) the Inspector of Record; (3) the General Contractor or his authorized representative; and (4) the Sub-Contractor or his authorized representative.
- C. The test report shall be signed by the General Contractor and the Inspector of Record and copies of the test report shall be submitted to the Owner, Architect and Engineer for review prior to the commencement of any Fire Alarm work, or work that may affect the Fire Alarm system.
- D. The testing shall be performed in accordance with the reacceptance testing requirements of NFPA 72 14.4.2.
- E. In the event that the existing Fire Alarm Control Panel to be re-located system is found to be in "trouble", "alarm" or any state other than its system normal operating state, the Contractor shall notify the Owner and allow the Owner to perform repairs or take other reasonable corrective action, prior to the Contractor commencing with work on the Fire Alarm system.
- F. In the event that work commences prior to the pre-construction testing of the existing Fire Alarm Control Panel to be re-located and it is subsequently found to be in "trouble", "alarm" or any state other than its system normal operating state, the Contractor shall perform the required repairs to return the FACP to its system normal operating state at no increase in Contract price.

3.2 EQUIPMENT INSTALLATION

- A. Installation shall be in accordance with the CBC, CFC, CEC, NFPA 72, and state codes, as shown on the drawings, and as recommended by the equipment manufacturer.
- B. All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.

3.3 WIRING INSTALLATION

- A. Fire Alarm System initiation device circuits and notification appliance circuits shall be installed in conduit. The minimum conduit size shall be $\frac{3}{4}$ ".
- B. All conduit, junction boxes, conduit supports and hangers shall be concealed. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.
- C. Power-Limited Circuits: NFPA 70, Types FPL, FPLR, or FPLP, as recommended by manufacturer.

- D. Each Fire Alarm Control Panel and Voice Evacuation Control Panel shall be connected to a separate dedicated 120V, 20A branch circuit with a dedicated neutral conductor and an equipment grounding conductor. The circuit breakers shall be painted red and shall be labeled at the panelboard as "FIRE ALARM CIRCUIT". Fire Alarm Booster Power Panel Primary Power wiring shall be 12 AWG. The Fire Alarm Panel cabinet shall be grounded.
- E. Each Fire Alarm Control Panel and Voice Evacuation Control Panel shall be provided with battery backup as an emergency power source per CFC 907.5.2.2.5.

3.4 GROUNDING

- A. Ground cable shields and equipment according to system manufacturer's written instructions to eliminate shock hazard and to minimize, to the greatest extent possible, ground loops, common-mode returns, noise pickup, cross talk, and other impairments.
- B. Signal Ground Terminal: Locate at main equipment rack or cabinet. Isolate from power system and equipment grounding.

3.5 PROGRAMMING

- A. The Contractor shall provide all programming of the Fire Alarm System to result in a complete and functional Fire Alarm System in accordance with all applicable codes and standards, and as specified herein.
- B. LCD Annunciation
 - 1. The Contractor shall program the LCD annunciator at the Fire Alarm Control Panel to annunciate the following information:
 - a. The zone that is in alarm.
 - b. The type of alarm initiating device:
 - 1) Manual Pull Station.
 - 2) Smoke Detector.
 - 3) Duct Smoke Detector and the associated HVAC unit.
 - 4) Other.
 - c. The location of the device that is in alarm (refer to Article titled, IDENTIFICATION AND DOCUMENTATION, for device map location requirements.)
- C. Controls
 - 1. The Contractor shall utilize addressable control relays and auxiliary relays and shall program the fire alarm system control panel to cause the closure of fire/smoke dampers and provide a signal for HVAC units to shut down.

3.6 IDENTIFICATION AND DOCUMENTATION

- A. Zone Map – The Contractor shall create an 11"x17" site plan identifying each building and identifying the zones. The zone map shall be created by a CAD program and shall be posted under plastic cover at the location of the fire alarm control panel.

- B. Device Location Map – For each building the Contractor shall create an 11"x17" floor plan of the building showing the location of each device and the device address as it is annunciated at the control panel and remote annunciator. The device location map shall be created by a CAD program and shall be posted under plastic cover at the location of the fire alarm control panel or fire alarm booster power supply within each building.
- C. Paint each circuit breaker handle for the branch circuits that supply power to the Fire Alarm Control Panel and Fire Alarm Booster Power Panels red and label "FIRE ALARM CIRCUIT."

3.7 ACCEPTANCE TESTING AND CERTIFICATION

- A. Prior to the final acceptance test provide the service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment to technically supervise and participate during all of the adjustments and tests for the system:
 - 1. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
 - 2. Open initiating device circuits and verify that the trouble signal actuates.
 - 3. Open and short signaling line circuits and verify that the trouble signal actuates.
 - 4. Open and short Notification Appliance Circuits and verify that trouble signal actuates.
 - 5. Ground all circuits and verify response of trouble signals.
 - 6. Check presence and audibility of tone at all alarm notification devices.
 - 7. Check installation, supervision, and operation of all addressable smoke detectors using the Walk Test.
 - 8. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.
 - 9. When the system is equipped with optional features, the manufacturer's manual should be consulted to determine the proper testing procedures. This is intended to address such items as verifying the controls performance by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.
- B. Upon completion of the installation, a test of the entire system shall be performed in the presence of the Inspector of Record and the local authority having jurisdiction. The local Fire Marshal shall be notified and invited to witness the test a minimum of 72 hours prior to the test. Components and functions of the system shall be tested and an Inspection and Testing Record Form shall be generated in accordance with NFPA 72 indicating the proper functioning of each component of the system.
- C. If devices or other components of the system fail during testing the defective devices or components shall be removed and immediately replaced with functional units and the test shall be repeated.

- D. The Contractor shall furnish a completed Fire Alarm System Record of Completion in accordance with CFM/Title 19 901.6.2, 901.6.2.1 and NFPA 72 and shall provide the Certification of Completion to the Authority Having Jurisdiction.
- E. Upon completion of the Fire Alarm System Record of Completion, the final inspection shall be performed. At the final inspection a manufacturer-trained representative shall demonstrate that the system functions properly in every respect.

3.8 FIRE WATCH

- A. The Contractor shall provide a 24-hour fire watch each day that the campus is occupied until the fire alarm system is fully operational and the Fire Alarm System Record of Completion has been submitted to the Authority Having Jurisdiction. All costs of the fire watch shall be borne by the Contractor.
- B. Prior to taking the existing fire alarm system out of operation, the Contractor and Owner shall designate an impairment coordinator per CFC Section 901.7.1. The impairment coordinator shall verify that all of the procedures required by CFC Section 901.7.4 have been implemented prior to planned shutdown of the existing fire alarm system and follow the requirements of CFC 901.7.5 in the event of an emergency shutdown of the fire alarm system. The local fire authority shall be notified prior to any shutdown of the fire alarm system.

3.9 INSTRUCTION

- A. Provide instruction as required for operating the system. "Hands-on" demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided. The Contractor and/or the Systems Manufacturer's representatives shall provide a typewritten "Sequence of Operation" to the Owner.
- B. The Contractor shall furnish a reduced set of "as-built" record drawings on 11"x17" bond paper in a plastic cover showing locations of all devices and the proper address of the device as it is displayed on the LCD annunciator at the fire alarm control panels and/or remote annunciators. This reduced set shall be located in document cabinet above the FACP in the Administration Building for the reference of the Authority Having Jurisdiction.

3.10 CLOSEOUT SUBMITTAL

- A. The Contractor shall submit closeout submittal documentation consisting of the following items:
 - 1. Full size fire alarm "as-built" record drawings;
 - 2. Device cut sheets and CSFM listing services;
 - 3. A copy of the Fire Alarm System Record of Completion signed by the Installer and the Inspector of Record;
 - 4. Owner's Manuals and Operating Instructions.

SECTION 311000 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.

- B. Related Sections:

1. Division 02 Section "Selective Demolition" for removal partial removal of buildings or structures.
2. Division 31 Section "Earthwork."

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 topsoil or existing in-place surface soil and is 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.
 1. Tree protection shall be defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated
- E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIALS OWNERSHIP

- A. Except for materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 SUBMITTALS

- A. Existing Conditions: Digital photographic 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.
- B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 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 Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Salvage Improvements: Carefully remove items indicated to be salvaged.
 - 1. Salvage for Reinstallation: Clean and store on-site in a secure location, ready for reinstallation.
 - 2. Salvage to Owner: Deliver to Owner's designated location on-site.
- C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.
- D. Erosion and Sedimentation Control: Do not commence site clearing operations until temporary erosion and sedimentation control and plant-protection measures 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. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PREPARATION

- A. Comply with requirements of referenced Geotechnical Report for site clearing operations.
- B. Protect and maintain benchmarks and survey control points from disturbance during construction.
- C. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.
- D. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated. Identify trees to remain by wrapping a 1-inch blue vinyl tie tape flag around each tree trunk at 54 inches above the ground.
- E. Protect trees, plant growth, and vegetation not specifically designated for removal.
- F. Verify that existing plant life to be removed has been authorized for removal.
- G. Examine site and compare individual work areas with the Drawings and Specifications.
- H. Thoroughly investigate and verify conditions under which the work is to be performed.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Comply with Storm Water Pollution Prevention Plan (SWPPP) and requirements of authorities having jurisdiction.
- B. 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 requirements of authorities having jurisdiction.
- 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.

3.3 EXISTING UTILITIES

- A. Utilities to Remain: Locate, identify, and protect utilities that are to remain from damage.
- B. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's written permission.
- C. Utility Termination: Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place. Arrange with utility companies to shut off affected utilities and notify Owner not less than 48 hours in advance of utility termination.
 - 1. Excavate for and remove underground utilities indicated to be removed.

3.4 CLEARING AND GRUBBING

- A. Clear only limited areas required for execution of work at proposed improvement location.
- B. 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 not less than 24 inches below the bottom of the lowest structure footing or 2 feet below finished subgrade whichever depth is lower. Root systems deeper than indicated above shall be excavated to allow no roots larger than 2 inches in diameter.
 - 3. Use only hand methods for grubbing within protection zones.
 - 4. Chip removed tree branches and dispose of off-site.
- C. 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.

3.5 TOPSOIL EXCAVATION

- A. Remove sod, grass, and similar vegetation 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 more 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. 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 is not to be reused.

3.6 REMOVAL OF 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. Remove paving only where authorized and necessary to execute the Work.
 - 1. Remove concrete slabs, paving, walks, gutters, and curbs to nearest existing joint locations. Neatly saw-cut joints before removing 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.

3.7 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 Owner's property.
- B. Separate recyclable materials produced during site clearing from other nonrecyclable 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

SECTION 312000
EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Excavating and filling for rough grading the Site.
2. Preparing subgrades for slabs-on-grade, walks, pavements, turf and grasses, and plants.
3. Over excavation of building pad and pavement area.
4. Excavating soil and other material for surface improvements.
5. Placing fill.
6. Compaction of existing ground and fill.
7. Preparation of subgrade for other improvements.
8. Grading of soil.

B. Related Sections:

1. Division 31 Section "Site Clearing."
2. Division 31 Section "Trenching."

1.3 REFERENCES

- A. ASTM D 1557.

1.4 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

- B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

- C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
- F. Fill: Soil material used to raise existing grades.
- G. 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.
- H. Subgrade: Uppermost surface of an excavation.
- I. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.5 SUBMITTALS

- A. Material Test Reports: Classification according to ASTM D 2487 for each borrow soil material proposed for fill and backfill.

1.6 QUALITY ASSURANCE

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

1.7 FIELD CONDITIONS

- A. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth moving operations.
- B. Do not commence earth moving operations until temporary erosion and sedimentation control measures required by authorities having jurisdiction are in place.
- C. 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 Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- D. Do not direct vehicle or equipment exhaust towards protection zones.
- E. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
1. Any borrow soil materials proposed to be brought on-site are subject to inspection and testing by Owner's geotechnical testing agency to verify they are in compliance with referenced standards. Owner shall determine if testing of materials is required prior to any material being brought onto the site. Testing of materials may take up to two weeks to verify compliance with standards.
- B. Soil Types:
1. Soil Type S1: Excavated and re-used material, graded, free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
 2. Soil Type S2: Excavated and reused material, graded, free of roots, lumps greater than one inch, rocks larger than 1/2 inch, debris, weeds and foreign matter.
 3. Soil Type S3: Imported topsoil, friable loam; reasonably free of roots, rocks larger than 1/2 inch, debris, weeds, and foreign matter.
 4. Soil Type S4: Imported borrow, suitable for purposes intended, free of vegetable matter and other unsatisfactory material, meeting the following characteristics:
 - a. Maximum Particle Size (inches): 3 inches.
 - b. Maximum Plasticity Index: 9.
 - c. Percentage Passing #4 Sieve: 60-100%.
 - d. Percentage Passing #200 Sieve: 20-70%.
 - e. Expansion Index: Less than 20 (very low expansion).
 - f. R-Value (in paved areas): Minimum 50.
 - g. Corrosion Potential:
 - 1) Soluble Sulfates: Less than 2,000 mg/Kg.
 - 2) Soluble Chlorides: Less than 500 mg/Kg.
 - 3) Soil Resistivity: Greater than 5,000 ohm-cm
 5. Soil Type S5: Imported sand. Natural river or bank sand (sand equivalent greater than 30), washed; free of silt, clay, loam, friable or soluble materials, and organic matter.
- C. Soil for Fills:
1. Fill in Turf or Planting Areas: Excavated soils that have been graded and cleansed of excessive organics, debris, rocks, and lumps.
 2. Fill in Turf or Other Planting Areas: Type S2 or S3.
 3. Fill in Non-planting Areas: Type S1, S2 or S4.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Contractor shall thoroughly examine the project site prior to submitting his bid to familiarize himself with the conditions of the site and the conditions in which he will be required to work.
- B. Contractor shall thoroughly examine contract documents prior to bid.
 - 1. Documents do not necessarily indicate a balanced site.
 - 2. Contractor shall be responsible for importing materials from an off-site location or exporting excess material to an off-site location.

3.2 PREPARATION

- A. Site clearing specified in Division 31 Section "Site Clearing" shall be performed prior to beginning earthwork.
- B. 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. Coordinate excavations near existing utilities with utility companies.
- C. Protect and maintain erosion and sedimentation controls during earth moving operations.
- D. Identify required lines, levels, contours and datum.
- E. Locate, identify, and protect existing above and below grade utilities from damage.
- F. Protect plant life, lawns, trees, shrubs, and other features not authorized for removal.
- G. Employ equipment and methods appropriate to the work site.
- H. Protect excavated areas from drainage inflow, and provide drainage to all excavated areas.

3.3 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
 - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

- C. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others.

3.4 STORAGE OF SOIL MATERIALS

- A. Stockpile excavated satisfactory soil and materials borrow soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust. Stockpile soil materials away from edge of excavations. Do not store within drip line of trees to remain.

3.5 EXCAVATION

- A. Earthwork shall comply with requirements and recommendations in referenced Geotechnical Report.
 - 1. A representative from the Owner's geotechnical testing agency shall be present during earthwork operations.
- B. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
- C. Excavations at Edges of Tree and Plant-Protection Zones: Excavate by hand to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots.
 - 1. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
 - 2. Where authorized to cut roots, cut roots with a saw.
- D. Excavation for Structures: Following the stripping operations, the exposed surface in the area of the planned building improvements and structural concrete slabs-on-grade shall be over excavated to a minimum depth of 18 inches below stripped ground surface or 6 inches below the bottom of proposed footings, whichever is deeper. The over excavation shall extend at least 5 feet horizontally beyond perimeter exterior edges of proposed footings or structural concrete slabs-on-grade. The exposed ground surface shall be reviewed by a field representative of the Owner's Geotechnical Engineer to evaluate if any loose or soft zones are present that will require additional over excavation. Any areas encountered with debris fill in the subgrade of the over excavation shall be excavated an additional depth equal to the depth of the debris fill and the exact depth shall be determined by a field representative of the Owner's Geotechnical Engineer. The bottom of the over excavation shall be scarified to a depth of 6 inches, moisture conditioned to near optimum moisture content, and compacted as required under the "Compaction" Article.

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.
- E. Excavation for Pavements and Flatwork: Following the stripping operations, the exposed surface in the area of proposed paved areas shall be over excavated to a minimum depth of 6 inches below stripped ground surface or 6 inches below the proposed pavement subgrade, whichever is deeper. The exposed ground surface shall be reviewed by a field representative of the Owner's Geotechnical Engineer to evaluate if any loose or soft zones are present that will require additional over excavation. Any areas encountered with debris fill in the subgrade of the over excavation shall be excavated an additional depth equal to the depth of the debris fill and the exact depth shall be determined by a field representative of the Owner's Geotechnical Engineer. The bottom of the over excavation shall be scarified to a depth of 6 inches, moisture conditioned to near optimum moisture content, and compacted as required under the "Compaction" Article.

3.6 SUBGRADE INSPECTION

- A. If representative of Owner's geotechnical testing agency determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- B. Proof-roll subgrade below building slabs, pavements, and walks with equipment of type, size, and weight recommended by representative of Owner's geotechnical testing agency to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
 2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

3.7 FILLING, BACKFILLING, AND COMPACTING

- A. After excavation and just prior to filling, the bottom of excavations shall be scarified to a depth of 6 inches, moisture conditioned to a minimum of 2 percent above optimum moisture content, and compacted to a minimum of 90 percent of maximum density based on ASTM Method D 1557.
- B. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
- C. Fills shall be placed in lifts approximately 8 inches thick, moisture conditioned to a minimum of 2 percent above optimum moisture content, and compacted to values indicated.

- D. Place soil fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- E. Compact soil materials to not less than the following percentages of maximum dry unit weight according ASTM D 1557:
 - 1. Under structures, building slabs, steps, and pavements: 95 percent.
 - 2. Under walkways: 92 percent.
 - 3. Under turf or unpaved areas: 85 percent.

3.8 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 on Drawings.
 - 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 required elevations within the following tolerances:
 - 1. Turf or Unpaved Areas: Plus or minus 1 inch.
 - 2. Walks: Plus or minus 1/2 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.

3.9 FIELD QUALITY CONTROL

- A. Testing and Inspecting Agency: Owner will engage and pay for a qualified independent testing and inspecting agency to perform tests and inspections as applicable and prepare reports.
 - 1. Testing and Inspection Agency shall be acceptable to the Architect and the Division of the State Architect.
- B. The Architect and the Division of the State Architect shall have the right to order the testing of any materials used in the construction to determine if they are of the quality specified.
- C. Contractor Responsibilities:
 - 1. The Contractor shall maintain control of the quality of materials and workmanship in order to conform with the Drawings and Specifications.
 - 2. To facilitate testing and inspection, the Contractor shall:

- a. Schedule tests and inspections with the Testing and Inspection Agency sufficiently in advance of operations to allow for the assignment of personnel and for the completion of testing and inspecting responsibilities.
 - b. Provide access to the Work for the designated Testing and Inspection Agency.
 - c. Furnish all necessary materials and labor to assist the designated Testing and Inspection Agency in obtaining and handling samples at the project or other sources of materials.
 - d. Provide and maintain for the sole use of the Testing and Inspection Agency adequate facilities for safe storage of test specimens on the project site.
- 3. The Contractor shall correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- D. Testing and Inspection Services:
 - 1. Testing and inspections shall be performed by the designated Testing and Inspection Agency.
 - 2. Testing and inspections shall be in accordance with the 2019 California Building Code, Section 1705A.6 and Table 1705A.6, DSA Testing and Inspections form DSA 103, and Structural Drawings Special Inspection Criteria.
- E. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- F. Compaction testing will be performed in accordance with ASTM D 1557-78 (Method A).
- G. If tests indicate work does not meet specified requirements, recompact, or remove and replace, and retest.

3.10 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 Architect; 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.

3.11 CLEANING AND DISPOSAL OF SURPLUS MATERIALS

- A. Rake Clean.
- B. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.
- C. Adjacent roadways shall be kept clean during the progress of this work.

END OF SECTION

SECTION 312005 TRENCHING

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 backfilling trenches for utilities and pits for buried utility structures.
- B. Related Sections:
 - 1. Division 01 Section "Temporary Facilities and Controls" for temporary controls, utilities, and support facilities; also for temporary site fencing if not in another Section.
 - 2. Division 21, 22, 23, 26, 27, 28, and 33 Sections as applicable for installing underground mechanical and electrical utilities and buried mechanical and electrical structures.
 - 3. Division 31 Section "Earthwork" for soil types and earth moving.

1.3 DEFINITIONS

- A. Utility: Any buried or above ground piping, conduit, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

- A. Product Data: For each type of the following manufactured products required:
 - 1. Warning tapes.

1.5 PROJECT CONDITIONS

- A. Existing Utilities: A diligent attempt has been made to indicate on the Drawings the locations of utilities which may affect the Work. Utility locations are based on information provided by the Owner and limited above grade site observation. The locations of indicated utilities shall be considered approximate only until exposed by the Contractor.
 - 1. Maintain existing utilities in constant service during construction of the Work.
 - 2. Utility Locator Service: Notify utility locator service for area where Project is located before beginning trenching operations.
- B. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during trenching operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- C. Do not commence trenching operations until temporary erosion and sedimentation control measures are in place.
- D. Do not commence earth moving operations until plant and landscape protection measures are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations. The acceptance of borrowed soil materials shall be subject to review and approval by the architect.
- B. Satisfactory Soils:
 - 1. Soil Type S1: Excavated and re-used material, graded, free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
 - 2. Soil Type S2: Excavated and reused material, graded, free of roots, lumps greater than one inch, rocks larger than ½ inch, debris, weeds and foreign matter.
 - 3. Soil Type S3: Imported topsoil, friable loam; reasonably free of roots, rocks larger than ½ inch, debris, weeds, and foreign matter.
 - 4. Soil Type S4: Imported borrow, suitable for purposes intended, free of vegetable matter and other unsatisfactory material, with minimum R value of 10 and required as follows:
- C. Sand: ASTM C 33; fine aggregate.

2.2 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.
 - 1. Detectable Warning Tape: Provided detectable warning tape for underground utilities that would otherwise not be detectable by above ground utility locating methods. Detectable warning tape shall include metallic core encased in a protective jacket for corrosion protection and be detectable by a metal detector when tape is buried up to 30 inches deep.
 - 2. Colors: Warning tape shall be colored as follows:
 - a. Red: Electric.
 - b. Yellow: Gas.
 - c. Orange: Telephone and other communications.
 - d. Blue: Water systems.
 - e. Green: Sewer systems.

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 trenching operations.
- B. Locate, identify, and mark existing underground utilities.
- C. Protect plant life, lawns, trees, shrubs, and other features not authorized for removal.
- D. Protect and maintain erosion and sedimentation controls during trenching operations.
- E. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.
- F. Comply with all provisions of the Construction Safety Orders and General Safety Orders of the California Division of Industrial Safety, as well as all other applicable regulations as they pertain to the protection of workers from the hazard of caving ground in excavations.
- G. Prevent surface water and ground water from entering excavations and from flooding Project site and surrounding area. Protect excavations from softening 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.

3.2 EXCAVATION FOR UTILITY TRENCHES

- A. Provide protection for all open excavations, backfill trenches on same day in which excavation occurs to avoid leaving excavations open overnight.
- B. Excavate trenches to lines, depths, and widths required for installation of utilities.
- C. Cut trenches just wide enough to enable installation of utilities and proper backfill, and to allow inspection.
- D. Employ equipment and methods appropriate to the work site. Small mechanical excavators may be used only in areas where there is sufficient space so as not to damage adjacent improvements, and where the locations of all existing utilities have been determined.
- E. Use hand excavation methods to locate and expose existing utilities along the route of the new work prior to using any mechanical equipment. If mechanical equipment is allowed at a particular location, it may only be used after the completion by the Contractor of a successful exhaustive search by hand methods to locate all existing facilities as indicated on the plans, and as indicated on the ground by utility locating service or Owner.
- F. When excavating through tree roots, perform work by hand and cut roots, where authorized, with a saw.
- G. Excavate trenches to provide not less than the minimum cover required.
- H. Do not interfere with 45 degree bearing splay of foundations.
- I. Hand trim excavations for bell and spigot pipe joints. Remove loose matter.
- J. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- K. Excavate trenches, pits or holes bottoming in hardpan to a minimum of 6 inches below the grade for the bottom of the pipe and any couplings, and then backfill to the pipe grade with satisfactory soil material, thoroughly compacted. No additional payment will be made for such over-excavation and refill.
- L. In trenches where a firm foundation is not encountered, such as soft, spongy, or otherwise unsuitable material, remove the material to a minimum of 12 inches below the bottom of the proposed pipe or structure, or to a depth determined by the Engineer, and backfill the space with satisfactory soil material containing sufficient moisture to produce maximum compaction. No additional payment will be made for such additional excavation or backfill.
- M. Stockpile excavated material to be returned to trench adjacent to trench in location which will not be detrimental to existing improvements, trees, or pedestrian or vehicular traffic. Cover to prevent windblown dust. Remove unsuitable or excess material not being used, from site.

3.3 BACKFILL FOR UTILITY TRENCHES

- A. Prior to placing backfill in excavations, complete the following:
 - 1. Survey locations of underground utilities for Record Documents.
 - 2. Test and inspect underground utilities.
 - 3. Remove trash and debris.
 - 4. Remove temporary shoring and bracing.
- B. Backfilling and Compaction: Carefully place and compact backfill of satisfactory soil materials as follows:
 - 1. Initial Backfill: Place initial backfill of satisfactory soil free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit. Carefully compact initial backfill evenly on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit.
 - 2. Subsequent Backfill: Place backfill of satisfactory soil material in layers not more than 8 inches in loose depth and carefully compact.
 - 3. Final Backfill: Place final backfill in thickness required, but not more than 8 inches, to achieve final subgrade elevation after compaction and as required for grading.
 - 4. Compaction: Compact soil using hand operated tampers or lightweight power operated tamping equipment that will not damage or displace installed utilities. Compact each layer of backfill to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:
 - a. Turf or Unpaved Areas: 85%.
 - b. Areas Under Paving: 93% for the top 24 inches below the subgrade elevation, 85% for depths over 24 inches below the subgrade elevation.
- C. Trenches under Roadways: Provide 4-inch thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase course. Concrete is specified in Division 03 Section "Cast-in-Place Concrete."
- D. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.
- E. Soil Moisture Control: Uniformly moisten or aerate soil materials before compaction to within 2 percent of optimum moisture content.
 - 1. Do not over moisten or flood trenches to move or settle soil materials.
 - 2. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 - 3. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

- F. Grading: Uniformly grade areas to be smooth and flush with adjacent grade free of irregular or abrupt surface changes. Provide final grading in turf or landscaped areas where no further grading will occur.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- B. Allow testing agency to inspect and test each fill or backfill layer. Proceed with subsequent Work only after test results for previously completed work comply with requirements.
- C. Testing agency will test compaction of soils in place according to ASTM D 1557. Tests will be performed at the following locations and frequencies:
 - 1. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet or less of trench length, but no fewer than two tests.
- D. When testing agency reports that 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.

3.5 PROTECTION

- A. 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.

3.6 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 Owner's property.

END OF SECTION

SECTION 313116
TERMITE CONTROL

PART 1 - GENERAL

1.1 REQUIRED 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 soil treatment with termiticide.
 - 1. Extent of application indicated in Part 3 Article "AREA OF APPLICATION."

1.3 SUBMITTALS

- A. Product Data: For termiticide. Include EPA-Registered Label for termiticide products.
- B. Qualification Data: For Installer of termite control products.
- C. Product Certificates: For termite control products, signed by product manufacturer.
- D. Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's record information, including the following:
 - 1. Date and time of application.
 - 2. Moisture content of soil before application.
 - 3. Termiticide brand name and manufacturer.
 - 4. Quantity of undiluted termiticide used.
 - 5. Dilutions, methods, volumes, and rates of application.
 - 6. Areas of application.
 - 7. Water source for application.
- E. Sample Warranty: For special warranties.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment and products in jurisdiction where Project is located.
- B. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination" to schedule application of termiticide products.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.
- B. Related Work: Coordinate soil treatment application with excavating, filling, grading, and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.

1.6 WARRANTY

- A. Soil Treatment Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain termite control products from a single source from a single manufacturer.

2.2 SOIL TREATMENT

- A. Termiticide: Provide an EPA-registered termiticide complying with requirements of authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to product's EPA-Registered Label.
 - 1. Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Corporation, Agricultural Products; Termidor.
 - b. Bayer Environmental Science; Premise 75.
 - c. FMC Corporation, Agricultural Products Group; Dragnet SFR.
 - 2. Service Life of Treatment: Soil treatment termiticide that is effective for not less than five (5) years against infestation of subterranean termites.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil, interfaces with earthwork, slab and foundation work, landscaping, and other conditions affecting performance of termite control.
- B. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Prepare work areas according to the requirements of authorities having jurisdiction and according to manufacturer's written instructions before beginning application of termite control treatment. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.
- B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.
 - 1. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.3 AREA OF APPLICATION

- A. Provide Termiticide soil treatment of the following areas:
 - 1. Modular Universal TK Building pad.

3.4 APPLYING SOIL TREATMENT

- A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.
- B. Application: Mix soil treatment termiticide solution to a uniform consistency. Distribute treatment uniformly. Apply treatment at the product's EPA-Registered Label volume and rate for maximum specified concentration of termiticide to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction.

1. Slabs-on-Grade: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
 2. Foundations: Soil adjacent to and along the entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating the slab, and around interior column footers, and piers; also along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
 3. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.
- C. Post warning signs in areas of application.
- D. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

3.5 PROTECTION

- A. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.
- B. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

END OF SECTION

SECTION 321216
ASPHALT 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.
- B. SSCDOT – Standard Specifications, State of California, Department of Transportation (Caltrans) latest edition, except references to method of payment, and references to any state furnished materials.

1.2 SUMMARY

- A. Section Includes:
 - 1. Hot-mix asphalt patching.
 - 2. Hot-mix asphalt paving.
 - 3. Aggregate base course.
 - 4. Soil sterilant and treatment
- B. Related Sections:
 - 1. Division 31 Section "Earthwork."

1.3 DEFINITION

- A. Hot-Mix Asphalt Paving Terminology: Refer to ASTM D 8 for definitions of terms.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.
 - 1. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
 - 2. Job-Mix Designs: For each job mix proposed for the Work.
- B. Material Certificates: For each paving material, from manufacturer.
- C. Material Test Reports: For each paving material.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by authorities having jurisdiction or the California Department of Transportation.
- B. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of Section 39 of the Caltrans Specifications.
 - 1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.
- C. All improvements within property owned by a City, County, or State Entity shall be in accordance with the Standards and Specifications of the authority having jurisdiction.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
 - 1. Prime Coat: Minimum surface temperature of 50 deg F.
 - 2. Tack Coat: Minimum surface temperature of 50 deg F.
 - 3. Slurry Coat: Comply with weather limitations in ASTM D 3910.
 - 4. Asphalt Base Course: Minimum surface temperature of 50 deg F and rising at time of placement.
 - 5. Asphalt Surface Course: Minimum surface temperature of 50 deg F at time of placement.

PART 2 - PRODUCTS

2.1 AGGREGATES

- A. Aggregates: The grading and proportioning of aggregates shall be such that the combined mineral aggregate conforms to the specified requirements. All aggregates shall be clean and free from decomposed materials, organic materials, and other deleterious substances.
 - 1. Aggregates for base course shall conform to Section 26 of the State Standard Specifications, Class 2 for 3/4 inch maximum size gradation.
 - 2. Aggregates for asphaltic concrete shall conform to Type B as outlined in Section 39 of the State Standard Specifications. Aggregate grading shall be 3/4 inch maximum, medium for 1-1/2 inches or greater in total new pavement thickness.

2.2 ASPHALT MATERIALS

- A. Asphalt Binder: PG 64-10 in accordance with Section 92 of the Caltrans Specifications.
- B. Asphalt Cement: ASTM D 946 for penetration-graded material.
- C. Prime Coat: Asphalt emulsion prime coat complying with Section 93 of the Caltrans Specifications. Prime coat is not required unless specifically noted on the Drawings.
- D. Tack Coat: Asphaltic emulsion for use as tack coat shall be of the penetration type conforming to the requirements of Section 94 of the Caltrans Specifications.
- E. Water: Potable.

2.3 AUXILIARY MATERIALS

- A. Herbicide/Soil Sterilant: Commercial chemical for weed control, registered by the EPA. Provide in granular, liquid, or wettable powder form. Herbicide/soil sterilant shall comply with current EPA regulations at time of application.
 - 1. Product: Dow AgroSciences; Treflan Weed and Grass Preventer, or approved equal.
- B. Sand: ASTM D 1073, Grade Nos. 2 or 3.
- C. Joint Sealant: ASTM D 6690, Type I, hot-applied, single-component, polymer-modified bituminous sealant.

2.4 MIXES

- A. Hot-Mix Asphalt: Asphalt concrete shall be Type B and shall conform to the provisions of Section 39 of the Caltrans Specifications. The asphalt binder shall be steam refined paving asphalt classified as PG 64-10 in accordance with Section 92 of the Caltrans Specifications.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Geotechnical Engineer shall verify that subgrade is stable and in suitable condition to begin paving.
- B. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Subgrade preparation shall be as specified in Division 31 Section "Earthwork."
- B. Prior to construction of base course and asphaltic concrete, clean previously constructed subgrade or subbase of all foreign substances. The surfaces shall be inspected for the specified compaction and trueness to line and grade.
- C. Base Course: Aggregate base shall be placed in accordance with requirements of Section 26 of the State Standard Specifications and to the thickness shown. The materials shall be graded and compacted in maximum 4-inch layers to at least 95 percent of maximum density (ASTM D 1557).
 - 1. The base course shall be maintained until the asphaltic pavement is in place. Maintenance shall include drainage, rolling, shaping, and watering as necessary to maintain the course in proper condition. Sufficient moisture shall be maintained at the surface to prevent a dusty condition by light sprinkling with water. Areas of completed base course that are damaged by freezing shall be conditioned, reshaped and recompactd in accordance with the requirements of this specification, without additional cost to the Owner.
- D. Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared base course is ready to receive paving.
- E. Herbicide/Soil Sterilant Treatment: Apply herbicide/soil sterilant solution over surface to receive pavement or surfacing prior to the start of pavement or surfacing installation.
 - 1. Thoroughly water soak surface to be treated, avoid excess water runoff.
 - 2. Apply in spray form according to manufacturer's written application instructions at rates recommended manufacturer and in compliance with the State of California.
 - 3. Limit application to areas immediately under areas to be paved, use shields or other means to protect adjacent areas. Do not apply under windy conditions.
- F. Prime Coat: Prime Coat is only required if indicated on Drawings. It shall be the Contractor's option to apply Prime Coat if not indicated on the Drawings. Apply uniformly over surface of compacted unbound-aggregate base course at a rate of 0.15 to 0.50 gal./sq. yd. Apply enough material to penetrate and seal but not flood surface. Allow prime coat to cure.
 - 1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
 - 2. Protect primed substrate from damage until ready to receive paving.

- G. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot mix asphalt paving at a rate of 0.05 to 0.15 gal./sq. yd. Tack coat will not be required over surfaces of existing pavement unless indicated on the Drawings. Where indicated it shall be applied uniformly to existing pavement surfaces at a rate of 0.05 to 0.15 gal./sq. yd.
1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.3 HOT-MIX ASPHALT SPREADING, LAYING, AND COMPACTING

- A. Spreading and laying operations shall conform to the requirements of Sections 39-5 and 39-6 of the Caltrans Specifications. Where the total depth of paving exceeds 0.20 feet, the top layer of asphalt concrete shall not exceed 0.20 feet in compacted thickness. The aggregate for this layer and all lower layers shall be 3/4" maximum aggregate (medium). The next lower layer shall not exceed 0.25 feet in compacted thickness. Any lower layers shall not exceed 0.25 feet in compacted thickness. For total asphalt concrete thickness of 3 inches or greater, the minimum layer thicknesses shall be 1.5 inches compacted. Total asphalt concrete thicknesses of 3 inches may be placed in one layer at Contractor's option. No asphalt concrete paving shall be placed when the atmospheric temperature is below 50 degrees Fahrenheit. Compaction operations shall conform to the requirements of Section 39-6.03 of the Caltrans Specifications.
- B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.
1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt base course before placing asphalt surface course.
- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.
- D. All utility boxes and/or manholes shall be set flush with finished grade after placing final lift of asphalt paving, unless noted otherwise.

3.4 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
1. Base Course: Plus or minus 1/2 inch.
 2. Surface Course: Plus 1/2 inch, no minus.

- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
1. Base Course: 1/4 inch.
 2. Surface Course: 1/4 inch.
 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

3.5 PATCHING

- A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.
- B. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.05 to 0.15 gal./sq. yd. .
1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
- C. Patching: Fill excavated pavements with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.

3.6 REPAIRS

- A. Leveling Course: Install and compact leveling course consisting of hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch in existing pavements.
1. Install leveling wedges in compacted lifts not exceeding 3 inches thick.
- B. Crack and Joint Filling: Remove existing joint filler material from cracks or joints to a depth of 1/4 inch.
1. Clean cracks and joints in existing hot-mix asphalt pavement.
 2. Use emulsified-asphalt slurry to seal cracks and joints less than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.
 3. Use hot-applied joint sealant to seal cracks and joints more than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Owner shall engage a qualified testing agency to perform tests and inspections. Agency shall be qualified according to ASTM D 3666 for testing indicated.

- B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.
- C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- D. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979.
 - 1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
 - 2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.
 - a. One core sample will be taken for every 1000 sq. yd. or less of installed pavement, with no fewer than 3 cores taken.
 - b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.
- E. Replace and compact hot-mix asphalt where core tests were taken.
- F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements. Additional construction, testing, and replacement costs resulting from damaged or improperly installed infrastructure shall be paid for by the Contractor.

3.8 DISPOSAL

- A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.
 - 1. Do not allow milled materials to accumulate on-site.

END OF SECTION

SECTION 321313
CONCRETE PAVING AND WALKS

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. SSCDOT – Standard Specifications, State of California, Department of Transportation (Caltrans) latest edition, except references to method of payment, and references to any state furnished materials.

1.2 SUMMARY

- A. Section Includes: Concrete paving for the following:
 - 1. Curbs, gutters, walks and pedestrian paving.
- B. Related Sections:
 - 1. Division 03 Section "Cast-in-Place Concrete" for general building applications of concrete.
 - 2. Division 31 Section "Earthwork."

1.3 DEFINITIONS

- A. Cementitious Materials: Type II gray Portland Cement conforming to the specifications of ASTM C150-02a and the requirements of Caltrans Specification Section 90 for "Type II Modified" portland cement.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Material Test Reports: For each of the following:
 - 1. Aggregates. Include service-record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.
- D. Delivery Tags: Delivery tags for all concrete.

1.5 QUALITY ASSURANCE

- A. All improvements within property owned by a City, County, or State Entity shall be in accordance with the Standards and Specifications of the authority having jurisdiction.
- B. Installer Qualifications: A qualified installer who employs on Project personnel who shall be thoroughly familiar with the specified requirements, completely trained and experienced in the necessary skills required for work performed under this Section. In actual installation of the work of this Section, use adequate numbers of skilled workmen to insure installation in strict accordance with the contract documents design.
- C. Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
 - 2. ACI 318-14, "Building Code Requirements for Structural Concrete" with amendments per 2019 California Building Code, Chapter 19A, Section 1905A.
 - 3. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

1.6 ACCESSIBILITY REQUIREMENTS FOR PEDESTRIAN PAVING

- A. Concrete paving for accessible pedestrian routes for persons with disabilities shall comply with the following per 2019 California Building Code (CBC) requirements:
 - 1. Changes in Level: 1/4 inch maximum vertical change in level; changes greater than 1/4 inch to not more than 1/2 inch shall be beveled with a slope not exceeding 1:2 vertical to horizontal; offsets exceeding 1/2 inch shall be by a ramp (CBC 11B-303).
 - 2. Cross Slope of Walks and Ramps: 1/4:12 maximum (CBC 11B-403.3).
 - 3. Slope of Pedestrian Pavements: 1/4:12 maximum in any direction where there is no defined direction of travel (CBC 11B-403.3).
 - 4. Slope of Door and Ramp Landings: 1/4:12 maximum in any direction (CBC 11B-404.2.4.4 and 11B-405.7.1). Changes in level are not permitted within door and ramp landings.
 - 5. Slope of Parking Stalls and Access Aisles for Persons with Disabilities: 1/4:12 maximum in any direction (CBC 11B-502.4). Changes in level are not permitted within accessible parking stalls and access aisles.
 - 6. Slope of walks in the direction of travel: 1:20 (5%) maximum (CBC 11B-403.3).
 - 7. Slope of Ramps in the Direction of Travel: 1:12 (8.33%) maximum (CBC 11B-405.2).
 - 8. Width of Walks and Ramps: 48 inches minimum clear width (CBC 11B-403.5.1 and 11B-405.5).

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- 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. Do not use notched and bent forms.
- 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.

2.2 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from steel wire into flat sheets.
- B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.
- C. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 plain-steel bars. Cut bars true to length with ends square and free of burrs.
- D. 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, or precast 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.

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:
 - 1. Portland Cement: Type II gray Portland Cement conforming to the specifications of ASTM C150-02a and the requirements of Caltrans Specification Section 90 for "Type II Modified" Portland Cement.
- B. Normal-Weight Aggregates: ASTM C 33, uniformly graded. Provide aggregates from a single source with documented service-record data of at least 10 years' satisfactory service in similar paving applications and service conditions using similar aggregates and cementitious materials.
 - 1. Maximum Coarse-Aggregate Size: 1 inch nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

- C. Water: Potable and complying with ASTM C 94/C 94M.

2.4 CURING MATERIALS

- A. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- B. Water: Potable.
- C. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.
- D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating. It shall be the Contractor's responsibility to verify that all curing compounds used comply with the VOC Emission requirements of the San Joaquin Valley Air Pollution Control District.

2.5 RELATED MATERIALS

- A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber in preformed strips.

2.6 CONCRETE MIXTURES

- A. General: Concrete mixtures shall comply with requirements of authorities having jurisdiction.
- B. Mixtures for concrete pavements, gutters and curbs subject to vehicular traffic:
 - 1. Concrete shall be Class 2 (Previous years denoted as Class A) and shall contain 590 pounds minimum (6 sacks) of Portland Cement per cubic yard conforming to the requirements of Section 90 of the Caltrans Specifications.
 - a. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
 - 2. Proportion mixtures to provide normal-weight concrete with the following properties:
 - a. Compressive Strength (28 Days): 3000 psi minimum.
 - b. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.50.
 - c. Slump Limit: 4 inches maximum.
- C. Mixtures for concrete walks, gutters and curbs subject to only pedestrian traffic:
 - 1. Concrete shall be Class 3 (Previous years denoted as Class B) and shall contain 505 pounds minimum (5 sacks) of Portland Cement per cubic yard conforming to the requirements of Section 90 of the Caltrans Specifications unless noted otherwise on the drawings.

- a. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
- 2. Proportion mixtures to provide normal-weight concrete with the following properties:
 - a. Compressive Strength (28 Days): 2500 psi minimum.
 - b. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.58.
 - c. Slump Limit: 5 inches maximum.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.
 - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine exposed subgrades and base surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared base surface below concrete paving to identify soft pockets and areas of excess yielding.
 - 1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.
 - 2. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
 - 3. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch according to requirements in Division 31 Section "Earth Moving."
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. 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.

3.4 STEEL REINFORCEMENT

- 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.

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 where noted on the Drawings.
 - 1. Extend joint fillers full width and depth of joint.

2. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
 3. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 4. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 5. 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. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:
1. Grooved Joints: Form 1/4-inch wide contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius unless noted otherwise on the drawings. Repeat grooving of contraction joints after applying surface finishes. Eliminate grooving-tool marks on concrete surfaces.
 - a. Tolerance: Ensure that grooved joints are within 3 inches either way from centers of dowels.
 2. Sawed Joints: Sawed joints shall not be used where concrete is permanently exposed to view.
 - a. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
 - 1) Tolerance: Ensure that sawed joints are within 3 inches either way from centers of dowels.
- 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 unless noted otherwise on the Drawings. 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.
- 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 ACI 301 requirements 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.
- 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 and dowels.
- 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. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
 - 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.
 - 2. Do not use frozen materials or materials containing ice or snow.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.
- K. Hot-Weather 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.
 - 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.

3.7 CONCRETE FINISHING

- A. Float Finish: After initial floating during placement, 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 to provide slip resistant finish.
 - 2. Ramps: Finish ramps with medium broom finish with direction perpendicular to the direction of travel to provide slip resistant finish.
- 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.

3.8 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305 for hot-weather protection during curing.
- 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 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: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas that have been subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

3.9 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:
 1. Elevation: 1/4 inch.
 2. Thickness: Plus 3/8 inch, no minus.
 3. Surface: Gap below 10-foot- 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.
 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 for Grooved Joints: Plus 1/8 inch, no minus.
- B. Comply with tolerances per CBC Chapter 11B for accessible routes for persons with disabilities. Refer to regulatory requirements referenced in Part 1 Article "Accessibility Requirements for Pedestrian Paving" of this specification section.

3.10 FIELD QUALITY CONTROL

- A. Testing and Inspecting Agency: Owner will engage and pay for a qualified independent testing and inspecting agency to perform tests and inspections as applicable and prepare reports.
 1. Testing and Inspection Agency shall be acceptable to the Architect and the Division of the State Architect.
- B. The Architect and the Division of the State Architect shall have the right to order the testing of any materials used in the concrete construction to determine if they are of the quality specified.
- C. Contractor Responsibilities:
 1. The Contractor shall maintain control of the quality of materials and workmanship in order to conform with the drawings and specifications.
 2. To facilitate testing and inspection, the Contractor shall:
 - a. Schedule tests and inspections with the Testing and Inspection Agency sufficiently in advance of operations to allow for the assignment of personnel and for the completion of testing and inspecting responsibilities.

- b. Provide access to the Work for the designated Testing and Inspection Agency.
 - c. Furnish all necessary materials and labor to assist the designated Testing and Inspection Agency in obtaining and handling samples at the project or other sources of materials.
 - d. Provide and maintain for the sole use of the Testing and Inspection Agency adequate facilities for safe storage and proper curing of concrete test specimens on the project site for the first 24 hr. as required by ASTM C31.
 - 3. The Contractor shall correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- D. Concrete Tests: 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 5000 sq. ft. or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - 3. Air Content: ASTM C 231/C 231M, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.
 - 5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
 - 6. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at 28 days.
 - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.
- E. Strength of each concrete mixture will be satisfactory if the 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.
- F. Test results shall be reported in writing to Architect, 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 mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

- G. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- H. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, compressive strengths, or other requirements have not been met, as directed by Architect.
- I. Concrete will be considered defective if it does not pass tests and inspections.
- J. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- K. Test and inspection reports are to be prepared and distributed by the testing agency.

3.11 REPAIRS 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 Architect.
- B. Additional construction, testing, and replacement costs resulting from damaged or improperly installed infrastructure shall be paid for by the Contractor.
- C. Drill test cores, where directed by Architect, 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.
- D. 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.
- E. 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.

END OF SECTION

SECTION 321373
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. Cold-applied joint sealants.
- 2. Joint-sealant backer materials.
- 3. Primers.

- B. Related Requirements:

- 1. Division 07 Section "Joint Sealants" for sealing nontraffic and traffic joints in locations not specified in this Section.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Paving-Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of joint sealant and accessory.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Product Testing: Test joint sealants using a qualified testing agency.

1.7 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

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.

2.2 COLD-APPLIED JOINT SEALANTS

- A. Cold Applied Joint Sealants: Provide one of the following:
 - 1. Single Component, Pourable, Urethane, Elastomeric Joint Sealant: ASTM C 920, Type S, Grade P, Class 25, for Use T.
 - a. Available Product: W.R. Meadows, Inc.; Pourthane SL.
 - 1) Subject to compliance with requirements, provide product indicated or a comparable product subject to Architect's approval.
 - 2. Multicomponent, Pourable, Urethane, Elastomeric Joint Sealant: ASTM C 920, Type M, Grade P, Class 25, for Use T.
 - a. Available Product: Pecora Corporation; Urexpan NR-200 or DynaFlex.
 - 1) Subject to compliance with requirements, provide product indicated or a comparable product subject to Architect's approval.

B. Joint-Sealant Application: Joints within concrete paving, locations as follows:

1. Expansion and isolation joints in concrete paving.
2. Contraction joints in concrete paving.
3. Other joints as indicated.

C. Joint-Sealant Color: As selected by Architect from Manufacturer's full range.

D. Joint-Sealant Color: As selected by Architect from Manufacturer's full range.

2.3 JOINT-SEALANT BACKER MATERIALS

- A. Joint-Sealant Backer Materials: Non-staining; 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: ASTM D 5249, Type 1 or Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.
- C. Backer Strips for 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.

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: Before installing joint sealants, clean out joints immediately 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 preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

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.
 - 4. Fill joints to depths shown, or if not shown, as recommended by sealant manufacturer, and equal to 75 percent of joint width, but neither more than 5/8 inch deep nor less than 3/8 inch deep.
- 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.

END OF SECTION

SECTION 323119
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 metal fences and gates (shop fabricated).
- B. Related Requirements:
 - 1. Division 03 Section "Cast-in-Place Concrete" for concrete for setting fence posts.
 - 2. Division 05 Section "Metal Fabrications" for metal fabrications not included in this section.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product, including finishing materials.
- B. Shop Drawings: Include plans, elevations, component details, and attachments to other work. Indicate materials and profiles of each metal member, fittings, joinery, finishes, fasteners, anchorages, and accessory items.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing decorative metal fencing and gates similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- B. Installer Qualifications: Fabricator of products.

- C. Powder-Coating Applicator Qualifications: A firm experienced in successfully applying powder coatings of type indicated and employing competent control personnel to conduct continuing, effective quality-control program to ensure compliance with requirements.
- D. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store decorative metal fencing and gates in a well-ventilated area, away from uncured concrete and masonry, and protected from weather, moisture, soiling, abrasion, extreme temperatures, and humidity.

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with decorative metal fencing and gates by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Accessibility Requirements for Gates and Hardware: Pedestrian gates and hardware shall comply with accessibility requirements of 2010 ADA Standards for Accessible Design and the 2019 California Building Code, Chapters 10 and 11B.
 - 1. Gates shall be capable of opening a minimum of 90 degrees.
 - 2. Gates in the open position shall provide a clear opening width of not less than 32 inches.
 - 3. The bottom 10 inches of the push side of gates shall have a smooth uninterrupted surface that allows the door to be opened by a wheel chair footrest without creating a trap or hazardous condition.
 - 4. The effort to open gates shall not exceed a 5 pound force applied perpendicular to the face of the gate.
 - 5. Gates shall be openable from the secure side (inside) without the use of a key or special knowledge or effort. Operating hardware shall not require pinching or grasping to operate hardware.
 - a. Gates may be designed for key operation from either or both sides when gates are not required egress gates as determined by the Architect and the Division of the State Architect.

2.2 STEEL AND IRON MATERIALS

- A. Metal Surfaces, General: Use materials with smooth, flat surfaces unless otherwise indicated. Use materials without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Tubing: ASTM A 500/A 500M (cold formed).
- C. Bars: Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.
- D. Plates, Shapes, and Bars: ASTM A 36/A 36M.
- E. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M unless otherwise indicated.
- F. Steel Sheet, Cold Rolled: ASTM A 1008/A 1008M, either commercial steel or structural steel, exposed.

2.3 FASTENERS

- A. Fastener Materials: Plated steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating or Type 304 stainless steel.
- B. Fasteners for Anchoring to Other Construction: Unless otherwise indicated, select fasteners of type, grade, and class required to produce connections suitable for anchoring indicated items to other types of construction indicated.
- C. Post-Installed Anchors: Mechanical fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193.
 - 1. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.4 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.5 SETTING MATERIALS

- A. Cementitious Material: Portland cement, ASTM C 150, Type II, gray.

- B. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information. Proportion normal-weight concrete mixture as indicated below for strength, slump, water/cement ratio, and maximum aggregate size.
1. Strength: 3000 psi at 28 days.
 2. Aggregate Size: 1-1/2 inch maximum.
 3. Slump: 4 inches.
 4. Water Cement Ratio: 0.53 Maximum.

2.6 FABRICATION, GENERAL

- A. Fabricate fence panels in sections to prevent the need for field welding or cutting. Assemble items in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
1. Components of fabricated items shall not be finished until after fabrication.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Provide weep holes where water may accumulate. Locate weep holes in inconspicuous locations.
- D. Provide necessary brackets to assemble units and to attach to other work. Cut, reinforce, drill, and tap as needed to receive finish hardware, screws, and similar items unless otherwise indicated.
- E. Connect members with full-penetration welds unless otherwise indicated. Use welding method that is appropriate for metal and finish indicated and that develops full strength of members joined. Finish exposed welds and surfaces smooth, flush, and blended to match adjoining surfaces.

2.7 DECORATIVE METAL FENCING

- A. General: Fabricate decorative metal fencing from steel bars and shapes of sizes and profiles indicated.
1. Fabricate fence panels in sections to facilitate galvanizing, transportation to the Project Site, and installation.
- B. Fence Height: As indicated on Drawings.

- C. Posts, Rails, and Pickets: Square steel tube sections complying with ASTM A-500 with hot dipped galvanized exterior zinc coating and as follows:
1. Posts: Posts having a minimum yield strength of 45,000 psi and a minimum size as follows:
 - a. Posts for Fences: Size as indicated on Drawings, not less than 3-1/2 inches square x 1/8 inch thickness.
 - 1) Spacing: Nominal 8 feet on center maximum; posts shall be equally spaced on a standard module.
 - b. Posts for Swing Gates: Size as indicated on Drawings, not less than the following:
 - 1) Gates to 48 inches Wide: 4 inches square x 1/4 inch wall thickness.
 - 2) Gates over 48 inches Wide to 96 inches Wide: 6 inches square x 1/4 inch thickness.
 - 3) Gates over 96 inches wide to 144 inches Wide: 6 inches square x 3/8 inch thickness.
 2. Horizontal Rails: Size as indicated on Drawings, not less than 1-1/2 inches square x 11 gage (0.109 inch).
 3. Pickets: Size as indicated on Drawings, not less than 3/4 inch square x 1/8 inch thickness.
 - a. Spacing: 4 inches on center nominal; pickets shall be spaced such that a 4 inch diameter sphere shall not be capable of passing through the opening.
- D. Perforated Mesh Panels: Pre-galvanized, 1/8 inch round on 3/16 inch staggered centers, 40% open area, 24 gage.
- E. Caps: Basis of Design: Julius Blum 5640 for 4" x 4" post. (Select cap according to post size as required). Tack weld to post
- F. Finish: Galvanize and powder coat after fabrication.

2.8 SWING GATES

- A. General: Fabricate decorative metal swing gates from steel bars and shapes of sizes and profiles indicated in Drawings, match characteristics of fence design.
1. Pedestrian gates shall comply with accessibility and hardware requirements indicated in Part 2 "Performance Requirements" Article.
- B. Gate Height: Match adjacent fence panels.
- C. Gate Width: As indicated on Drawings; 32 inches minimum clear width when gate is in a 90 degree open position.

- D. Gate Framing: Hollow tubular steel sections of size, wall thickness, and spacing as indicated on Drawings, not less than 2 inches x 2 inches x 11 gauge (0.120 inch) minimum size).
- E. Rails: Match fence rails.
- F. Pickets: Match fence pickets.
- G. Hinges: Butt hinges or pivots as selected by fabricator; hinges to be sized for not less than twice the weight of the gate and allow the gate to open 180 degrees.
- H. Operating Hardware: Gates shall be prepared to receive a cylinder lock, mortise lock, or exit device as indicated on the drawings.
- I. Perforated Mesh Panels: Match fence panels
- J. Finish: Galvanize and powder coat after fabrication.

2.9 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize products made from rolled, pressed, and forged steel shapes, castings, plates, bars, and strips indicated to be galvanized to comply with ASTM A 123/A 123M. Galvanize items after fabrication.
 - 1. Hot-dip galvanize steel and iron hardware indicated to be galvanized to comply with ASTM A 153/A 153M.
 - 2. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
 - 3. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
- B. Powder-Coat Finish for Galvanized Metal: Prepare, treat, and coat galvanized metal to comply with resin manufacturer's written instructions and as follows:
 - 1. Prepare galvanized metal by thoroughly removing grease, dirt, oil, flux, and other foreign matter.
 - 2. Treat prepared metal with zinc-phosphate pretreatment, rinse, and seal surfaces.
 - 3. Apply thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than 2 mils.
 - 4. Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of decorative metal fences and gates.

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

3.2 INSTALLATION

- A. Provide anchorage devices and fasteners where needed to secure decorative metal fencing to in-place construction.
- B. Set posts accurately in location, alignment, and elevation; measured from established lines and levels.
 - 1. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil. Footings shall have a diameter not less than 4 times the width of posts and shall extend 6 inches below the bottom of the post.
 - 2. Post Setting: Set posts in concrete into firm, undisturbed soil. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices. Crown top of exposed concrete to drain water away from posts. Protect aboveground portion of posts from concrete splatter.
- C. Install gates level, plumb, and secure for full opening without interference. Attach hardware using tamper-resistant or concealed means. Adjust hardware for smooth operation and lubricate where necessary.
- D. Perform cutting, drilling, and fitting required to install decorative metal fencing. Set products accurately in location, alignment, and elevation, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items to be built into concrete, masonry, or similar construction.
- E. Fit exposed connections accurately together to form tight, hairline joints or, where indicated, uniform reveals and spaces for sealants and joint fillers. Where cutting, welding, and grinding are required for proper shop fitting and jointing of decorative metal, restore finishes to eliminate evidence of such corrective work.
- F. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.
- G. Field Welding: Comply with applicable AWS specification for procedures of manual shielded metal arc welding and requirements for welding and for finishing welded connections in "Fabrication, General" Article. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
- H. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
 - 1. Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

3.3 ADJUSTING

- A. 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.

3.4 CLEANING AND PROTECTION

- A. Unless otherwise indicated, clean metals by washing thoroughly with clean water and soap, rinsing with clean water, and drying with soft cloths.
- B. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.
- D. Protect finishes from damage during construction period with temporary protective coverings approved by decorative metal fabricator. Remove protective covering at time of Substantial Completion.
- E. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION

SECTION 328400
LANDSCAPE IRRIGATION SYSTEM

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Provide all materials, labor, equipment and services necessary to furnish and install Landscape Irrigation System, accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded. The extent of the underground landscape irrigation system is shown on the drawings. The Contractor shall carefully review the plans and specifications and if they feel that more equipment is needed, they shall include that in the bid. All extra work to achieve full coverage shall be at the Contractors expense. Sprinkler systems shall be complete, operative and automatic and provide full coverage of the planted areas.
- B. Irrigation systems shall be constructed to the sizes, grades and locations shown on the plans. Irrigation pipelines shown on the plans are essentially diagrammatic. Locations of all irrigation improvements shall be established by the Contractor at the time of construction. Typical spacing of the sprinklers are shown on the plans and shall not be exceeded, except by written permission of the Owner's authorized representative.
- C. The system has been designed to a pressure as indicated in these specifications. The Contractor shall test the mainline prior to starting any work and verify that such pressure does exist. If it does not, the Contractor shall notify the Owner at once for a ruling before starting work. If the Contractor does not test prior to starting work, all corrective work shall be at the Contractors expense.

1.2 RELATED SPECIFICATION SECTIONS

Division 31	EARTHWORK
32 9000	LANDSCAPE CONSTRUCTION
Division 03	CONCRETE
Division 26	ELECTRICAL

1.3 STANDARDS

- A. Materials and installation shall conform to all State and Local codes and regulations governing the trades included in this work. Requirements of these plans and specifications not conforming therewith, but exceeding code requirements, then the plans and specifications shall govern.

1.4 EXPLANATION AND EXAMINATION OF SPECIFICATIONS AND PLANS

- A. Due to the scale of the Drawings, it is not possible to indicate offsets, fittings, etc. which may be required. The Contractor shall carefully investigate the structural and finished conditions affecting all of their work and plan their work accordingly, furnishing such fittings, etc. as may be required to meet such conditions. Drawings are generally diagrammatic and indicative of the work to be installed in the most direct and workmanlike manner so that conflicts between irrigation systems, planting, utilities, and architectural features will be avoided.
- B. Notes on Drawings: Work called for on the Drawings by notes shall be furnished and installed whether or not specifically mentioned in the Specifications.
- C. It shall be the responsibility of the Contractor to carefully examine the site, plans and specifications relating to this work for completeness, accuracy and clarity. Any conflict, error, or clarification shall be immediately brought to the attention of the Owner's authorized representative in writing to obtain a ruling. Failure to do so prior to bidding shall result in any corrective work necessary shall be completed at the Contractor's expense.

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- D. It is the intent of these specifications and plans to form a guide to accomplish the work of installing a complete sprinkler system which will operate in an efficient and satisfactory manner according to the workmanlike standards established for the irrigation industry. Therefore, any items not specifically noted, but necessary for a complete installation, shall be furnished and installed under this contract.
- E. Manufacturer printed instructions shall also be a part of these specifications and shall prevail over these specifications. The Contractor shall be responsible to provide such details and instructions to the inspecting person for approval or rulings.
- F. All general and specific notes shown on the drawings and details herein shall take precedence over these specifications. All work designated on the drawings by notes shall be furnished and installed.

1.5 PERMITS AND INSPECTIONS

- A. The Contractor shall obtain and pay required fees to any governmental or public agency. Permits for the installation or construction of the work included under this Contract, which are required by legally constituted authorities having jurisdiction, shall be obtained and paid for by the Contractor, each at the proper time. The Contractor shall also arrange for and pay costs in connection with inspections and examination required by these authorities.

1.6 GUARANTEE

- A. Irrigation system shall be guaranteed for a period of one year from the date of final acceptance. Any repairs required are to be completed by the Contractor in a timely manner at no additional cost to the Owner.

1.7 OPERATIONS AND MAINTENANCE INSTRUCTIONS / RECORD DOCUMENTS

- A. Two copies of equipment operations, maintenance instructions, and wire diagrams shall be furnished to the Owner prior to final acceptance. Two copies of control valve station charts (color coded reduced Irrigation Plan with plastic waterproof lamination) showing watering zones and stationing shall be provided and mounted in the controller pedestal.
- B. The Contractor shall furnish one set of reproducible Record Documents (As-Built drawings) in form of 24 lb bright white bond paper.
 - 1. Label first page of each document, or set of documents, "RECORD DRAWINGS" in neat large printed letters on lower right hand corner. Record information concurrently with construction progress. Do not conceal any work until required information is recorded on a daily basis.
 - 2. Drawings: Legibly mark to record actual construction:
 - a. Horizontal and vertical locations of underground utilities and appurtenances referenced to permanent surface improvements. Give sufficient horizontal and vertical dimensions to accurately trace route and invert of each concealed line or item. Accurately locate each capped, plugged, or stubbed line.
 - b. Field changes of dimension and detail.
 - c. Changes made by Field Order, by Addenda, or by Change Order.
 - d. Details not on original Contract Drawings.
 - 3. Deliver all Record Documents (As-Built) to Landscape Architect. Accompany submittal with transmittal letter in duplicate, containing:
 - a. Date.

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- b. Project title.
- c. Contractor's name and address.
- d. Title and number of each Record Document (As-Built).
- e. Signature of Contractor or his authorized representative.

1.8 SUBMITTALS

- A. Within the required time period stated in the General Provisions, the Contractor shall submit electronic PDF documents of complete lists of proposed materials to Landscape Architect including manufacturer's name and catalog numbers.
- B. Shop drawings shall follow (six copies) for equipment including dimensions, capacities, and other characteristics listed in product specifications. Materials and equipment shall not be ordered until given written approval by Landscape Architect.

1.9 DEFINITIONS

- A. Piping: All pipe fittings, valves, and accessories as required for a complete piping system.
- B. PVC: Polyvinyl Chloride.
- C. Agencies and Organizations:
 - 1. ASTM American Society for Testing and Materials
 - 2. AWWA American Water Works Association
 - 3. IAPMO International Association of Plumbing and Mechanical Officials
 - 4. CEC California Electrical Code
 - 5. UL Underwriter's Laboratories

1.10 UNDERGROUND OBSTRUCTION

- A. The Contractor shall verify all underground obstructions, and / or utilities, existing or proposed, prior to trenching. Contractor shall avail themselves of any "as built" drawings of the site, Underground Service Alert (USA) 1-800-227-2600 and records of existing and proposed site work. This shall also include verifying between proposed irrigation work and existing / proposed underground utilities. Contractor shall call for a ruling by the Owner's Authorized Representative prior to work to obtain a ruling in the event of a conflict.
- B. The Contractor, after availing themselves to the existing record drawings, Underground Service Alert and coordination with other trades installing underground utilities and excavation operations incurs and damages any existing utility not identified, the Contractor shall stop work and notify the inspector on site, obtain a ruling and repair the damage.

1.11 WORKMANSHIP

- A. The Contractor shall have experience and demonstrated ability in the installation of irrigation systems of this type. No work shall be completed without supervision. All work shall be installed by skilled persons proficient in the trades required, in a neat, orderly and organized manner, with the recognized standards of craftsmanship developed for the industry and as described in the plans, specifications and manufacturers installation instructions.

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1.12 PROTECTION TO THE PUBLIC HEALTH AND WELFARE

- A. The Contractor in the course of their work shall make every effort to guard the public health, safety and welfare during construction. This shall include erection of barricades, night warning lights and all necessary devices required to protect the public health and welfare or as required by existing governmental codes. The Contractor shall accept any and all liabilities arising from accident or injury on the job and after construction. All equipment which protrudes above grade shall be installed against a structure or an appropriate barricade shall be erected to protect public safety.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. All materials and equipment to be used shall be as outlined on the irrigation legend, or as described in the irrigation notes and irrigation specifications. All materials shall be new and unused.
- B. All specified materials, products and manufacturers are relevant to describe the required quality and features of a particular component of the irrigation system, however, the specific product or manufacturer noted is to be construed to be followed by the words, "or approved equal".

2.2 PIPELINES / SLEEVES

- A. Irrigation Piping:
1. 2" thru 3": Pressure pipe / upstream of control valve (mainline pipe): PVC Schedule 40 solvent weld pipe, PVC Material ASTM D1784, Cell Class 12454B, Pipe Design ASTM D1785 & compliance with all NSF & IAPMO (UPC) requirements.
 2. 4" thru 6": Pressure pipe / upstream of control valve (mainline pipe): PVC Class 200 gasketed pipe, pressure rating 200 psi, SDR 21, PVC Material ASTM D1784, Cell Class 12454B, Pipe Design ASTM D2241 & Gasket Material ASTM F477.
 3. 3/4" thru 2 1/2": Circuit pipe / downstream of control valve (lateral pipe): PVC Class 200 solvent weld pipe, pressure rating 200 psi, SDR 21, PVC Material ASTM D1784, Cell Class 12454B & Pipe Design – SDR Pipe ASTM D2241.
 4. 2" and larger: Sleeving under hardscape / paving: PVC Schedule 40 solvent weld pipe, pressure rating varies, PVC Material ASTM D1784, Cell Class 12454B & Pipe Design ASTM D1785.
 5. Pipe shall be continuously and permanently marked with the following information: Manufacturer's name or trademark, nominal pipe size, schedule and type of pipe, pressure rating in PSI and (NSF, IAPMO & AWWA) seals of approval.
- B. Plastic pipe shall be as called for on the plan and extruded from PVC 1120/1220 and shall meet commercial standards CS 256-63. Class and schedule of pipe shall be as called for in the plans. Strict conformance with the manufacturers recommended installation instructions is required. Painted galvanized steel (schedule 40), threaded bronze nipples, copper or painted ductile iron pipe is to be used for any pipe installed above grade. Fittings for above grade piping are to be consistent with pipeline material. Sun burned pipe or pipe that has been abused in shipping and handling is not to be used.

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- C. The Contractor is to install concrete thrust blocks as outlined in the thrust block detail and as recommended by the pipe & fitting manufacturers to secure all changes in direction or dead ends of all mainline pipe. The Contractor is to use rebar as needed if necessary, to insure the stability of the pipe. Where concrete thrust blocks cannot be installed against continuous native subgrade, the Contractor is to install ductile iron mechanical joint restraints. No bending, or curving of pipe will be allowed, except as permitted by the pipe manufacturer. Pipe manufacturer must be approved prior to ordering materials.
- D. Where piping on the plans is shown under paved areas, but is running parallel and adjacent to planted areas, the intent of the plans is to install the piping in the planted area. PVC Schedule 40 sleeves are to be used with all pipe and wire installed under hardscaped surfaces over six feet (6'-0") wide or wider.
- E. Where pipeline routing changes occur in the field, the Contractor is to size the pipe so that a flow velocity of 5.0 feet per second is NOT exceeded. The minimum pipe size is 3/4" and 1 1/4" pipe is not used due to its limited flow range. The following is a basic guide for sizing lateral pipes in the field:
1. 3/4" Pipe - 0 gpm thru 8.0 gpm
 2. 1" Pipe - 8.1 gpm thru 16.0 gpm
 3. 1 1/2" Pipe - 16.1 gpm thru 36.0 gpm
 4. 2" Pipe - 36.1 gpm thru 55.0 gpm
 5. 2 1/2" Pipe - 55.1 gpm thru 85 gpm

2.3 PIPELINE FITTINGS

- A. Fittings:
1. For PVC solvent weld plastic pipe, 2" thru 3" mainline fittings: PVC Schedule 80 socket fittings (ASTM A2564, D2466, D2464 & D2467), Type 1, Grade 1. All mainline fittings are to be PVC Schedule 80 type with solvent weld or threaded connections.
 2. For PVC class 200 gasketed pipe, 4" thru 6" mainline fittings: Ductile iron deep bell gasketed fittings as manufactured by LEEMCO, or approved equal. See manufacturers instructions and recommendations. No angular deflection of mainline pipe at the fitting bell end is allowed. For automatic valve connections to large mainline (4" thru 6") pipe, Romac 202N ductile iron service saddle with double stainless steel straps may be used.
 3. For PVC solvent weld plastic pipe, 3/4" thru 2 1/2" lateral fittings: PVC Schedule 40 socket fittings (ASTM A2564, D2466, D2464 & D2467), Type 1, Grade 1. All lateral fittings (downstream remote control valve) not specifically noted as PVC Schedule 80 type in the specifications or irrigation details are to be PVC schedule 40 type with solvent weld or threaded connections.
 4. For connections between main lines and remote control valves: Schedule 80 PVC fittings and nipples (threaded both ends), see Irrigation Details.
 5. When connection is plastic to metal, Schedule 80 TOE nipple shall be used.
 6. Teflon tape shall be used on all small diameter (1/2" to 3") threaded connections. No liquid or paste pipe thread sealants are allowed.

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- B. Risers to irrigation heads: Shall be as noted on Irrigation Details.
- C. Solvent Weld Adhesive: Weld-On cement & primer appropriate for size & type of pipe and fittings. See manufacturer's instructions and recommendations. Note weather and temperature limitations for use. Use primer for all joints, mainline and lateral pipe connections.

2.4 VALVES / CONTROL WIRE

- A. Automatic Control Valves: Globe / Angle valves operated by low-power solenoid, normally closed, with manual flow adjustment. Sizes and types as shown on drawings. Low voltage electrical connections to valves shall have a minimum 24" coiled loop to each valve in valve box, see details. Valves shall be installed in a heavy duty plastic valve box with bolt down lid. Install one valve per valve box, no exceptions. Remote control valves are to have a solenoid that is compatible with Base Line two-wire / decoder system.
- B. Two-Wire Communication Cable: Base Line biline 14-2 as manufactured by Paige #7072D Black & Red, or approved equal. Two-wire communication cable is to be installed in 1" PVC electrical conduit with long sweep ells into and exiting each valve box. Two-wire communication cable is to have a junction / pull box installed at all changes in direction and at a maximum of 150 ft apart for longer straight runs. Two-wire communication cable is to be a minimum of 18" below grade and splices are to extend a minimum of three feet (3'-0") above grade at all wire splice locations.
- C. Two-wire Splices / Connectors: All wire splices / connectors to be 3M DBY-6 / DBR-6 waterproof splice kits and spare wire ends. All splices are to be located in a valve box and no direct bury splices are allowed.
- D. Control Wire Marking: T. Christy Enterprise, Inc. Waterproof Irrigation I.D. Tag or approved equal (714) 771-4172.
- E. Control Valve Boxes: Christy heavy duty plastic valve boxes with heavy duty bolt down lids or approved equal. See Irrigation Details for model numbers and sizes.
- F. Control Valve Box Marking: Heat imprinted or engraved with appropriate controller and station number.

2.5 IRRIGATION HEADS

- A. Spray Head: Molded plastic body with plastic nozzles. Refer to schedule on drawings. Manufacturer's numbers are listed with description.
- B. Rotor Head: Molded plastic and stainless-steel construction. Gear driven with lockable arc adjustment and matched precipitation rate nozzles. Refer to schedule on drawings. Manufacturer's numbers are listed with description.
- C. Irrigation heads adjacent to concrete walks, mow strips or other paved areas shall be offset 3" to permit edging without damage to irrigation equipment. Irrigation heads are to be set at grade. Irrigation heads are to be adjusted so that no spray hits buildings, fences, walls, or hardscaped surfaces. Install anti-drain check valves under all irrigation heads that weep or show drainage after operation.

2.6 GATE VALVES

- A. 1" thru 3" Size, if required: Class 125 bronze gate valve, 200 psi WOG, manufactured domestically made of cast bronze material and cross handle with non rising stem as

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manufactured by NIBCO, or approved equal. Solid wedge with screw in bonnet gate valve with threaded connections resistant to dezincification.

- B. 4" thru 6" Size, if required: Resilient seat ductile iron gasketed joint gate valve rated for a minimum of 200 psi, manufactured domestically by NIBCO, Waterous or approved equal.

2.7 QUICK COUPLER VALVES

- A. Two piece valve with heavy duty brass construction with vinyl cover and single lug operation. See Irrigation Legend and Details for detailed descriptions.

2.8 CENTRAL CONTROL SYSTEM

- A. Central Control System is existing and is to remain and protect. Contractor is to provide data collection, data entry, programming and changes to the existing system (Base Manager Plus) for the project work being completed. Contractor is to provide all setup required for Et control of the irrigation system with online weather data. Contractor is to follow all Base Line requirements and have system certified by an authorized Base Line representative to maintain the existing 10-year extended warranty.

2.9 HANDHELD RADIO SYSTEM

- A. Not required for this project.

2.10 IRRIGATION CONTROLLER

- A. Irrigation controller is existing and is to remain and protect.

2.11 IRRIGATION BOOSTER PUMP STATION

- A. Irrigation Booster Pump Station is existing and is to remain and protect.

2.12 VALVE BOXES

- A. All valves, manual or automatic shall have a valve box, set flush with grade. All valve boxes shall be of heavy-duty plastic construction with heavy duty bolt down lids. Valve boxes are to be manufactured by Applied Engineering, or approved equal. Maximum of one (1) valve per valve box, no exceptions. Placement of the valves within the valve boxes shall allow for proper servicing and maintenance space, or the installation will be rejected. Valve decoders are to be mounted to a 1" PVC schedule 40 pipe section used as a stake to keep them out of the bottom of the valve box.

2.13 AIR RELIEF VALVES

- A. Air relief valves shall be installed at high elevation areas of the mainline pipe and at dead end runs. Air relief valves are to be located in the field where high elevation points can be determined. Contractor is to submit a shop drawing showing the proposed installation locations for review and approval.

2.14 BACKFLOW PREVENTION DEVICES

- A. The backflow prevention device is existing and is to remain and protect.

2.15 OTHER MATERIALS

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- A. Materials not specifically indicated but necessary for proper execution of this work shall be of the first quality as selected by the Contractor subject to the acceptance of Architect.
- B. All materials appearing in the legend and details of the irrigation drawings are part of this job. Contractor is responsible for installation according to drawings and details. The system shall efficiently and uniformly irrigate all areas and perform as required by these plans and specifications.

PART 3 - EXECUTION

3.1 IRRIGATION SYSTEM DESIGN

- A. Irrigation system is designed for a water pressure of 65 psi at the irrigation point of connection.
- B. Verify the design pressure provided at the irrigation point of connection prior to system modifications and report any discrepancies in writing to the Architect. Failure to inform the Architect of any discrepancy in design pressure seven working days prior to installation of the irrigation system shall institute the responsibility of corrective action to the Contractor, at no expense to the Owner.

3.2 IRRIGATION STAKING

- A. The location of all sprinklers, valves, piping and other irrigation improvements shall be staked out by the Contractor. All staking and measurements shall be taken from permanent objects, buildings, or other permanent hardscape features including survey bench markers, and are NOT to be taken from non-permanent boundaries such as turf boundaries which are subject to modification. All measurements shall be made in feet and inches, rounding to the nearest inch. All variations from the plans are to be continuously updated on a daily basis on the record (as built) drawings. The Contractor is to present the areas staked to the Landscape Architect for review and approval prior to starting work. The Contractor is to make the adjustments in staking requested by the Landscape Architect at no additional cost to the Owner.
- B. In planter areas, the Contractor is to stake the tree and shrub locations prior to layout of the irrigation system to get approval from the Landscape Architect in the field prior to trenching. Contractor is to use color coded flags to stake plant materials by variety. Landscape Architect may move plants, delete or add plants during the staking review process. Contractor is to make changes in the field and on the as built plans at no additional cost to the Owner. After the plant layout has been staked, reviewed, adjusted and approved, the Contractor is to stake the bubbler locations for each plant or tree. Bubblers are to be located within the plant water basin on the uphill side of the plant or tree. Bubblers that are too far from the plant or tree will need to be relocated within an acceptable difference. The plant or tree rootball is to have direct access to irrigation water from the intended bubbler. Sloppy or non-compliant work will be rejected.

3.3 EXCAVATION, BACKFILL

- A. Trenches for irrigation pipelines and sleeves shall be excavated either by hand or machine and shall be of sufficient width to permit proper handling and installation of the pipe and fittings. The backfill shall be compacted and evened off with the adjacent soil level. Select fill material or sand shall be used if soil conditions are rocky or have debris. No material over 3/8" shall be allowed near the pipe, 6" below it, or 6" above the pipe. Backfill shall be made early in the morning when the soil and pipe temperatures are the same. Pipe to be installed with a minimum cover of 18" for mainline pipe and 12" for lateral pipe with spray heads and 18" for lateral pipe with rotors. Backfill shall be in 6" (lifts) increments. Each (lift) increment shall be

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compacted as needed to prevent settlement with tamping machine. Backfill material is to be brought to the optimum moisture content prior to starting compaction operations.

- B. Contractor shall compact trench fill material as required to prevent settling of trenches. Contractor is to guarantee trenches against settling for a period of one year from the date of final acceptance by the Owner. Contractor is to fill, compact and seed settled trenches during this time at no additional cost to the Owner.
- C. All pipe in the same trench shall have a minimum clearance of 4" from each other. Pipelines are not to be stacked vertically in the same trench. Pipes and wires or conduit are to have a minimum clearance of 12" from each other. Final fill over trenches shall be compacted to a level grade with no depressions.

3.4 ROAD, DRIVEWAY, PARKING LOT AND SIDEWALK PIPELINE CROSSINGS

- A. Any pipe, wire or communication cable that crosses any hardscaped surface six feet (6'-0") or wider, shall be installed in a PVC class 200 sleeve that is a minimum of two times larger than the pipe or wire bundle being sleeved. Sleeves are to have a minimum trench cover of 18" deep. Pipelines and wires that are to be installed below existing hardscaped improvements are to be installed in a sleeve as noted above, by horizontal directional boring. No cutting and patching of any hardscaped surface will be permitted without written permission of the Owner's authorized representative. Newly paved areas are to be protected and preserved from construction damage. Jacking and hydraulic (water jet) driving are not permitted. The minimum sleeve size is two (2") inch. The Contractor is to verify the inside and outside diameters of pipes and wire bundles being sleeved to insure proper fit and installation. Irrigation pipelines and wires are to be installed in separate sleeves. No more than one (1) irrigation pipeline is allowed per pipe sleeve. Low voltage wires may be bundled with communication cable and installed in an appropriate size wire sleeve in conformance with NEC requirements for wires installed in conduit.
- B. If approval to cut and patch a hardscaped surface has been obtained, the Contractor shall make cuts by a pavement / concrete saw or other approved means. Where any cutting or breaking of hardscaped surface work is necessary, it shall be removed and replaced by the Contractor conforming to all prevailing project specifications and requirements. Cuts are to be made along existing scoring lines or other markings to minimize negative visual aesthetics. Barriers and night lighting shall be erected to protect the public health welfare and safety. If approval to cut and patch a hardscaped surface is denied, the Contractor shall make the crossing by using horizontal directional boring. All materials and labor for all sleeves and crossings, whatever method, are to be supplied by the Contractor at no additional cost to the Owner.
- C. Backfill shall be compacted to 95%. The Owner reserves the right to test such backfill. If the backfill does not meet the required 95% compaction, the Contractor shall recompact the trench. The Contractor shall pay for all additional testing until the work meets the specifications.

3.5 PIPING INSTALLATION

- A. General: Support piping without strain on joints or fittings and allow for piping expansion and contraction. "Snake" pipe into trench in accordance with manufacturer's recommendations to allow for expansion. Lay on solid sub-base, uniformly sloped.
- B. The Contractor shall examine all other portions of working drawing and plan trenching and pipe routing and depth so that no conflicts will arise between irrigation and any other work. Any corrective action will be the Contractor's responsibility at no further expense to the Owner. Contractor is to endeavor to route mainline pipes a minimum of fifteen feet (15'-0") from trees

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and is to get permission to install mainline pipe closer in tight locations from the Owners Authorized Representative.

C. Joints:

1. PVC Solvent Weld: Pipe shall be cut square and reamed to full size. Check for assembly prior to solvent weld. Remove excess solvent. All assembly shall be in accordance with manufacturer's recommendations, including use of primer on 3/4" pipe or larger.
2. Steel or PVC Schedule 40 Threaded: Pipe shall be cut square and reamed to full size. Threads shall be full cut, true and tapered. Teflon tape suitable for conveyed fluid shall be applied to male thread only.
3. Open Ends: Open ends of piping shall be capped during progress to preclude foreign matter. All pipe shall be assembled free from dirt and pipe scale.

D. The Contractor shall thoroughly flush all mainline and lateral piping prior to the installation of irrigation heads. Flush entire piping system of all debris.

3.6 IRRIGATION HEAD INSTALLATION

- A. Head spacing on drawings is diagrammatic. Head spacing and patterns shall be adjusted to provide complete and adequate coverage without overspray on non-planted areas. Flush all lines prior to installation of the sprinkler heads.

3.7 CONTROL WIRE

- A. Protect two-wire path by running along side mainline piping, maintain minimum 4" separation to mainline. Do not tape wire together when encased in sleeve or conduit. Minimum cover shall be 18 inches. Connect wires together at valve manifold with 3M DBY-6 / DBR-6 splice kits as required. Tag all control wire splices with approved control wire marker at splices in valve box and in controller.

3.8 CONTROL VALVE BOX MARKING

- A. Imprint valve box lid by heat imprinting or engraving with appropriate controller and station number.

3.9 TESTING

- A. General: Unless otherwise directed, tests shall be witnessed by a representative of the Owner. Mainlines are to be center loaded with the joints exposed. Should any joints be covered before such tests, the Contractor shall, at their expense, uncover, test, and repair the work and that of other contractors to original conditions. Leaks and defects shown by tests shall be repaired and entire work re-tested. Tests may be made in sections, however, all connections between sections previously tested and new section must be included in the test.
- B. Piping Upstream of control valves (Mainline): Maintain 100 PSI water pressure for a duration of four (4) hours. There shall be no drop in pressure during test except that due to ambient temperature changes. Perform test with control valves installed.

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3.10 CONSTRUCTION OBSERVATION

A. Observation of Work:

1. Installation and operations must be approved by the Landscape Architect.
2. In no event shall the Contractor cover up or otherwise remove from view any work under this contract without prior approval of the Landscape Architect. Any work covered prior to inspection shall be opened to view by the Contractor at their expense.

B. Construction Observation: Periodic site visits shall be required for basic operations and installations during progression of the project. Such site visits will include, but not necessarily be limited to, the following items:

1. Preconstruction meeting.
2. Staking of plant and tree locations prior to irrigation installation.
3. Staking of sprinklers and mainline routing.
4. Mainline, wiring, lateral pipes & valve manifolds prior to backfill.
5. Irrigation coverage test and rough grading.
6. Trees & plants prior to installation, still in containers.
7. Fine grading of turf areas prior to hydroseeding.
8. Substantial completion to start maintenance.
9. Final acceptance after successful maintenance period.

The Owner will pay for initial construction observation visits, however, any additional visits required due to non-compliance, incomplete work, or substandard performance will be paid by the contractor at a cost of \$850.00 per extra visit.

C. Coverage Test: When the irrigation system is completed, the Contractor in the presence of the Landscape Architect shall perform a coverage test of water afforded in the planting areas. The Contractor shall furnish all materials and labor required to correct any inadequacies of coverage disclosed. The Contractor shall inform the Landscape Architect of any deviation from the plan required due to wind, planting, soil, or site conditions that bear on proper coverage. If such corrections or additions are required in the irrigation system, the Contractor shall make all adjustments and corrections without any extra cost to the Owner.

D. Completion of Work: Prior to substantial completion and the start of the maintenance period, the Contractor shall deliver to the Owner a complete set of as built drawings on 24 lbs bright white bond paper, two (2) sets of manuals covering all materials in the irrigation system with a list of local vendors, two (2) sets of all tools required to maintain system in tool boxes, two (2) gate valve operating handles, waterproof color coded controller diagrams and extra equipment listed below not installed as part of the project. Irrigation system shall be fully automatic, operable and provide full coverage of the planting areas. In judging the work, no allowance for deviation from the original plans and specifications will be made unless already approved in writing at proper time. Should it become necessary, due to developed conditions, to occupy any portion of the work before the Contract is fully completed, such occupancy shall not constitute acceptance. The Contractor will not be responsible for any damage caused by the Owner's work forces.

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3.11 EXTRA IRRIGATION EQUIPMENT

- A. The Contractor shall supply the following extra equipment to be installed at the direction of the Landscape Architect during the project. Each item is to include all piping, wiring, fittings, appurtenances, labor and equipment costs for a complete installation at no additional cost to the Owner. Should any items not be installed as part of the project, the remaining items are to be delivered to Owner as part of project completion documentation.

1. Four (4): Four inch pop up bubblers.
2. Five (5): Six inch pop up sprinklers.
3. Five (5): I-20 rotor sprinklers.
4. Four (4): Tree bubbler tube assemblies.
5. One (1): 1" electric valve with line size filter.
6. One (1): 1 1/2" electric valve with line size filter.
7. Five (5): Base Line 1 station decoders.
8. Twenty (20): DBY-6 splice kits.

All work is to be in compliance with all project specifications and construction details at no additional cost to the Owner. Items not installed as part of the project are to be delivered to the Owner as part of project close out procedures (turn over items).

3.12 MAINTENANCE

- A. Adjustments: Irrigation system shall be maintained and adjusted as required to provide proper coverage throughout the 90 day maintenance period. Irrigation system maintenance shall commence upon approval of substantial completion following irrigation installation, planting operations, and general site clean up. Maintenance shall be continued until final acceptance.
- B. Irrigation controller shall be set during this time with Owner. Training for persons appointed by the Owner is to be completed during this time. Final acceptance of the project will NOT occur until all training of Owner's personnel is completed.

-- END OF SECTION --

SECTION 329000
LANDSCAPE CONSTRUCTION

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Provide all material, labor, equipment and services necessary to do all Landscape Construction work and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded. Work is to include, but is not limited to, the following:
1. Soil Testing
 2. Clearing, Ripping and Grading
 3. Cultivation, Soil Amending and Leaching
 4. Furnish and Plant Plants and Trees
 5. Fertilization
 6. Turfgrass Repair / Sod Installation
 7. Weeding
 8. Staking
 9. Clean-up and Maintenance

1.2 RELATED SPECIFICATION SECTIONS

Division 31	EARTHWORK
32 8400	LANDSCAPE IRRIGATION
Division 03	CONCRETE
Division 26	ELECTRICAL

1.3 STANDARDS

- A. Materials and installation shall conform with all State and Local codes and regulations governing the trades included in this work. Requirements of these plans and specifications not conforming therewith, but exceeding code requirements, then the plans and specifications shall govern.

1.4 DEFINITIONS

- A. The term approved shall mean by the Architect, and only in writing.

1.5 EXAMINATION OF SPECIFICATIONS, PLANS AND SITE

- A. It shall be the responsibility of the Contractor to carefully examine the site, plans and specifications relating to this work for completeness, accuracy and clarity. Any conflict, error, or clarification shall be immediately brought to the attention of the Owner's authorized representative in writing to obtain a ruling. Failure to do so prior to bidding shall result in any corrective work necessary shall be completed at the Contractor's expense.

1.6 PERMITS AND INSPECTIONS

- A. The Contractor shall obtain and pay required fees to any governmental or public agency. Permits for the installation or construction or the work included under this Contract, which are required by

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legally constituted authorities having jurisdiction, shall be obtained and paid for by the Contractor, each at the proper time. Contractor shall also arrange for and pay costs in connection with inspections and examination required by these authorities.

1.7 GUARANTEE

- A. Guarantee shrubs, ground covers, and lawn as to growth and health for one (1) year after final acceptance by Owner. The contractor is responsible for replacement of plant materials due to theft and vandalism until final acceptance of the project by the Owner after completion of the specified maintenance period.
- B. Guarantee trees to live and grow upright for a period of one (1) year after completion and final acceptance by the Owner. The contractor is responsible for replacement of trees due to theft and vandalism until final acceptance of the project by the Owner after completion of the specified maintenance period.
- C. Replace plants which lose more than 30% of their original leaves within the below described time limits.
- D. Remove and replace plants within 15 days of notification which fail to conform. Replace with materials as originally specified. Guarantee for replaced materials shall begin with date of replanting and shall be as previously described.

1.8 SUBMITTALS

- A. Within the required time period stated, the Contractor shall submit electronic PDF documents of complete lists of proposed materials to Landscape Architect including source, manufacturers name and catalog numbers.
- B. Materials and equipment shall not be ordered until given written approval by Landscape Architect.
- C. The Contractor shall confirm availability of plant material, supplies and materials for inclusion in the submittal. If a plant is found not to be suitable or available, the Contractor is to submit a list of three to five appropriate substitutions that are available for selection by the Landscape Architect.

1.9 UNDERGROUND OBSTRUCTION

- A. The Contractor shall verify all underground obstructions and / or utilities, existing or proposed prior to making landscape excavations or installing tree stakes. Contractor shall avail themselves of any as built drawings of the site, Underground Service Alert (USA) 1-800-227-2600 and records of existing and proposed site work.
- B. If there is a conflict with the utilities and the planting, notify the Landscape Architect for a ruling prior to planting.

1.10 PROJECT CONDITIONS

- A. No plants shall be planted in situations that show obvious poor drainage. Such situations shall be brought to the attention of the Landscape Architect and Owner's authorized representative. Generally, the drainage problem is to be corrected prior to installing plant material.
- B. All landscape areas are to be deep ripped to a depth of twelve inches (12") below finish grade in two directions. All trees are to have 18" diameter drainage holes that are 10' deep.
- C. The Contractor shall guarantee repair of damage to any part of the premises resulting from leaks,

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defects in materials, equipment or workmanship. The Contractor shall be liable for any and all accidents resulting from their work, including open holes and trenches during construction.

- D. During landscape construction operations keep hardscaped surfaces clean and work areas organized.
- E. Landscape concrete mow strips are to be installed so that they do not conflict with site drainage or impede drainage away from buildings. Generally, a minimum 2% slope away from buildings is to be maintained for positive site drainage. Concrete mow strips are not to trap water or cause puddling.

1.11 WORKMANSHIP

- A. The Contractor shall have experience and demonstrated ability in the installation of landscapes of this type. No work shall be completed without supervision by a qualified foreman. All work shall be installed by skilled persons proficient in the trades required, in a neat, orderly and organized manner, with the recognized standards of craftsmanship developed for the industry and as described in the plans, specifications and manufacturers installation instructions.

1.12 SOIL TESTING

- A. An independent soil testing laboratory is to test the existing soil after rough grading operations are completed with a complete fertility assay to evaluate the soils ability to maintain and support the ornamental landscaping. Samples from two (2) locations on the site are to be taken, with two samples from each location, one at four (4") inches in depth, and the second at sixteen (16") inches in depth (four samples). The soil testing laboratory is also to complete a preliminary screening for detrimental agricultural chemical residue that may be present on site, if these results are positive, notify the Owners authorized representative for a ruling. The contractor is to pay for all required soil tests and consulting time with the soil scientist for detailed recommendations to be submitted to the Owners authorized representative for evaluation.
- B. After the soil amending and leaching process, if required, has been completed, the Contractor is to take additional samples from the two (2) locations on the site, with two samples from each location, one at four (4") inches in depth, and the second at sixteen (16") inches in depth (four samples) to evaluate the progress and effectiveness of the soil amending and leaching work. The contractor is to pay for all required soil tests and consulting time with the soil scientist for detailed recommendations to be submitted to the Owners authorized representative for evaluation.

1.13 CONSTRUCTION OBSERVATION

- A. The Contractor is to coordinate construction observation site visits with the Landscape Architect during the appropriate phases of construction, or as required by the Landscape Architect. The Contractor is to schedule site visits a minimum of one week in advance at the required phases of construction. The following outlines the phases of construction which require a site visit; however it is not limited to the following construction phases:
 - 1. Preconstruction meeting
 - 2. Staking of plant and tree locations prior to irrigation installation.
 - 3. Staking of sprinklers and mainline routing.
 - 4. Mainlines, wiring, lateral pipes, & valve manifolds prior to backfill.
 - 5. Irrigation coverage test and rough grading.

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6. Trees & plants prior to installation, still in containers.
7. Fine grading of turf areas prior to sod and stolon installation.
8. Substantial completion to start maintenance.
9. Final acceptance after successful maintenance period.

The Owner will pay for initial construction observation visits, however, any additional visits required due to non-compliance, incomplete work, or substandard performance will be paid by the contractor at a cost of \$850.00 per extra visit.

1.14 PROTECTION TO THE PUBLIC HEALTH AND WELFARE

- A. The Contractor in the course of their work shall make every effort to guard the public health, safety and welfare during construction. This shall include erection of barricades, night warning lights and all necessary devices required to protect the public health and welfare or as required by existing governmental codes. The Contractor shall accept any and all liabilities arising from accident or injury on the job and after construction. All equipment which protrudes above grade shall be installed against a structure or an appropriate barricade shall be erected to protect public safety.

PART 2 - MATERIALS

2.1 PLANTS

- A. Conform to list of plant materials on drawings. Contractor is to provide digital photos of representative example of each plant and tree type to be used and submit to Landscape Architect for review and comment. Plants and trees are also to be inspected when delivered to the site so non-conforming materials can be identified prior to planting.
- B. Plants shall be the best of their kind and class, and of optimum age, and in conformance with the standards of the American Society of Nurserymen.
- C. Plants shall have normal, well-developed branch systems and shall not be root or pot-bound. Do not prune or top trees prior to delivery.
- D. Delivery to be made not more than 2 days prior to installation unless nursery area approved by landscape architect is established.
- E. It will be the responsibility of the contractor to place material order(s) sufficiently in advance of planting to assure availability of plants in species and size specified. Substitutions for plants and trees will not be made due to lack of advance planning.
- F. No substitutions will be made without approval of the Landscape Architect or authorized representative.

2.2 SOIL AMENDMENTS

- A. Soil amendments (type and quantity) are to be based on the soil test results and recommendations by the soil testing laboratory. The contractor is to include the amendments outlined in part 3.03 of this Section in the bid price. Prices for the soil amendments are to be quoted as unit prices to be adjusted based upon the recommendation of the testing lab. The contractor is to pay for all required soil tests and consulting time with the soil scientist for detailed recommendations.

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- B. Nitrified Aged Fir Bark Humus (forest product) as supplied by Superior Soil Supplements, Hanford, California, (559) 904-3372.
- C. Commercial fertilizer (15-15-15), Best Pre-plant fertilizer (6-20-20 XB), slow release fertilizer Best All Season (19-6-12) with Polyon 43.
- D. Gypsum (95% purity) and Elemental Soil Sulfur (99% purity) as supplied by Superior Soil Supplements, Hanford, California, (559) 904-3372.
- E. Plant fertilizer tabs: Agriform, Best-Tabs or approved equal, quantities as shown below: 1 gallon plant (2 tabs), 5 gallon plant (4 tabs), 15 gallon plant (6 tabs) & box size tree (8 tabs).
- F. Terra C Premium Humate as supplied by Superior Soil Supplements, Hanford, California, (559) 904-3372.
- G. Certificates: In addition to any certificates specified, the Contractor shall furnish a certificate with each delivery of bulk material stating the source, quantity, date, and type of material. All certificates shall be delivered to the Owners authorized representative at the time of each delivery.
- H. Samples: The contractor is to submit samples of the materials to be used for inspection and approval.

2.3 ACCESSORIES

- A. Tree Stakes: 2 inches by 2 inches by 10 feet long treated lodgepole or natural redwood. Use two stakes per tree. See the tree installation detail.
- B. Tree Ties: flexible vinyl "Cinch-Tie", manufactured by V.I.T. Products, San Diego, California, (619) 673-1760, and distributed by Horizon Sales, Pleasanton, California, (510) 462-6602. Use a minimum of four 24" ties per tree. See the tree installation detail.
- C. Tree String Trimmer Guard: polyethylene "Trim Guard", manufactured by V.I.T. Products, San Diego, California, (619) 673-1760, and distributed by Horizon Sales, Pleasanton, California, (510) 462-6602. Use one Trim Guard per tree in the lawn areas only.
- D. Tree Root Barriers: All trees within ten (10'-0") feet of a hardscaped surface, perimeter fence or building are to have root barriers installed that are 24" deep by 24" wide as manufactured by Root Solutions, Inc. and distributed by Vespro Inc., San Rafael, California, (415) 434-3072. Each fifteen gallon tree is to have up to 20 panels and box size trees are to have additional panels as required. If the concrete is only on one side of the tree, then 10 panels (centered on the tree) are to be installed in a straight line along the concrete or boundary as recommended by the manufacturer, or if the concrete is on two sides of the tree, then install 10 panels (centered on the tree) on two sides or the 20 panels are to be installed in a circular pattern around the tree, if concrete is on more than two sides of the tree as recommended by the manufacturer.
- E. Top Soil: If required, imported topsoil shall be natural, fertile, friable loam, capable of sustaining vigorous plant growth, free of subsoil, roots, grass, excessive amount of weeds, salt, stone and foreign matter; acidity range of pH 5.5 to 7.5; containing a minimum of 4% and a maximum of 25% organic matter. Obtain approval of the Landscape Architect or Authorized representative for placement. The contractor is to submit a topsoil sample to an approved testing lab for a complete fertility assay for approval prior to importing the material on-site.
- F. Import Soil: If required, imported fill dirt shall be tested with a fertility assay from Dellavalle Laboratories to certify that the fill dirt is free of salt, boron or other deleterious minerals or matter prior to delivery and placement on the site. Contractor is responsible for all remediation required

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for the placement of substandard fill dirt containing salt, boron or other deleterious minerals or matter that may require the installation of additional soil amendments, leaching, additional soil testing, replacement of failed plant materials to bring the non-conforming soil into compliance at the Contractors sole expense.

- G. Other Materials: Materials not specifically indicated, but necessary for the proper execution of the work, shall be of first quality as selected by the Contractor subject to approval of the Landscape Architect.

2.4 WEED CONTROL

- A. Methods and chemicals shall be suitable with regard to season and shall control weeds and shall be approved by all governing agencies.
- B. Treatment shall not damage or impede growth of trees, shrubs, and ground covers to be planted, nor kill or damage any existing plant material specified to remain.
- C. Applicator shall be a licensed State of California Agricultural Pest Control Operator, Category E, or as required by all governing agencies.
- D. Contractor shall obtain required permits from County Agricultural Commissioner. Weed control treatment shall be in accordance with Federal, State of California, County and local codes and regulations, and shall be safe, not cause a health hazard, nor disrupt or inconvenience continuing business operations of the Owner and neighbors, public street, parking lot and sidewalk use or construction activities.
- E. Method of treatment shall be strictly in accordance with manufacturer's recommendations.
- F. Method of application and chemicals to be reviewed and approved by the Owners representative.
- G. Contractor shall ascertain and insure that all planted areas are weed-free prior to planting and maintain the site weed free during construction and maintenance periods.

PART 3 - EXECUTION

3.1 SITE INSPECTION

- A. Locate cables, conduit, piping, and other obstacles prior to beginning excavation. Notify Owners representative of obstacles requiring relocation.
- B. Remove rocks and other similar underground obstructions to depths necessary to permit proper installation of lawns and planting.
- C. Verify that landscape irrigation system has been properly installed and is fully operational.
- D. Verify dimensions shown on plan and notify Owners representative of any discrepancy.
- E. Review plant list and consult Owners representative with any questions or concerns.

3.2 GRADING

- A. Contractor is to remove weeds and debris from site prior to starting grading operations and is to maintain the site weed free throughout the progress of construction.

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- B. Contractor is to work soil in a manner which does not cause excessive compaction or clods which will not break easily. Apply water as necessary to obtain optimum moisture content for tilling and planting. The Contractor is to coordinate deep ripping of all landscape areas to a depth of twelve inches (12") to break up compacted areas to improve drainage.
- C. After the grades have been reestablished after irrigation trench backfill and prior to planting, the Contractor is to heavily irrigate the site to the point of producing runoff to verify that the site is free draining without puddles or low spots. Contractor is to address grading problems and repeat the test until all puddles and areas of standing water drain within one half hour (1/2 hr). Contractor is to fill settled areas as required. Planting shall not proceed until all grading corrections have been completed and the areas have been retested to confirm conformance.
- D. The contractor is responsible for the grading of all planting areas. The grades shall be gently flowing with no abrupt changes. The contractor is responsible to insure that the planting areas have adequate soil and is to fill low areas as needed. The contractor is to grade the areas to drain as intended by the site grading plan by the Project Civil Engineer. Typically the planter areas are to be slightly crowned or cross sloped to insure positive drainage away from planted areas to the perimeter to drain as intended by the Site Drainage Plan. No standing water will be permitted in planter areas where plants and trees are located. Slope surfaces away from buildings at a 2% slope with no pockets of standing water. The contractor is responsible for all import or export of soil and removal of debris, trash, or other elements off site at Contractors expense to provide the Owner with a completed landscape project at no additional cost to the Owner.
- E. Provide neat, smooth, and uniform finish grade. Final soil elevations in perimeter areas are to be as noted below. Grades may taper from perimeter areas over a smooth gradual transition.
1. Turf Areas: 1" below the adjacent sidewalks or other hardscape features.
 2. Planter Areas: 1 1/2" to 2" below the adjacent sidewalks or other hardscape features.
- F. Notify Owners representative upon completion of grading for approval and to verify the smoothness and accuracy of fine grading and clod-free condition of planting surface. No planting is to be started prior to obtaining the approval of the fine grading from the Owners authorized representative.
- G. Install concrete mow strips between all turf and planter boundaries. Install the mow strips as shown in the Concrete Mow Strip Detail and as outlined in the project plans and specifications. Contractor is to insure that concrete mow strips do not interfere with site drainage and do not trap water or cause puddling.

3.3 SOIL PREPARATION

- A. Soil Amendments, Cultivation and Weed Control:
1. The contractor is to cultivate the soil amendments into the top eight (8") inches of soil. The following soil amendment types and quantities are to be included in the bid. Pending the results of the soil tests, and recommendations of the soil testing laboratory, adjustments to the types and quantities of soil amendments to be used may be necessary. The contract price will be adjusted according to the actual soil amendments installed on the project. The contractor is to include the following soil amendments as part of the bid:
 - a. Lawn Areas:
 - 1) Nitrified Aged Fir Forest Humus (Preplant), (4 cu yds per 1,000 sq ft)
 - 2) Gypsum (95% purity) (Preplant), (4 tons per acre).
 - 3) Soil Sulfur (99% purity) (Preplant), (1/2 ton per acre).
 - 4) Best Triple Pro Fertilizer (Preplant) - (15-15-15), (500 lbs per acre).

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- 5) Best Preplant Fertilizer (Preplant) - (6-20-20 XB), (500 lbs per acre).
- 6) Terra C Premium Humate (Preplant), (250 lbs per acre).
- 7) Best All Season Fertilizer with Polyon 43 (Maintenance) - (19-6-12), maintenance applications and rates as follows:

Turf Areas: (200 lbs per acre) per maintenance application. Minimum of three maintenance applications required for bid. Fertilize sodded areas monthly. Actual application will conform to soil test results.

- 8) Pelletized Gypsum, (Maintenance) - (1 tons per acre). One maintenance application required for bid. Actual application will conform to soil test results.
- 9) Terra C Premium Humate, (Maintenance) - (250 lbs per acre). One maintenance application required for bid. Actual application will conform to soil test results.

b. Planter Areas:

- 1) Nitrified Aged Fir Forest Humus (Preplant), (4 cu. yds. per 1000 sq. ft.).
- 2) Gypsum (95% purity) (Preplant), (4 tons per acre).
- 3) Soil Sulfur (99% purity) (Preplant), (1/2 ton per acre).
- 4) Best Triple Pro Fertilizer (Preplant), (15-15-15), 500 lbs per acre.
- 5) Best Preplant Fertilizer (Preplant), (6-20-20 XB), (500 lbs per acre).
- 6) Terra C Premium Humate (Preplant), (250 lbs per acre).
- 7) Best All Season Fertilizer with Polyon 43 (Maintenance) - (19-6-12), maintenance applications and rates as follows:

Planter Areas: (200 lbs per acre) per maintenance application. Minimum of three maintenance applications required for bid. Fertilize planter areas monthly. Actual application will conform to soil test results.

- 8) Pelletized Gypsum, (Maintenance) - (1 tons per acre). One maintenance application required for bid. Actual application will conform with soil test results.
- 9) Terra C Premium Humate, (Maintenance) - (250 lbs per acre). One maintenance application required for bid. Actual application will conform to soil test results.

The Owners authorized representative and Contractor shall negotiate the differences in costs according to the materials required based upon the recommendations of the soil testing laboratory. No labor difference in cost will be allowed for application of the corrected materials to be used.

2. Soil Amending – Application #1: If salt is present in the soil test results, Contractor is to apply and incorporate the following soil amendments into the soil – Gypsum, Soil Sulfur and Nitrified Aged Fir Humus (planter areas only). Contractor is to reestablish site grades (smooth areas without displacing amendments) and leach the soils for up to six weeks.
3. Contractor is to retest the site soils as noted in 1.12 (B) above, if salt is present in the soil test results and leaching is required.
4. Soil Amending – Application #2: Contractor is to apply and incorporate the following soil amendments into the soil – Preplant Fertilizers and Humate amendments. Contractor is to reestablish site grades (smooth areas without displacing amendments) and leach the soils

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for one to two weeks.

5. If there are no or low salts in the soil test reports and leaching is not required, then the Contractor can combine Preplant Soil Amendment Applications #1 & #2 and delete the leaching requirement and issue a credit to the District.
6. After cultivation, water the site until the first weed crop is established. Cultivate or treat with chemicals to assure a weed-free condition.
7. Planting beds may be established after the second cultivation and final fine grading has been inspected and approved.

B. Planting holes:

1. All 15 gallon size trees or larger, are to have one 18" diameter hole drilled up to ten feet (10'-0") deep to insure proper drainage. Holes are to be off set with tree root balls "benched" into the top of the hole to prevent the tree against settlement.
2. Holes are to be excavated three times the size of the rootball. The contractor is to slightly off-set the drainage holes to prevent settling of plants after installation. The contractor is to guarantee that the trees and shrubs will not settle below grade. Trees in turf grass areas are to be planted after the stolons and sod has become established and no longer requires excessive irrigation, which may cause undue stress to the trees.
3. Holes are to be in damp (but not saturated) and friable condition with all hidden obstructions removed before planting. The backfill is to be mixed thoroughly as specified adjacent to the planting hole prior to planting.

C. Leaching: Leaching of the soils is a critical element in how fast the soils will be reclaimed. The Contractor is to expedite the irrigation installation during the early stages of the project to allow leaching operations with the irrigation system at the earliest possible time in the project schedule. The Contractor is to provide labor and materials as needed to leach soils with irrigation water in areas that will not delay the progress of other site improvements. During leaching operations, the Contractor is to maintain the soil saturated while limiting runoff. Contractor is to monitor depth of soil saturation to plan periods of drying appropriately.

Contractor is responsible for temporary measures required to retrofit the planter area irrigation system for leaching by installing spray nozzles on bubbler pop ups, installing temporary sprinklers, relocating sprinkler or other improvements required to insure good coverage of all planter areas for the purposes of leaching. Once leaching has been completed, contractor is to remove temporary improvements and restore the system to conform to the project documents.

3.4 PLANTING

A. Water plants immediately upon delivery to site. Maintain in moist condition until planted.

B. Space plants uniformly as shown on plans. The Contractor is to stake the locations of plants and tree locations prior to layout of irrigation system for review and approval by the Landscape Architect in the field prior to trenching. Contractor is to use color coded flags to stake plant materials by variety. After the plant layout has been approved, the Contractor is to stake the bubbler locations for each plant and tree. Bubblers are to be located on the uphill side of the plant within the plant basin. Landscape Architect may move, add or delete plants or trees in the field and the Contractor is to adjust the work as required at no additional cost to the District. Contractor is not to proceed with irrigation or planting operations, until the planting locations have been approved by the Landscape Architect in the field.

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- C. Cut cans by cutting vertically on two opposite sides of can with can cutter, or as recommended by the nursery for the type and size of containers supplied with the plant materials. Do not damage plant.
- D. Plant immediately after removal from the can or flat. Position the top of the plant root ball 1" above finish grade. Backfill as follows:
 - 1. (85%) native soil.
 - 2. (15%) nitrified humus.
 - 3. Azaleas and camellias are to have an additional 2 cu. ft. Camellia Mix in backfill.
 - 4. Agriform / Best plant tabs as indicated on plans. Place plant tabs beside root ball as recommended by the fertilizer manufacturer. Construct a watering well one foot radius from stem or trunk that will allow water to fill well at least 3" deep for shrubs and two foot radius from trunk that will allow water to fill well at least 4" deep for trees. Fill water well at least six times by hand after planting.
- E. Fertilize all ground cover areas with post-plant commercial slow release fertilizer 19-6-12 upon completion of planting, and every 30 days through the first growing season at a rate of 5 lbs per 1000 square feet, or as recommended by the soil test results.
- F. At completion of planting, all non-turf planted areas are to receive a three inch (3") layer of topdressing mulch of shredded walk-on fir bark as supplied by Green's Best or Superior Soil Supplements, (559) 904-3372. Wash excess bark off leaves and do not engulf stems of plants and ground cover.
- G. Turf Hydroseed and Renovation:
 - 1. The turf areas, as indicated on the plans, shall be hydroseeded in one operation after all trees, weed removal, soil preparation, grading, scalping, verticutting and irrigation system work have been completely installed, inspected and approved.
 - 2. Hydromulch mixing shall be performed in a tank with a built-in continuous agitation and recirculation system of sufficient capacity to produce a homogeneous slurry of fiber, fertilizer, water, and additives in the specified proportion. Hydroseeding Slurry Mix:
 - a. Mulch: Agrono-Mulch @ 1500 lbs per acre. As distributed by Agrono-Tec Seed Co., Fresno, California, (559) 277-2444.
 - b. Binder: Agrono-Tac @ 120 lbs per acre.
Fiber Plus @ 25 lbs per acre.
 - c. Fertilizer: Soluble time release granular mixture of 24-4-8 @ 250 lbs per acre.
 - d. Seed – Bermudagrass Turf: Yukon Bermudagrass (4 lbs per 1,000 sq ft) and Perennial Ryegrass (8 lbs per 1,000 sq ft) Blend. Seed at a rate of 12.0 lbs per 1,000 sq ft.
 - 3. The final seed mix is subject to change. Verify the final approved seed mixes with the Owners authorized representative prior to seeding. The seed mix will be adjusted to account for the use, drought tolerance, and the time of year to be installed.
 - 4. The area to be seeded shall be slightly moist after the last watering and final weeding operations. The grading must be approved prior to hydroseeding. The site must be free draining prior to hydroseeding.

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5. The area to be seeded shall be hydromulched with a discharge system that will apply the slurry to the areas to be treated at a continuous, uniform rate. The tank shall have a minimum capacity of 1000 gallons. Nozzle applying the slurry shall be held close enough to the areas to be planted to distribute the slurry in a uniform coating on the surface. A green marker dye shall be used to show such coverage.
 6. The turf area establishment work is to proceed as follows. Time periods noted are from the date of hydroseed planting.
 - a. Weeks 1 thru 4: Fertilize once (week 4) with Best 19-6-12 with polyon 43 at a rate of 4.6 lbs per 1,000 sq ft (200 lbs per acre) to keep hydroseed in a healthy growth state and mow once (week 4) with reel mower with roller (Toro 5210, or approved equal) to stimulate the lateral turf growth and increase density.
 - b. Weeks 5 thru 10: Fertilize every month (week 8) with Best 19-6-12 with polyon 43 at a rate of 4.6 lbs per 1,000 sq ft (200 lbs per acre). Mow 2 times weekly with reel mower with roller (Toro 5210, or approved equal) to stimulate the lateral turf growth and increase density. Mowing height to be 1/2" to 5/8" of an inch.
 - c. Weeks 11 thru 12: Fertilize once (week 12) to keep turfgrass in a healthy condition. Mow 1-2 times weekly with reel mower with roller (Toro 5210, or approved equal) and raise turfgrass mowing height to 3/4" to complete the maintenance period.
 7. A minimum of one trained workman shall be on the site 2 hrs per day (minimum or as required) after hydroseeding and through the maintenance period. The hydroseeded areas shall be watered immediately and kept damp during the entire germination period. Areas that are drying out too soon due to wind or other causes shall be watered by hand until the whole grass area comes up in a uniform and even covering of grass. Care shall be used to not overwater, which would create erosion. All erosion scars are to be repaired the same day.
 8. The contractor is to carefully observe the newly planted grass to keep moist and in a healthy growing condition. The contractor is to water and fertilize as needed to keep the turf in a vigorous healthy condition.
 9. The contractor is to protect the newly seeded area from foot traffic as needed. The contractor is to continuously reseed and repair damaged areas. The turf areas, as indicated on the plans, shall be hydroseeded in one operation after all weed removal, soil preparation, grading and irrigation system have been completely installed and approved. Trees are to be installed after the turf has been established. Stake tree locations during turf establishment.
- H. Lawn Installation (Sod):
1. The turf areas, as indicated on the plans, shall be sodded in one operation after all weed removal, soil preparation, grading and irrigation system have been completely installed and approved. Trees are to be installed after the turf has been established. Stake tree locations during turf establishment.
 2. The allowable planting window for sod starts on April 1st and extends thru August 30th annually. Planting after August 30th or before April 1st requires specified sod that is overseeded with perennial ryegrass at no additional cost to the project. Do not plant in excessively hot weather or when unseasonably hot weather is forecast in the near future.
 3. Finish grade is to be smooth and firm to prevent differential settlement. Sod is to be laid in staggered rows (brick like pattern). Edges are to be firmly butted together to insure soil to soil contact between sod pieces. Sodded areas are to be rolled (water roller) to remove air pockets and insure good soil contact.

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4. The area to be sodded shall be slightly moist after the last watering and final weeding operations. The grading must be approved prior to sodding. The site must be free draining prior to sodding.
5. The turf area establishment work is to proceed as follows. Time periods noted are from the date of sod planting.
 - a. Weeks 1 thru 4: Fertilize once (week 4) with Best 19-6-12 with polyon 43 at a rate of 4.6 lbs per 1,000 sq ft (200 lbs per acre) to keep sod in a healthy growth state and mow once per week.
 - b. Weeks 5 thru 10: Fertilize twice (weeks 8) with Best 19-6-12 with polyon 43 at a rate of 4.6 lbs per 1,000 sq ft (200 lbs per acre). Mow 1 time weekly. Mowing height to be 1/2" to 5/8" of an inch.
 - c. Weeks 11 thru 12: Fertilize once (week 12) to keep turfgrass in a healthy condition. Mow 1 time weekly and raise turfgrass mowing height to 3/4" to complete the maintenance period.
6. A minimum of one trained workman shall be on the site 2 hrs per day after sodding and through the maintenance period. The sodded areas shall be watered immediately and kept damp during the entire establishment period. Areas that are drying out too soon due to wind or other causes shall be watered by hand until the whole grass area is established in a uniform manner. Care shall be used to not overwater, which would create erosion and fungus. All erosion scars are to be repaired the same day.
7. The contractor is to carefully observe the newly planted grass to keep moist and in a healthy growing condition. The contractor is to water and fertilize as needed to keep the turf in a vigorous healthy condition.
8. The contractor is to protect the newly sodded area from foot traffic as needed. The contractor is to continuously resod and repair damaged areas as required.

3.5 STAKING AND TYING

- A. Remove nursery stakes and ties.
- B. Install tree stakes 18" deep on windward and leeward sides of tree and tie to tree with 4 ties. Install ties loose enough to avoid injuring cambium layer of tree and to allow limited movement.
- C. Remove nursery ties from shrubs and espaliered plants and install new plastic ties in a loose manner so new plant growth will not girdle the branch or stem.

3.6 MAINTENANCE

- A. Maintain planted areas during the progress of the work and through the maintenance period. A minimum of one trained workman shall be on the site 2 hrs per day after planting until the fourth mowing and as needed through the maintenance period.
- B. The maintenance period begins when the work is substantially completed and accepted by the Owner. The turf areas are to be completely planted and show active growth and reasonable coverage before the specified maintenance period can begin. The maintenance period shall be for ninety days (90) days, after substantial completion by the Owner. The Owner and Landscape Architect shall be notified a minimum of 10 days prior to the time that the work is ready for final inspection. This final inspection is required before the maintenance period can begin. The contractor is responsible to provide all materials and labor to maintain the site for the maintenance

SECTION 329000
LANDSCAPE CONSTRUCTION

period at no cost to the Owner. The maintenance period may be extended at no cost to the Owner should prevailing site conditions do not warrant final acceptance by the Owner. The site should be in a weed free condition, the lawns should be established, vigorous, have minimum 99% coverage, be weed free, and fertilized, and all plants and trees are to be in good condition. The maintenance period will be extended in one month increments until the Contractor brings the site into compliance at no additional cost to the Owner.

- C. During the maintenance period the contractor shall provide the following services but is not limited to the services outlined below.
1. Maintain surfaces and supply additional top soil where necessary, including areas affected by erosion.
 2. Water to ensure uniform stolon growth and to keep surface of soil damp. Fertilize as specified on a monthly, or as needed basis.
 3. Apply water slowly so that surface of soil will not puddle and crust.
 4. Maintain turf & planted areas weed free. Hand weed or use chemicals at the Contractor's option.
 5. Mow and maintain the turf areas and pick up grass clippings to be hauled off site at the Contractors expense.

3.7 CLEAN-UP

- A. Remove rubbish, trash, and debris resulting from the operation at the end of each working day.
- B. Wash paved surfaces clean.
- C. Maintenance period will begin with acceptance of installation by the Owner and will continue as noted in article 3.06.

3.8 EXTRA LANDSCAPE MATERIALS

- A. Contractor shall supply the following extra materials to be installed at the direction of the Landscape Architect during the project at any time. Each item is to include all associated materials (landscape and irrigation) and all appurtenances associated with the item, including material, labor and equipment costs for a complete installation in accordance with the project documents at no additional cost to the Owner. Should any items not be installed as part of the project, the remaining items are to be delivered to Owner or a credit issued at the Owner's option as part of the project completion documentation.

1. Three (3): One gallon size plants (Variety to be determined in the field)
2. Three (3): Five gallon size plants (Variety to be determined in the field)
3. Three (3): Fifteen gallon size trees (Variety to be determined in the field)

All work is to be in compliance with all project specifications and construction details at no additional cost to the Owner.

-- END OF SECTION --

SECTION 331000
WATER DISTRIBUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Pipe and fittings for water piping.
 - 2. Valves.
 - 3. Valve boxes.
 - 4. Accessories.
- B. Related Sections:
 - 1. Division 31 Section "Trenching."

1.3 REFERENCES

- A. ASTM Test Method D1557.
- B. ANSI/ASTM D2466 - Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40.
- C. ANSI/AWWA C110 - Ductile Iron and Grey-Iron Fittings, 3 inch through 48 inch, for Water and Other Liquids.
- D. ANSI/AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.
- E. ANSI/AWWA C500 - Gate Valves, 3 through 48 in NPS, for Water and Sewage Systems.
- F. ANSI/AWWA C900 - Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4 inch through 12 inch, for Water.
- G. ASTM D1785 - Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and Class 200.
- H. ASTM D2855 - Making Solvent-Cemented Joints with Polyvinyl Chloride (PVC) Pipe and Fittings.
- I. ASTM D3139 - Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals.

1.4 SUBMITTALS

- A. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.
- B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- C. Project Record Documents: Submit under provisions of Division 01.
 - 1. Accurately record actual locations of piping mains, valves, connections, and appurtenances.
 - 2. Identify and describe discovery of uncharted utilities, or utilities found at locations different than indicated on plans.

1.5 QUALITY ASSURANCE

- A. Perform work in accordance with product manufacturer's recommendations and these Contract Documents.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle all products required.

PART 2 - PRODUCTS

2.1 PIPE MATERIALS

- A. Ductile Iron Pipe (for iron pipe larger than 3 inches in diameter, above ground): ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51, thickness Class 50, with cement - mortar lining and seal coating per ANSI/AWWA C104/A21.4.
 - 1. Fittings: ANSI/AWWA C110/A21.10, ductile iron.
 - 2. Joints: Flanged.
- B. PVC Pipe (for pipe 3" and smaller, underground): ASTM D1785, Schedule 40; 1120 high impact.
 - 1. Fittings: ANSI/ASTM D2464, Schedule 80 PVC (Schedule 40 PVC for pipes 1 ½ inches and smaller).
 - 2. Joints: ASTM D2855, solvent weld.
- C. PVC Pipe (for pipe 4" and larger, underground): ANSI/AWWA C900 Class 200, 1120 high impact.
 - 1. Fittings: ANSI/AWWA C111, cast iron.

2. Joints: ASTM D3139 compression gasket ring.

2.2 VALVES

- A. General: Brass or Bronze body, non-rising stem, inside screw, single wedge or disc, IPS ends.
- B. Valves Up to 2 inches: Full port ball valves.
- C. Valves 2-1/2 inches and Larger: Gate valves, ANSI/AWWA C500, Iron body, bronze trim, non-rising stem with square nut or control handle wheel, resilient single wedge, threaded or flanged.

2.3 VALVE BOXES

- A. Valve Boxes and Covers: Precast reinforced concrete with cast iron lid marked for service, Christy No. G5 traffic box or approved equal. Cover marking shall read "Water".
 - 1. A one-piece PVC riser extension shall be provided as necessary to allow unobstructed access to valve operating nut.

2.4 ACCESSORIES

- A. Concrete for Thrust Blocks and Valve Box Surface Collars: Concrete type specified in Division 03 Section "Cast-in-Place Concrete".
- B. Concrete pad and guard post for the fire hydrant shall be as per detail drawing.
- C. Solvent Cement and Primer for PVC Pipe and Fittings: Per ASTM F656 and ASTM D2564.
- D. Construct blow-off assembly as indicated on Drawings.
- E. Furnish and install reduced pressure backflow preventors as indicated on Drawings.
- F. Furnish and install fire main and appurtenances as indicated on Drawings and per the governing Fire Department Standards.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions. All plot dimensions are approximate. Before proceeding with any work, carefully check and verify all dimensions and report any variations to the Inspector.

- B. Due to the scale of the drawings, it is not possible to indicate all offsets, fittings, etc., which may be required. Carefully investigate the structural and finished conditions affecting all work, and plan work accordingly, furnishing such fittings, etc., as may be required to meet such conditions. Drawings are generally diagrammatic and indicative of the work to be installed in the most direct and workmanlike manner, so that conflicts between water systems, planting, and architectural features will be minimized.
- C. Do not install the facilities as indicated on the drawings when it is obvious in the field that unknown obstructions might not have been considered in the engineering. Such obstructions or differences should be brought to the attention of the Architect.

3.2 PREPARATION

- A. Prepare for pipe installation by assembling all needed materials.
- B. Cover all PVC pipe during storage.

3.3 TRENCHING

- A. Trenching shall be in accordance with Division 31 Section "Trenching."

3.4 BEDDING

- A. Where trench or pit has been overexcavated, place bedding material at bottom of excavations, level soil materials in continuous layers not exceeding 6 inches uncompacted depth.
- B. Backfill around sides and to a level six inches above the top of pipe with bedding sand, tamped in place.
- C. Maintain optimum moisture content of bedding material to attain required compaction density.

3.5 INSTALLATION, PIPE AND FITTINGS

- A. Install pipe at locations and depths indicated on Drawings.
- B. Install pipe, fittings, and associated materials in accordance with manufacturer's written recommendations.
- C. Route pipe in straight line, whenever possible. All changes in direction of pipes shall be made with fittings, not by bending.
- D. Install pipe to allow for expansion and contraction without stressing pipe or joints.
- E. Form and place concrete for thrust blocks at each elbow, tee, angle or other significant change of direction in loose-joint pipe as indicated on Drawings.

- F. Establish elevations of buried piping to ensure not less than 24 inches of cover, except at connections to existing lines, which may be shallower or deeper, or where shown otherwise on Drawings.
- G. When two water pipes are to be installed in same trench, maintain 4-inch horizontal clearance between pipes.
- H. Backfill trench or other excavation in accordance with Division 31 Section "Trenching and Backfilling".

3.6 INSTALLATION, VALVES

- A. Set valves on solid bearing.
- B. Where valves are installed below finish surface grade, center and plumb valve box and any necessary extensions over valve. Set box cover flush with finished grade.
- C. Pour concrete collar around top of valve box as indicated on Drawings.
- D. Furnish and install valves and valve boxes in addition to those shown on plans as required for isolation of lines for construction and disinfection, while minimizing disruption of service to buildings, at no additional cost to Owner.

3.7 INSTALLATION, THREADED CONNECTIONS

- A. Assemble all plastic and galvanized steel threaded pipe and fittings using an approved Teflon tape applied to the male threads only. A minimum of two (2) wraps and a maximum of three (3) wraps of an approved Teflon tape will be required.
- B. At all plastic (PVC) pipe connections, work the ductile iron connections first. Connections shall always be plastic into steel, never steel into plastic.
- C. A non-hardening sealant and lubricant similar to Permatex #51 or LASCO blue pipe sealant may be used in lieu of Teflon tape. Apply sealant to clean male threads brushing into grooves and to the first three threads of the female threads.

3.8 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Disinfect all domestic water piping systems in accordance with AWWA Standard C601, "AWWA Standard for Disinfecting Water Mains", and in accordance with administrative authority. Disinfection process shall be performed in cooperation with health department having jurisdiction and witnessed by a representative of the Architect. During procedure signs shall be posted at each water outlet stating, "Chlorination - Do No Drink". After disinfection, water samples shall be collected for bacteriological analysis. Certificate of Bacteriological Purity shall be obtained and delivered to the Owner through the Architect.

3.9 FIELD QUALITY CONTROL

- A. Test completed piping systems according to requirements of authorities having jurisdiction.
 - 1. Do not enclose, cover, or put into service before inspection and approval.
- B. Field inspection will be performed under provisions of Division 01 General Requirements Sections.
- C. Compaction testing will be performed in accordance with ASTM Test Method D1557.
- D. If compaction tests indicate Work does not meet specified requirements, recompact and retest at no additional cost to Owner.
- E. If tests indicate that Work does not meet specified requirements, remove work, replace and retest at no additional cost to Owner.

END OF SECTION

SECTION 333000
SANITARY SEWERAGE

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. Furnish and install site sanitary sewer collection systems and associated accessory items as shown on the Drawings and as specified herein. Items include, but are not necessarily limited to, the following:
 - 2. Sanitary Sewer Pipelines and Services.

- B. Related Sections:

- 1. Division 31 Section "Trenching."

1.3 REFERENCES

- A. American Water Works Association (AWWA).
- B. American Society for Testing and Materials (ASTM):
- C. Designation D3034 - Polyvinyl Chloride (PVC) pipe.

1.4 SUBMITTALS

- A. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.
 - 1. Submit manufacturer's data and/or fabrication drawings for all pipes, and appurtenances installed under this Section. No items shall be incorporated into the work until submittals are approved by the Architect.

1.5 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. Safety Regulations: Work shall comply with all Federal, State and Municipal regulations regarding safety, including the requirements of the following:
2. William-Steiger Occupational Safety & Health Act of 1970.
 - a. State of California, California Administrative Code, Title 8 Industrial Relations, Chapter 4, Subchapter 4, "Construction of Safety Orders" and other State and local agencies having jurisdiction.
 - b. All trenching work shall conform to Trench Construction Safety Orders of California State Industrial Accident Commission.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleanout Boxes shall be precast reinforced concrete and cast iron lid marked for sewer service. Christy G5 or approved equal.
- B. Sanitary sewer pipelines shall be polyvinyl chloride (PVC) pipe for sanitary sewers conforming to ASTM Designation: 3034, SDR35 for 4" and larger and be Schedule 40 PVC pipe, ASTM D1785, 1120 high impact, for 3" and smaller.
- C. Concrete for structures shall conform to Division 03 Section "Cast-in-Place Concrete".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions. All plot dimensions are approximate. Before proceeding with any work, carefully check and verify all dimensions and report any variations to the Inspector.
- B. Due to the scale of the drawings, it is not possible to indicate all offsets, fittings, etc., which may be required. Carefully investigate the structural and finished conditions affecting all work, and plan work accordingly, furnishing such fittings, etc., as may be required to meet such conditions. Drawings are generally diagrammatic and indicative of the work to be installed in the most direct and workmanlike manner, so that conflicts between water systems, planting, and architectural features will be minimized.

3.2 TRENCH EXCAVATION

- A. Trench excavation and backfilling shall be in accordance with Division 31 Section "Trenching."

3.3 PIPE INSTALLATION

- A. Pipe Laying: Sewer pipe shall be laid in strict conformity to the prescribed line and grade, with grade bars set and each pipe length checked to the grade line. Three consecutive points on the same rate of slope shall be used at all times to detect any variation from a straight grade. In case any discrepancy exists, the work shall be stopped and the discrepancy immediately reported to the Architect. In addition, when requested by the Architect, a string line shall be used in the bottom of the trench to insure a straight alignment of the sewer pipe between manholes. The elevation of the pipe invert shall not deviate from the design elevation by more than +2 percent to the pipe size concerned, or 1 inch, whichever is greater. The rate of deviation from grade or returning to grade shall be limited to 1/16 inch per foot of pipe.
1. Pipe laying shall proceed upgrade with the bell ends of bell and spigot pipe placed upstream. Each section of pipe shall be laid to line and grade as herein specified and in such a manner as to form a watertight, concentric joint with the adjoining pipe. The interior of the pipe shall be cleared of all dirt and debris and excess joint sealing material as the work progresses. Pipe shall not be laid when the condition of the trench or weather is unsuitable. All open ends of pipe and fittings shall be adequately and securely closed whenever the work is discontinued for more than one-half hour. If pipe with elliptical or quadrant reinforcement is used, care shall be taken to properly orient the axis.
 2. Where plain end vitrified clay pipe with the compression coupling is installed, the contractor shall tighten the compression bands as pipe lying process. The first length of pipe laid on any run, except where a connection is made to an existing line, shall be anchored securely to prevent movement when each succeeding length is pushed home. After each compression band is torqued, the Contractor shall replace and tamp any bedding material that may have been displaced under the pipe and particularly under the coupler before proceeding with the initial backfill.
 3. All joint surfaces shall be cleaned before joints are made.
- B. Sewer Systems Plugs: Temporary plugs of brick or mortar shall be installed on all sewer projects at points of connection to existing facilities. These plugs shall remain in place until completion of the balling and flushing operation. The plugs, intended to prevent water from the balling and flushing operation, drainage, or any other condition from entering the existing system, shall be installed or removed in the presence of and under the direct supervision of the Engineer. Until the system has been pumped clear of accumulated water, the plugs shall not be removed. This water must not be allowed to enter adjacent sewer or drainage systems.
- C. Internal Inspection: Upon completion of construction and prior to final inspection, the Contractor shall clean the entire new pipeline of all dirt and debris. Any dirt or debris in previously existing pipes or ditches in the area, which in the opinion of the Architect resulted from the new installation, shall also be removed by the Contractor. Sewer pipes shall be cleaned by the controlled balling method. Temporary plugs shall be installed and maintained during cleaning operations at points of connection to existing facilities to prevent water, dirt, and debris from entering the existing facility. Temporary plugs for sewer systems shall also conform to Subsection B, above. Water from the drainage system operations shall be routed through a suitable trap to collect any dirt and debris prior to discharging into any downstream facility.
- The Contractor shall notify

the Architect immediately after completion of the pipe cleaning operations. Cleaning of drainage pipes by the controlled balling method will not be required.

1. As soon as possible after the completion of the pipe cleaning, and prior to final acceptance, the Architect may make a visual internal inspection of the new pipeline either manually or with television equipment.

3.4 CLEANOUTS

- A. Install cleanouts at locations shown on the Plans. Locate cleanouts in accessible locations and bring flush to finished surface.

3.5 TESTING OF SANITARY SEWERS

- A. After cleaning, each section of sewer constructed shall be tested in accordance with acceptable "Low Pressure Air Test for Sanitary Sewers" methods such as presented in the Journal of Sanitary Engineering, Division ASCE, April 1964.

3.6 ADJUSTMENT

- A. Adjustment of sewer manholes and cleanouts to finish grade shall be as per the Drawings.

3.7 CLEAN-UP

- A. Remove from the site all rubbish, debris, etc. resulting from Work in this Section. The clean up shall include the replacement and repair of any damaged or disturbed property.

END OF SECTION

SECTION 334000
STORM DRAINAGE FACILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Locating existing utilities.
- 2. Furnishing and installing storm drainage facilities, including pipe, manholes, cleanout and inlet and outfall structures.
- 3. Placing and compacting pipe bedding.
- 4. Final backfilling, compaction and grading.

B. Related Sections:

- 1. Division 03 Section "Cast-in-Place Concrete."
- 2. Division 31 Section "Earthwork."
- 3. Division 31 Section "Trenching."

1.3 DEFINITIONS

- A. Bedding: Fill placed under, around, beside and directly over pipe, prior to subsequent backfill operations.
- B. Utility: Any buried or above ground pipe, conduit, cable, associate device or appurtenances, or substructure pertaining thereto.

1.4 REFERENCES

- A. ANSI/ASTM C76 - Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.
- B. ANSI/ASTM C443 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
- C. ANSI/ASTM C478 - Precast Reinforced Concrete Manhole Sections.
- D. California Test Method No. 216 (Dry Method).

1.5 SUBMITTALS

- A. Product Data: Provide data indicating pipe, accessories, and associated equipment to be furnished.
- B. Certificates of compliance for material.
- C. Manufacturer's Installation Instructions: Indicate special procedures required to install products supplied.

1.6 COORDINATION

- A. Verify that the location of existing utilities have been indicated at work site by utility authorities and Campus personnel.
- B. Coordinate work with other project work.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Reinforced Concrete Pipe for pipe larger than 12": ANSI/ASTM C76, Class 3, with rubber gasket joints per ANSI/ASTM C443.
- B. Storm drainage sewer pipeline shall be polyvinyl chloride (PVC) pipe for storm sewer conforming to ASTM designation 3034, SDR 35 for pipe 12" or less.
- C. Precast Reinforced Concrete Manhole Sections: Per ANSI/ASTM C478. Elliptical single line reinforcement is not allowed and as shown on detail drawing.
- D. Cast in Place Concrete: Per Division 03 Section "Cast-in-Place Concrete."
- E. Steel Reinforcement: Per Division 03 Section "Cast-in-Place Concrete."
- F. Mortar: Composed of one part, by weight, portland cement (Type II low alkali per ASTM C150), 2 parts, by weight, sand, and water.
- G. Manhole Frames, Covers and Grates: Cast Iron per ASTM A48, Class 25.
- H. Storm drain inlet shall be Christy U-23 and V-12 drain inlet with precast extension as required. Contractor shall also construct concrete bottom as shown on detailed drawing.
- I. Soil Fill for Concrete Pipe Bedding Envelope: Type S2 or S4 per Division 31 Section "soils for Earthwork."
- J. Concrete collar shall be constructed as per detailed drawing.
- K. Cleanout shall be constructed as per detail drawing.

- L. Outfall Structure per detail drawing.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify site conditions.

3.2 PREPARATION

- A. Identify location of proposed storm drainage facilities to be constructed. Expose connection points to existing system.
- B. Locate, identify, and protect existing above and below grade utilities from damage.
- C. Protect plant life, lawns, trees, shrubs, and other features not authorized for removal.
- D. Protect existing structures and other improvements to remain from damage from excavation equipment and vehicular traffic.
- E. Employ equipment and methods appropriate to the work site.
- F. Protect excavated areas from drainage inflow, and provide drainage to all excavated areas. Dewater existing drainage basins and existing drainage pipeline systems as necessary to accomplish the work.
- G. Remove all interfering surface and subsurface improvements authorized for removal.

3.3 EXCAVATION

- A. Excavate soil required to locate existing utilities and install the work.
- B. Excavate trenches and pits per Division 31 Sections "Earthwork" and "Trenching."
- C. Excavate trenches and pits to allow installation and construction of the storm drainage facilities to the alignment, grades, depths and cross-sections as indicated on the construction plans.
- D. Excavate trench to depth which is 4 inches below the outside bottom of the pipe barrel to be placed therein.
- E. Cut trenches just wide enough to allow the installation of the pipe and pipe bedding as indicated on the plans. Minimize trench width above the pipe.

3.4 INSTALLATION AND BEDDING OF STORM DRAIN PIPE

- A. Install the pipe and fittings to the lines and grades shown on the construction plans.

- B. Install pipe and fittings in accordance with the manufacturer's recommendations, and these specifications.
- C. Unless otherwise approved by the Architect, lay all pipe upgrade from structure to structure, with bell or socket ends of pipe upgrade.
- D. Excavate suitable bell (or socket) holes in the bedding material, so that the bells do not bear on the subgrade or bedding. Provide uniform bearing of pipe barrel on bedding material.
- E. Ensure that all joints are properly "homed" and are watertight.
- F. Bed concrete pipe in Type S2 or S4 soil envelope, and compact to a minimum of 85% relative compaction. Place and compact the bedding material under, around and over the pipe, filling the trench cavity and extending from the bottom of the trench (4 inches below the outside bottom of the pipe barrel) to a level 12 inches above the outside top of the pipe barrel.

3.5 INSTALLATION OF STORM DRAINAGE STRUCTURES AND APPURTENANCES

- A. Install storm drainage structures as indicated on the construction plans, in accordance with the manufacturer's recommendations, and as specified herein.
- B. Key top of poured-in-place concrete bases for structures to receive the tongue of precast riser sections.
- C. Joint precast manhole and structure riser sections with a minimum thickness of 1/2 inch of mortar to make a watertight joint. Neatly point the inside and outside of the joint. Set sections plumb.
- D. Construct cleanout, outfall structure per Drawings.

3.6 BACKFILLING TO FINISH GRADE AND FINISH GRADING

- A. Place and compact backfill per Division 31 Section "Trenching."
- B. Conform finished surface to the lines, grades and cross-sections shown on the plans, or as otherwise directed by the Inspector.
- C. In areas to receive paving or a significant thickness of sealing material, temporarily set manhole frame and cover below finish grade, then return after final surfacing and/or pavement sealing and bring manhole frame and cover to final grade, as shown on the plans.
- D. Fine grade all finished soil surfaces disturbed to the lines, grades and cross-sections shown on the plans.
- E. Rake and smooth all finished dirt surfaces.

3.7 TOLERANCES

- A. Pipe laying tolerances:
- B. Above grade: Not to exceed 1/4 inch above planned grade.
 - 1. Below grade: Not to exceed 1/2 inch below planned grade.
 - 2. Alignment: Not to exceed 2 inches from planned alignment, if gradual and regular over a distance of 20 feet.
- C. Structure finish grade tolerance: Within 1/4 inch of planned grade, but must match adjacent improvements.

3.8 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed as required by authorities having jurisdiction.
- B. Compaction testing of bedding and backfill will be performed in accordance with ASTM D 1557.
- C. If tests indicate work does not meet specified requirements, recompact, or remove and replace, and retest.

END OF SECTION

PROJECT SUBMITTAL GUIDELINE: CALGREEN CODE

Division of the State Architect (DSA) documents referenced within this publication are available on the DSA [Forms](#) or [Publications](#) webpages.

Projects submitted to DSA for review, as a single project or as increments, must comply with the Title 24, Part 11, California Green Building Standards Code (CALGreen).

DSA-SS CALGreen regulatory requirements consists of compliance with the scoping requirements in CALGreen Chapter 3, Section 301.4 and the Nonresidential Mandatory Measures adopted by DSA-SS in Chapter 5. Please refer to the Chapter 5 Matrix Adoption Tables for each Division for the specific Mandatory Measures adopted by DSA-SS.

The measures outlined in CALGreen Chapter 5, Section 5.410.2 for building and site Commissioning and Section 5.410.4 for building and site Testing and Adjusting are *not* mandatory requirements for schools and community colleges; however, portions of these regulations are required by the California Energy Code with which all facilities must comply. For mandatory Commissioning requirements under the California Energy Code, including installation and acceptance testing requirements, refer to Energy Code Section 120.8. Although not adopted by DSA-SS, the additional design measures for Commissioning in CALGreen Section 5.410.2 and the verification measures for Testing and Adjusting under CALGreen Section 5.410.4 are encouraged and recommended.

CALGreen Section 306 Voluntary Measures encourages building practices that improve public health, safety and general welfare by promoting the use of building concepts which minimize the building's impact on the environment, and promote a more sustainable design. Chapter 5 Nonresidential Mandatory Measures that are not adopted as mandatory measures by DSA-SS are voluntary measures recommended and encouraged for the design, construction, verification, and maintenance of non-energy systems. Appendix A5, Divisions A5.1 through A5.5 outline means of achieving enhanced sustainable design and construction by incorporating voluntary measures that exceed the mandatory measures.

Attachment 1 lists the CALGreen Nonresidential Mandatory Measures adopted by DSA-SS. For the complete text, consult the 2019 Title 24, Part 11, California Green Building Standards Code. For Project Submission, check the CALGreen Mandatory Measures that are applicable to and have been incorporated into the Project and submit this Guideline (checklist) with the application.

CALGREEN CODE

Attachment 1

2019 CALIFORNIA GREEN BUILDING STANDARDS CODE

Division of the State Architect – Structural Safety (DSA-SS)

(CCR, Title 24, Part 11)

CHAPTER 3 – GREEN BUILDING

SECTION 301 – GENERAL

301.4 Mandatory measures for public schools and community colleges. [DSA-SS] New building construction and site work on a new or existing site shall comply with Section 301.4.

301.4.1 Building and site construction on a new site shall comply with Chapter 5 as adopted by DSA-SS.

301.4.2 Work on an existing site shall comply with Section 301.4.2.

301.4.2.1 Newly constructed site work shall comply with Chapter 5 as adopted by DSA-SS.

301.4.2.2 Newly constructed buildings shall comply with Chapter 5 as adopted by DSA-SS and Section 301.4.3.

301.4.2.3 Additions to existing buildings shall comply with Section 301.4.3.

301.4.2.4 Rehabilitated landscape areas shall comply with Sections 5.304.6 and 5.106.12.

301.4.3 Minimum rehabilitated landscape area requirement. A minimum rehabilitated landscape area equal to 75 percent of the footprint area of the building shall comply with Section 5.304.6 and Section 106.12. New buildings or additions to existing buildings less than 1,600 square feet shall not be required to comply with Section 301.4.3.

CHAPTER 5 – NONRESIDENTIAL MANDATORY MEASURES

DIVISION 5.1 – PLANNING AND DESIGN

SECTION 5.106 – SITE DEVELOPMENT

5.106.4.2 Bicycle parking. [DSA-SS] For public schools and community colleges, comply with Sections 5.106.4.2.1 and 5.106.4.2.2.

☒ **5.106.4.2.1 Student bicycle parking.** Provide permanently anchored bicycle racks conveniently accessed with a minimum of four two-bike capacity racks per new building.

☒ **5.106.4.2.2 Staff bicycle parking.** Provide permanent secure bicycle parking conveniently accessed with a minimum of two staff bicycle parking spaces per new building. Acceptable parking facilities shall be convenient from the street or staff parking area and shall meet one of the following:

1. Covered, lockable enclosures with permanently anchored racks for bicycles;
2. Lockable bicycle rooms with permanently anchored racks; or
3. Lockable, permanently anchored bicycle lockers.

☐ **5.106.5.3 Electric vehicle (EV) charging. [N]** Construction shall comply with Section 5.106.5.3.1 or Section 5.106.5.3.2 to facilitate future installation of electric vehicle supply equipment (EVSE). When EVSE(s) is/are installed, it shall be in accordance with the

California Building Code, the California Electrical Code and as follows:

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□ 5.106.5.3.1 Single charging space requirements. [N] When only a single charging space is required per Table 5.106.5.3.3, a raceway is required to be installed at the time of construction and shall be installed in accordance with the *California Electrical Code*. Construction plans and specifications shall include, but are not limited to, the following:

1. The type and location of the EVSE.
2. A listed raceway capable of accommodating a 208/240-volt dedicated branch circuit.
3. The raceway shall not be less than trade size 1 inch.
4. The raceway shall originate at a service panel or a subpanel serving the area, and shall terminate in close proximity to the proposed location of the charging equipment and into a listed suitable cabinet, box, enclosure or equivalent.
5. The service panel or subpanel shall have sufficient capacity to accommodate a minimum 40-ampere dedicated branch circuit for the future installation of the EVSE.

□ 5.106.5.3.2 Multiple charging space requirements. [N] When multiple charging spaces are required per Table 5.106.5.3.3 raceway(s) is/are required to be installed at the time of construction and shall be installed in accordance with the *California Electrical Code*. Construction plans and specifications shall include, but are not limited to, the following:

1. The type and location of the EVSE.
2. The raceway(s) shall originate at a service panel or a subpanel(s) serving the area, and shall terminate in close proximity to the proposed location of the charging equipment and into listed suitable cabinet(s), box(es), enclosure(s) or equivalent.
3. Plan design shall be based upon 40-ampere minimum branch circuits.
4. Electrical calculations shall substantiate the design of the electrical system, to include the rating of equipment and any on-site distribution transformers and have sufficient capacity to simultaneously charge all required EVs at its full rated amperage.
5. The service panel or subpanel(s) shall have sufficient capacity to accommodate the required number of dedicated branch circuit(s) for the future installation of the EVSE.

EV charging space calculation. [N] Table 5.106.5.3.3 shall be used to determine if single or multiple charging space requirements apply for the future installation of EVSE.

Exceptions: On a case-by-case basis where the local enforcing agency has determined EV charging and infrastructure is not feasible based upon one or more of the following conditions:

1. Where there is insufficient electrical supply.
2. Where there is evidence suitable to the local enforcing agency substantiating that additional local utility infrastructure design requirements, directly related to the implementation of Section 5.106.5.3, may adversely impact the construction cost of the project.

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TABLE 5.106.5.3.3	
TOTAL NUMBER OF ACTUAL PARKING SPACES	NUMBER OF REQUIRED EV CHARGING SPACES
0 – 9	0
10 – 25	1
26 – 50	2
51 – 75	4
76 – 100	5
101 – 150	7
151 – 200	10
201 and over	6 percent of total ¹

1. Calculation for spaces shall be rounded up to the nearest whole number.

□ 5.106.5.3.4 [N] Identification. The service panel or subpanel(s) circuit directory shall identify the reserved overcurrent protective device space(s) for future EV charging as “EV CAPABLE”. The raceway termination location shall be permanently and visibly marked as “EV CAPABLE.”

□ 5.106.5.3.5 [N] Future charging spaces. Future charging spaces qualify as designated parking as described in Section 5.106.5.2 Designated parking for clean air vehicles.

□ 5.106.8 Light pollution reduction. [N] Outdoor lighting systems shall be designed and installed to comply with the following:

1. The minimum requirements in the *California Energy Code* for Lighting Zones 0 to 4 as defined in Chapter 10, Section 10-114 of the *California Administrative Code*, and
2. Backlight, (B) ratings as defined in Illuminating Engineering Society of North America (IESNA) TM-15-11 (shown in TABLE A-1 in Chapter 8), and
3. Uplight and Glare ratings as defined in *California Energy Code* (shown in TABLES 130.2-A and 130.2-B in Chapter 8) and
4. Allowable Backlight, Uplight, and Glare (BUG) ratings not exceeding those shown in Table 5.106.8 [N], or Comply with a local ordinance lawfully enacted pursuant to Section 101.7, whichever is more stringent.

Exceptions: [N]

1. Luminaires that qualify as exceptions in Section 140.7 of the *California Energy Code*.
2. Emergency lighting.
3. Building facade meeting the requirements in Table 140.7-B of the *California Energy Code*, Part 6.
4. Custom lighting features as allowed by the local enforcing agency, as permitted by Section 101.8 Alternate materials, designs and methods of construction.

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Notes:

1. **[N]** See also *California Building Code*, Chapter 12, Section 1205.7 for college campus lighting requirements for parking facilities and walkways.
2. Refer to Chapter 8 (Compliance Forms, Worksheets and Reference Material) for Illuminating Engineering Society Technical Memorandum TM-15-11 Table A-1, *California Energy Code* Tables 130.2-A and 130.2-B.
3. Refer to the California Energy Code for requirements for additions and alterations.

TABLE 5.106.8 [N]

MAXIMUM ALLOWABLE BACKLIGHT, UPLIGHT, AND GLARE (BUG) RATINGS

(See CALGreen for TABLE)

☒ **5.106.10 Grading and paving.** Construction plans shall indicate how site grading or a drainage system will manage all surface water flows to keep water from entering buildings. Examples of methods to manage surface water include, but are not limited to, the following:

1. Swales.
2. Water collection and disposal systems.
3. French drains.
4. Water retention gardens.
5. Other water measures which keep surface water away from buildings and aid in groundwater recharge.

Exception: Additions and alterations not altering the drainage path.

☐ **5.106.12 Shade trees. [DSA-SS]** Shade trees shall be planted to comply with Sections 5.106.12.1, 5.106.12.2, and 5.106.12.3. Percentages shown shall be measured at noon on the summer solstice. Landscape irrigation necessary to establish and maintain tree health shall comply with Section 5.304.6.

☐ **5.106.12.1 Surface parking areas.** Shade tree plantings, minimum #10 container size or equal, shall be installed to provide shade over 50% of the parking area within 15 years.

Exception: The surface parking area covered by solar photovoltaic shade structures, or shade structures with roofing materials that comply with Table A5.106.11.2.2 in Appendix A5, are not included in the total area calculation.

☐ **5.106.12.2 Landscape areas.** Shade trees plantings, minimum #10 container size or equal, shall be installed to provide shade over 20% of the landscape area within 15 years

Exception: Playfields for organized sport activity are not included in the total area calculation.

☐ **5.106.12.3 Hardscape areas.** Shade trees plantings, minimum #10 container size or equal, shall be installed to provide shade over 20% of the hardscape area within 15 years.

Exception: Walks, hardscape areas covered by solar photovoltaic shade structures, and hardscape areas covered by shade structures with roofing materials that comply with Table A5.106.11.2.2 in Appendix A5, are not included in the total area calculation.

DIVISION 5.2 – ENERGY EFFICIENCY

SECTION 5.201 – GENERAL

☐ **5.201.1 California Energy Code.** For the purposes of mandatory energy efficiency standards in this code, the California Energy Commission will continue to adopt mandatory standards.

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DIVISION 5.3 – WATER EFFICIENCY AND CONSERVATION

SECTION 5.303 – INDOOR WATER USE

5.303.3 Water conserving plumbing fixtures and fittings. Plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall comply with the following:

☒ **5.303.3.1 Water closets.** The effective flush volume of all water closets shall not exceed 1.28 gallons per flush. Tank-type water closets shall be certified to the performance criteria of the U.S. EPA WaterSense Specifications for Tank-Type Toilets.

Note: The effective flush volume of dual flush toilets is defined as the composite, average flush volume of two reduced flushes and one full flush.

5.303.3.2 Urinals.

☐ **5.303.3.2.1 Wall mounted urinals.** The effective flush volume of wall mounted urinals shall not exceed 0.125 gallons per flush.

☐ **5.303.3.2.2 Floor mounted urinals.** The effective flush volume of floor mounted or other urinals shall not exceed 0.5 gallons per flush.

5.303.3.3 Showerheads

☐ **5.303.3.3.1 Single showerhead.** Showerheads shall have a maximum flow rate of not more than 1.8 gallons per minute at 80 psi. Showerheads shall be certified to the performance criteria of the U.S. EPA WaterSense Specifications for showerheads.

☐ **5.303.3.3.2 Multiple showerheads serving one shower.** When a shower is served by more than one showerhead, the combined flow rate of all showerheads and/or other shower outlets controlled by a single valve shall not exceed 1.8 gallons per minute at 80 psi, or the showerhead shall be designed to allow only one shower outlet to be in operation at one time.

Note: A hand-held shower shall be considered a showerhead.

5.303.3.4 Faucets and fountains.

☒ **5.303.3.4.1 Non-residential lavatory faucets.** Non-residential lavatory faucets shall have a maximum flow rate of not more than 0.5 gallons per minute at 60 psi.

☐ **5.303.3.4.2 Kitchen faucets.** Kitchen faucets shall have a maximum flow rate of not more than 1.8 gallons per minute at 60 psi. Kitchen faucets may temporarily increase the flow above the maximum rate, but not to exceed 2.2 gallons per minute at 60 psi, and must default to a maximum flow rate of 1.8 gallons per minute at 60 psi.

5.303.3.4.3 Wash fountains. Wash fountains shall have a maximum flow rate of not more than 1.8 gallons per minute/20 [rim space (inches) at 60 psi].

☐ **5.303.3.4.4 Metering faucets.** Metering faucets shall not deliver more than 0.20 gallons per cycle.

☐ **5.303.3.4.5 Metering faucets for wash fountains.** Metering faucets for wash fountains shall have a maximum flow rate of not more than 0.20 gallons per cycle/20 [rim space (inches) at 60 psi].

Note: Where complying faucets are unavailable, aerators or other means may be used to achieve reduction.

☒ **5.303.6 Standards for plumbing fixtures and fittings.** Plumbing fixtures and fittings shall be installed in accordance with the *California Plumbing Code*, and shall meet the applicable standards referenced in Table 1701.1 of the *California Plumbing Code* and in Chapter 6 of this code.

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SECTION 5.304 – OUTDOOR WATER USE

5.304.6 Outdoor potable water use in landscape areas. For public schools and community colleges, landscape projects as described in Sections 5.304.6.1 and 5.304.6.2 shall comply with the California Department of Water Resources Model Water Efficient Landscape Ordinance (MWELO) commencing with Section 490 of Chapter 2.7, Division 2, Title 23, *California Code of Regulations*, except that the Evapotranspiration Adjustment Factor (ETAF) shall be 0.65 with an additional water allowance for special landscape areas (SLA) of 0.35.

Exception: Any project with an aggregate landscape area of 2,500 square feet or less may comply with the prescriptive measures contained in Appendix D of the MWELO.

☐ **5.304.6.1 Newly constructed landscapes.** New construction projects with an aggregate landscape area equal to or greater than 500 square feet.

☒ **5.304.6.2 Rehabilitated landscapes.** Rehabilitated landscape projects with an aggregate landscape area equal to or greater than 1,200 square feet.

DIVISION 5.4 – MATERIAL CONSERVATION AND RESOURCE EFFICIENCY

SECTION 5.407 – WATER RESISTANCE AND MOISTURE MANAGEMENT

☐ **5.407.1 Weather protection.** Provide a weather-resistant exterior wall and foundation envelope as required by *California Building Code*, Section 1402.2 (Weather Protection), manufacturer's installation instructions, or local ordinance, whichever is more stringent.

5.407.2 Moisture control. Employ moisture control measures by the following methods:

☒ **5.407.2.1 Sprinklers.** Design and maintain landscape irrigation systems to prevent spray on structures.

5.407.2.2 Entries and openings. Design exterior entries and/or openings subject to foot traffic or wind-driven rain to prevent water intrusion into buildings as follows:

☒ **5.407.2.2.1 Exterior door protection.** Primary exterior entries shall be covered to prevent water intrusion by using nonabsorbent floor and wall finishes within at least 2 feet around and perpendicular to such openings plus at least one of the following:

1. An installed awning at least 4 feet in depth.
2. The door is protected by a roof overhang at least 4 feet in depth.
3. The door is recessed at least 4 feet.
4. Other methods which provide equivalent protection.

☒ **5.407.2.2.2 Flashing.** Installed flashings integrated with a drainage plane.

SECTION 5.408 – CONSTRUCTION WASTE REDUCTION, DISPOSAL AND RECYCLING

5.408.1 Construction waste management. Recycle and/or salvage for reuse a minimum of 65 percent of the nonhazardous construction and demolition waste in accordance with Section 5.408.1.1, 5.408.1.2 or 5.408.1.3; or meet a local construction and demolition waste management ordinance, whichever is more stringent.

☒ **5.408.1.1 Construction waste management plan.** Where a local jurisdiction does not have a construction and demolition waste management ordinance that is more stringent, submit a construction waste management plan that:

1. Identifies the construction and demolition waste materials to be diverted from disposal by efficient usage, recycling, reuse on the project or salvage for future use or sale.

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2. Determines if construction and demolition waste materials will be sorted on-site (source-separated) or bulk mixed (single stream).
3. Identifies diversion facilities where construction and demolition waste material collected will be taken.
4. Specifies that the amount of construction and demolition waste materials diverted shall be calculated by weight or volume, but not by both.

☑ 5.408.1.2 Waste management company. Utilize a waste management company that can provide verifiable documentation that the percentage of construction and demolition waste material diverted from the landfill complies with this section.

Note: The owner or contractor shall make the determination if the construction and demolition waste material will be diverted by a waste management company.

Exceptions to Sections 5.408.1.1 and 5.408.1.2:

1. Excavated soil and land-clearing debris.
2. Alternate waste reduction methods developed by working with local agencies if diversion or recycle facilities capable of compliance with this item do not exist.
3. Demolition waste meeting local ordinance or calculated in consideration of local recycling facilities and markets.

☐ 5.408.1.3 Waste stream reduction alternative. The combined weight of new construction disposal that does not exceed two pounds per square foot of building area may be deemed to meet the 65 percent minimum requirement as approved by the enforcing agency.

☑ 5.408.1.4 Documentation. Documentation shall be provided to the enforcing agency which demonstrates compliance with Section 5.408.1.1 through 5.408.1.3. The waste management plan shall be updated as necessary and shall be accessible during construction for examination by the enforcing agency.

Notes:

1. Sample forms found in “A Guide to the California Green Building Standards Code (Nonresidential)” located at www.bsc.ca.gov/Home/CALGreen.aspx may be used to assist in documenting compliance with the waste management plan.
2. Mixed construction and demolition debris (C&D) processors can be located at the California Department of Resources Recycling and Recovery (CalRecycle).

SECTION 5.410 – BUILDING MAINTENANCE AND OPERATION

☑ 5.410.1 Recycling by occupants. Provide readily accessible areas that serve the entire building and are identified for the depositing, storage and collection of non-hazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics, organic waste, and metals or meet a lawfully enacted local recycling ordinance, if more restrictive.

Exception: Rural jurisdictions that meet and apply for the exemption of Public Resources Code 42649.82 (a)(2)(A) et seq. will also be exempt from the organics waste portion of this section.

☐ 5.410.1.2 Sample ordinance. Space allocation for recycling areas shall comply with Chapter 18, Part 3, Division 30 of the *Public Resources Code*. Chapter 18 is known as the California Solid Waste Reuse and Recycling Access Act of 1991 (Act).

Note: A sample ordinance for use by local agencies may be found in Appendix A of the document at the CalRecycle’s website.

DIVISION 5.5 ENVIRONMENTAL QUALITY

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SECTION 5.504.1 – POLLUTANT CONTROL

☑ 5.504.3 Covering of duct openings and protection of mechanical equipment during construction. At the time of rough installation and during storage on the construction site until final startup of the heating, cooling and ventilating equipment, all duct and other related air distribution component openings shall be covered with tape, plastic, sheet metal or other methods acceptable to the enforcing agency to reduce the amount of dust, water and debris which may enter the system.

5.504.4 Finish material pollutant control. Finish materials shall comply with Sections 5.504.4.1 through 5.504.4.6.

☑ 5.504.4.1 Adhesives, sealants, and caulks. Adhesives, sealants, and caulks used on the project shall meet the requirements of the following standards:

1. Adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers, and caulks shall comply with local or regional air pollution control or air quality management district rules where applicable, or SCAQMD Rule 1168 VOC limits, as shown in Tables 5.504.4.1 and 5.504.4.2. Such products also shall comply with the Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene, and trichloroethylene), except for aerosol products as specified in subsection 2, below.
2. Aerosol adhesives, and smaller unit sizes of adhesives, and sealant or caulking compounds (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces) shall comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of *California Code of Regulations*, Title 17, commencing with Section 94507.

TABLE 5.504.4.1 – ADHESIVE VOC LIMIT

(See CALGreen for TABLE)

TABLE 5.504.4.2 – SEALANT VOC LIMIT

(See CALGreen for TABLE)

☑ 5.504.4.3 Paints and coatings. Architectural paints and coatings shall comply with VOC limits in Table 1 of the ARB Architectural Coatings Suggested Control Measure, as shown in Table 5.504.4.3, unless more stringent local limits apply. The VOC content limit for coatings that do not meet the definitions for the specialty coatings categories listed in Table 5.504.4.3, shall be determined by classifying the coating as a Flat, Nonflat, or Nonflat-High Gloss coating, based on its gloss, as defined in Subsections 4.21, 4.36 and 4.37 of the 2007 California Air Resources Board, Suggested Control Measure, and the corresponding Flat, Nonflat or Nonflat-High Gloss VOC limit in Table 5.504.4.3 shall apply.

TABLE 5.504.4.3 – VOC CONTENT LIMITS FOR ARCHITECTURAL COATINGS

(See CALGreen for TABLE)

☐ 5.504.4.3.1 Aerosol paints and coatings. Aerosol paints and coatings shall meet the PWMIR Limits for ROC in Section 94522(a)(3) and other requirements, including prohibitions on use of certain toxic compounds and ozone depleting substances, in Sections 94522(c)(2) and (d)(2) of *California Code of Regulations*, Title 17, commencing with Section 94520; and in areas under the jurisdiction of the Bay Area Air Quality Management District additionally comply with the percent VOC by weight of product limits of Regulation 8 Rule 49.

5.504.4.3.2 Verification. Verification of compliance with this section shall be provided at the request of the enforcing agency. Documentation may include, but is not limited to, the following:

1. Manufacturer's product specification.

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2. Field verification of on-site product containers.

☒ **5.504.4.4 Carpet systems.** All carpet installed in the building interior shall meet at least one of the following testing and product requirements:

1. Carpet and Rug Institute's Green Label Plus Program;
2. Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1, February 2010 (also known as CDPH Standard Method V1.1 or *Specification 01350*);
3. NSF/ANSI 140 at the Gold level or higher;
4. Scientific Certifications Systems Sustainable Choice; or
5. Compliant with the Collaborative for High Performance Schools California (CA-CHPS) Criteria 2014 and listed in the CHPS High Performance Product Database.

☒ **5.504.4.4.1 Carpet cushion.** All carpet cushion installed in the building interior shall meet the requirements of the Carpet and Rug Institute's Green Label program.

☒ **5.504.4.4.2 Carpet adhesive.** All carpet adhesive shall meet the requirements of Table 5.504.4.1.

☐ **5.504.4.5 Composite wood products.** Hardwood plywood, particleboard, and medium density fiberboard composite wood products used on the interior or exterior of the building shall meet the requirements for formaldehyde as specified in ARB's Air Toxics Control Measure (ATCM) for Composite Wood (17 CCR 93120 et seq.). Those materials not exempted by the ATCM must meet the specified emission limits as shown in Table 5.504.4.5.

TABLE 5.504.4.5 – FORMALDEHYDE LIMITS
(See CALGreen for TABLE)

☒ **5.504.4.6 Resilient flooring systems.** For 80 percent of floor area receiving resilient flooring, installed resilient flooring shall meet at least one of the following:

1. Certified under the Resilient Floor Covering Institute (RFCI) FloorScore program;
2. Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health's 2010 Standard Method for the Testing and Evaluation Chambers, Version 1.1, February 2010;
3. Compliant with the Collaborative for High Performance Schools California (CA-CHPS) Criteria 2014 and listed in the CHPS High Performance Product Database; or
4. Products certified under the UL GREENGUARD Gold (formerly the Greenguard Children & Schools program).

☐ **5.504.5.3 Filters.** In mechanically ventilated buildings, provide regularly occupied areas of the building with air filtration media for outside and return air prior to occupancy that provides at least a Minimum Efficiency Reporting Value (MERV) of 13. MERV 13 filters shall be installed prior to occupancy and recommendations for maintenance with filters of the same value shall be included in the operation and maintenance manual.

Exception: Existing mechanical equipment.

5.504.5.3.1 Labeling. Installed filters shall be clearly labeled by the manufacturer indicating the MERV rating.

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SECTION 5.505 – INDOOR MOISTURE CONTROL

☑ **5.505.1 Indoor moisture control.** Buildings shall meet or exceed the provisions of *California Building Code*, CCR, Title 24, Part 2, Sections 1202 (Ventilation) and Chapter 14 (Exterior Walls). For additional measures see Section 5.407.2 of this code.

SECTION 5.506 – INDOOR AIR QUALITY

☑ **5.506.1 Outside air delivery.** For mechanically or naturally ventilated spaces in buildings, meet the minimum requirements of Section 120.1 (Requirements for Ventilation) of the *California Energy Code*, or the applicable local code, whichever is more stringent, and Division 1, Chapter 4 of CCR, Title 8.

SECTION 5.507 – ENVIRONMENTAL COMFORT

☑ **5.507.4 Acoustical control.** Employ building assemblies and components with Sound Transmission Class (STC) values determined in accordance with ASTM E 90 and ASTM E 413 or Outdoor–Indoor Sound Transmission Class (OITC) determined in accordance with ASTM E 1332, using either the prescriptive or performance method in Section 5.507.4.1 or 5.507.4.2.

Exception: Buildings with few or no occupants or where occupants are not likely to be affected by exterior noise, as determined by the enforcement authority, such as factories, stadiums, storage, enclosed parking structures and utility buildings.

Exception: [DSA-SS] For public schools and community colleges, the requirement of this section and all subsections apply only to new construction.

☐ **5.507.4.1 Exteriors noise transmission, prescriptive method.** Wall and roof-ceiling assemblies exposed to the noise source making up the building or addition envelope or altered envelope shall meet a composite STC rating of at least 50 or a composite OITC rating of no less than 40, with exterior windows of a minimum STC of 40 or OITC of 30 in the following locations:

1. Within the 65 CNEL noise contour of an airport.

Exceptions:

1. L_{dn} or CNEL for military airports shall be determined by the facility Air Installation Compatible Land Use Zone (AICUZ) plan.
2. L_{dn} or CNEL for other airports and heliports for which a land use plan has not been developed shall be determined by the local general plan noise element.
2. Within the 65 CNEL or L_{dn} noise contour of a freeway or expressway, railroad, industrial source or fixed-guideway source as determined by the Noise Element of the General Plan.

☐ **5.507.4.1.1 Noise exposure where noise contours are not readily available.** Buildings exposed to a noise level of 65 dBL_{eq}-1-hr during any hour of operation shall have building, addition or alteration exterior wall and roof-ceiling assemblies exposed to the noise source meeting a composite STC rating of at least 45 (or OITC 35), with exterior windows of a minimum STC of 40 (or OITC 30).

☐ **5.507.4.2 Performance method.** For buildings located as defined in Section 5.507.4.1 or 5.507.4.1.1, wall and roof-ceiling assemblies exposed to the noise source making up the building or addition envelope or altered envelope shall be constructed to provide an interior noise environment attributable to exterior sources that does not exceed an hourly equivalent noise level (L_{eq} -1Hr) of 50 dBA in occupied areas during any hour of operation.

☐ **5.507.4.2.1 Site features.** Exterior features such as sound wall or earth berms may be utilized as appropriate to the building, addition or alteration project to mitigate sound migration to the interior.

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☐ **5.507.4.2.2. Documentation of compliance.** An acoustical analysis documenting complying interior sound levels shall be prepared by personnel approved by the architect or engineer of record.

☐ **5.507.4.3 Interior sound transmission.** Wall and floor-ceiling assemblies separating tenant spaces and tenant spaces and public places shall have an STC of at least 40.

Note: Examples of assemblies and their various STC rating may be found at the California Office of Noise Control: [www. https://www.tsib.org/files/STC_IIC_Ratings.pdf](https://www.tsib.org/files/STC_IIC_Ratings.pdf)

SECTION 5.508 – OUTDOOR AIR QUALITY

5.508.1 Ozone depletion and greenhouse gas reductions. Installations of HVAC, refrigeration and fire suppression equipment shall comply with Sections 5.508.1.1 and 5.508.1.2.

☐ **5.508.1.1 Chlorofluorocarbons (CFCs).** Install HVAC, refrigeration and fire suppression equipment that do not contain CFCs.

A DSA Project Submittal Guideline is a compilation of recommendations based on code, referenced standards, DSA bulletin/policy/procedure/interpretation documents, and DSA practices. These guidelines are intended to give the design profession helpful information and insight into DSA's project application, submittal, and review processes. Guidelines are provided by DSA in support of DSA's goals of providing stakeholders information they need to facilitate working smoothly with DSA, and to help standardize practices among the four DSA Regional Offices.

Compliance with a Guideline does not assure that a project is complete or that it adheres to the requirements of the California Building Standards Code (Title 24 of the California Code of Regulations) or all DSA requirements. Additional information may be required, depending on project complexity or site conditions. For complete submittal requirements see forms *DSA 1: Application for Approval of Plans and Specifications* and *DSA 3: Project Submittal Checklist*.