

PROJECT MANUAL

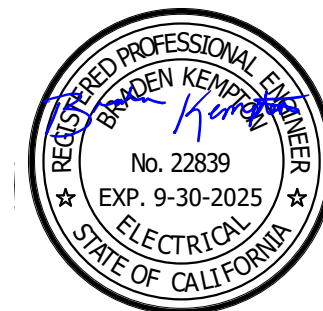
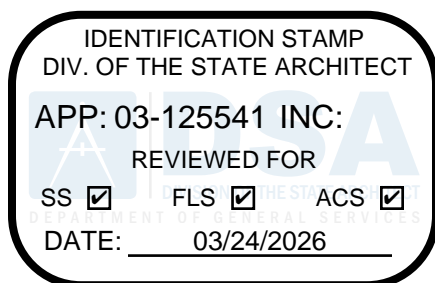
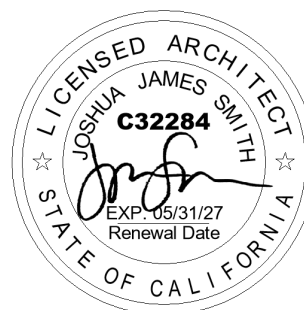
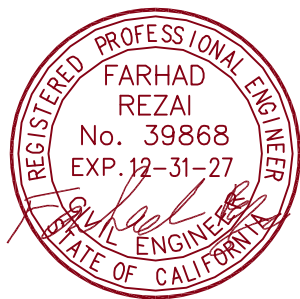
Volume I of I

FILLMORE MIDDLE SCHOOL - SHADE STRUCTURES

FILLMORE UNIFIED SCHOOL DISTRICT

543 A STREET
FILLMORE, CA 93015

DSA A# 03-125541
WD Project # 25817



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**SECTION 00 40 00
PROCUREMENT FORMS AND SUPPLEMENTS**

PART 1 GENERAL

**1.01 CONTRACTOR IS RESPONSIBLE FOR OBTAINING A VALID LICENSE TO USE ALL
COPYRIGHTED DOCUMENTS SPECIFIED BUT NOT INCLUDED IN THE PROJECT MANUAL.**

1.02 FORMS

- A. Use the following forms for the specified purposes unless otherwise indicated elsewhere in the procurement requirements:
1. Substitution Request Form
 2. Non-Collusion Affidavit
 3. Prevailing Wage
 4. Performance Bond
 5. Payment Bond
 6. Certificate of Contractor and Subcontractor Division of Industrial Relations Registration
 7. Information Required for Bidder
 8. List of Designated Subcontractors
 9. Certification of Financial Relationships in Regard to Window Project

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 00 73 10
DIVISION OF STATE ARCHITECT (DSA) SUPPLEMENTARY CONDITIONS

PART 1 GENERAL

1.01 COMPLIANCE REQUIREMENTS

- A. Comply with the California Code of Regulations, Title 24, for parts 1 through 6 and 9.
 - 1. Title 24, parts 1 through 5 must be kept on site during construction.
- B. All addenda must be signed by Architect and approved by DSA per California Administrative Code (CAC) Section 4-338(b)
- C. All substitution affecting DSA regulated items shall be considered as a Construction Change Document (CCD) or Addenda and shall be approved by DSA prior to fabrication and installation. (CAC, Section 4-338(C), IR A-6
- D. Construction Change Documents must be signed by A/E of Record, Structural Engineer, delegated professional engineer (when applicable) and DSA
- E. Project Inspector and testing lab must be employed by the owner and approved by A/E of Record, Structural Engineer, and DSA.

1.02 EXISTING CONDITIONS

- A. The intent of these drawings and specifications is that the work of the alteration, rehabilitation or reconstruction is to be In accordance with title 24, CCR. Should any existing conditions such as deterioration or non-complying construction be discovered which is not covered by the contract documents wherein the finished work will not comply with title 24, California Code of Regulations, a Construction Change Document (CCD), or a separate set of plans and specifications, detailing and specifying the required work shall be submitted to and approved by DSA before proceeding with the work. (Section 4-317(C), part 1, title 24, CCR).

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 01 25 00
SUBSTITUTION PROCEDURES**

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

2.01 GENERAL REQUIREMENTS

- A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
 - 2. Agrees to provide the same warranty for the substitution as for the specified product.
 - 3. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
 - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
- B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
- C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
- D. Limit each request to a single proposed substitution item.

2.02 RESOLUTION

2.03 ACCEPTANCE

END OF SECTION

**SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General administrative requirements.
- B. Preconstruction meeting.
- C. Site mobilization meeting.
- D. Progress meetings.
- E. Construction progress schedule.
- F. Contractor's daily reports.
- G. Progress photographs.
- H. Coordination drawings.
- I. Submittals for review, information, and project closeout.
- J. Requests for Interpretation (RFI) procedures.

1.02 RELATED REQUIREMENTS

- A. Section 01 33 00 - Submittal Procedures
- B. Section 01 60 00 - Product Requirements: General product requirements.
- C. Section 01 78 00 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

1.03 GENERAL ADMINISTRATIVE REQUIREMENTS

- A. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.
- B. Make the following types of submittals to Architect:
 - 1. Requests for Interpretation (RFI).
 - 2. Requests for substitution.
 - 3. Shop drawings, product data, and samples.
 - 4. Test and inspection reports.
 - 5. Design data.
 - 6. Manufacturer's instructions and field reports.
 - 7. Applications for payment and change order requests.
 - 8. Progress schedules.
 - 9. Coordination drawings.
 - 10. Correction Punch List and Final Correction Punch List for Substantial Completion.
 - 11. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

- A. Owner will schedule a meeting after Notice of Award.
- B. Attendance Required:
 - 1. Owner.
 - 2. Architect.
 - 3. Contractor.
- C. Agenda:
 - 1. Execution of Owner-Contractor Agreement.
 - 2. Submission of executed bonds and insurance certificates.
 - 3. Distribution of Contract Documents.

4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
 5. Submission of initial Submittal schedule.
 6. Designation of personnel representing the parties to Contract, Fillmore USD and <1|A/E|>.
 7. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 8. Scheduling.
- D. Record minutes and distribute copies within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

3.02 SITE MOBILIZATION MEETING

- A. Owner will schedule meeting at the Project site prior to Contractor occupancy.
- B. Attendance Required:
1. Contractor.
 2. Owner.
 3. Architect.
 4. Contractor's superintendent.
 5. Major subcontractors.
- C. Agenda:
1. Use of premises by Owner and Contractor.
 2. Owner's requirements.
 3. Construction facilities and controls provided by Owner.
 4. Temporary utilities provided by Owner.
 5. Survey and building layout.
 6. Security and housekeeping procedures.
 7. Schedules.
 8. Application for payment procedures.
 9. Procedures for testing.
 10. Procedures for maintaining record documents.
 11. Requirements for start-up of equipment.
 12. Inspection and acceptance of equipment put into service during construction period.
- D. Record minutes and distribute copies within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

3.03 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the work at maximum bi-monthly intervals.
- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required:
1. Contractor.
 2. Owner.
 3. Architect.
 4. Contractor's superintendent.
 5. Major subcontractors.
- D. Agenda:
1. Review minutes of previous meetings.
 2. Review of work progress.
 3. Field observations, problems, and decisions.
 4. Identification of problems that impede, or will impede, planned progress.
 5. Review of submittals schedule and status of submittals.
 6. Review of RFIs log and status of responses.
 7. Review of off-site fabrication and delivery schedules.

8. Maintenance of progress schedule.
 9. Corrective measures to regain projected schedules.
 10. Planned progress during succeeding work period.
 11. Coordination of projected progress.
 12. Maintenance of quality and work standards.
 13. Effect of proposed changes on progress schedule and coordination.
 14. Other business relating to work.
- E. Record minutes and distribute copies within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

3.04 CONSTRUCTION PROGRESS SCHEDULE - SEE SECTION 01 32 16

- A. Within 10 days after date established in Notice to Proceed, submit preliminary schedule.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
 1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- D. Within 10 days after joint review, submit complete schedule.
- E. Submit updated schedule with each Application for Payment.

3.05 PROGRESS PHOTOGRAPHS

- A. Submit photographs with each application for payment, taken not more than 3 days prior to submission of application for payment.
- B. Photography Type: Digital; electronic files.
- C. Provide photographs of site and construction throughout progress of work.
- D. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
 1. Delivery Medium: Via email.
 2. File Naming: Include project identification, date and time of view, and view identification.

3.06 REQUESTS FOR INTERPRETATION (RFI)

- A. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
 1. Prepare a separate RFI for each specific item.
 - a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
 - b. Do not forward requests which solely require internal coordination between subcontractors.
 2. Prepare in a format and with content acceptable to Owner.
 3. Combine RFI and its attachments into a single PDF electronic file.
- B. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
 1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
 2. Unacceptable Uses for RFIs: Do not use RFIs to request the following:
 - a. Approval of submittals (use procedures specified elsewhere in this section).
 - b. Approval of substitutions (see Section - 01 60 00 - Product Requirements)
 - c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
 - d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).

3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
- C. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
 1. Official Project name and number, and any additional required identifiers established in Contract Documents.
 2. Owner's, Architect's, and Contractor's names.
 3. Discrete and consecutive RFI number, and descriptive subject/title.
 4. Issue date, and requested reply date.
 5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
 6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
 7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.
- D. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.
- E. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
 1. Highlight items requiring priority or expedited response.
- F. Review Time: Architect will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
 1. Response period may be shortened or lengthened for specific items, subject to the complexity of the RFI.
- G. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
 1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
 2. Notify Architect within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.07 SUBMITTAL SCHEDULE

- A. Submit to Architect for review a schedule for submittals in tabular format.
 1. Coordinate with Contractor's construction schedule and schedule of values.
 2. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
 3. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.
 - a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make

corrections or revisions to initial submittals, and time for their review.

3.08 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
 - 1. Product data.
 - 2. Shop drawings.
 - 3. Samples for selection.
 - 4. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - Closeout Submittals.

3.09 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
 - 1. Design data.
 - 2. Certificates.
 - 3. Test reports.
 - 4. Inspection reports.
 - 5. Manufacturer's instructions.
 - 6. Manufacturer's field reports.
 - 7. Other types indicated.
- B. Submit for Architect's knowledge as contract administrator or for Owner.

3.10 SUBMITTALS FOR PROJECT CLOSEOUT

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 78 00 - Closeout Submittals:
 - 1. Project record documents.
 - 2. Operation and maintenance data.
 - 3. Warranties.
 - 4. Bonds.
 - 5. Other types as indicated.
- D. Submit for Owner's benefit during and after project completion.

3.11 SUBMITTAL PROCEDURES

- A. General Requirements:
 - 1. Refer to Section 01 33 00 - Submittal Procedures

END OF SECTION

**SECTION 01 33 00
SUBMITTAL PROCEDURES**

PART 1. - GENERAL

1.01 SUMMARY

- A. Submit to the Architect, progress schedule, application for payment, shop drawings, project data, and miscellaneous submittals required by the Contract Documents.
- B. Related Requirements Specified Elsewhere:
 - 1. General Conditions
 - 2. Supplementary Conditions
 - 3. Section 01 29 00 - Payment Procedures
- C. Designate in a progress schedule, or in a separate coordinated schedule, the dates for submission and the dates reviewed shop drawings, and project data will be needed for each product.

1.02 CONTRACTOR RESPONSIBILITIES

- A. Review shop drawings, and product data prior to submission. Provide review stamp on submittals. See Example "A" form at the end of this section and General Conditions for specific requirements
- B. Determine and Verify:
 - 1. Field measurements.
 - 2. Field construction criteria.
 - 3. Catalog numbers and similar data.
 - 4. Conformance with specifications.
- C. Coordinate each submittal with requirements of the work and of the Contract documents.
- D. Notify the Architect in writing, at time of submission, of any deviations in the submittals from requirements of the Contract Documents.
- E. Do not begin fabrication or work, which requires submittals until return of submittals with Architect's approval.

1.03 SUBMITTAL PROCEDURES

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that requires sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
 - a. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

1.04 SUBMISSION REQUIREMENTS

- A. Make submittals promptly in accordance with approved schedule, and in such sequence as to cause no delay in the work or in the work of any other contractor.
- B. Schedule submissions for the Architect to receive them at least 10 working days before dates reviewed submittals will be needed.
- C. Number of Submittals Required:
 - 1. Shop Drawings: Submit seven opaque prints.
 - 2. Product Data: Submit seven copies of manufacturer's product data.
- D. Accompany submittals with transmittal form provided by Architect, (sample provided at end of this section) in duplicate, containing:
 - 1. Date.

2. Project title and number.
 3. Contractor's name and address.
 4. The number of each shop drawing and product data submitted.
 5. Notification of deviations from Contract Documents.
 6. Other pertinent data.
- E. Submittals to include:
1. Date and revision dates.
 2. Project title and number.
 3. The names of:
 - a. Architect/Engineer.
 - b. Contractor.
 - c. Subcontractor.
 - d. Supplier.
 - e. Manufacturer.
 - f. Separate detailer when pertinent.
 4. Identification of product or material.
 5. Relation to adjacent materials.
 6. Field dimensions, clearly identified as such.
 7. Specification section number.
 8. Applicable standards, such as ASTM number or Federal Specification.
 9. A blank space, 8" x 3", for the Contractor and Architect stamps.
 10. Identification of deviations from Contract Documents.
 11. Contractor's stamp, signed, certifying to review of submittal, verification of field measurements and compliance with Contract Documents. Sample text of Contractors Review Stamp is provided at the end of this Section, identified as "Example 'A'."
- F. All items required to be submitted for review are to bear the review stamp of the Contractor certifying that he has reviewed the content of the submittal, that the submittal complies with the Contract Documents and contains no unauthorized substitutions.
- G. The Architect reserves the right to reject and return, unreviewed, all submittals not bearing the review stamp of the Contractor; poor quality or incomplete Shop Drawings and all submittal which do not meet the requirements of this Section and General Conditions Article 23, Shop Drawings, Product Data, and Samples. Construction delays resulting from returned, incomplete or incorrect submittals are the responsibility of the Contractor and not the Architect

1.05 RESUBMISSION REQUIREMENTS

- A. Shop Drawings:
1. Revise initial drawings as required and resubmit as specified for initial submittal.
 2. Indicate on drawings any changes, which have been made other than those, requested by Architect.
 3. Product Data: Submit new data as required for initial submittal.

1.06 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Critical-Path Schedule: Prepare a fully developed, Critical Path Method type Contractor's construction schedule. Submit within 7 days after the date established for "Award of Contract". Submit Schedule in compliance with General Conditions Article 32, Progress Schedule.
1. Provide a separate time for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the Work as indicated in the "Schedule of Values".
 2. Within each time period indicate estimated completion percentage in 10 percent increments. As Work progresses, indicate Actual Completion.
 3. Prepare the schedule on a sheet, or series of sheets, of stable transparency, or other reproducible media, of sufficient width to show data for the entire construction period.
 4. Coordinate the Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests and other

schedules.

5. Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on the schedule to allow time for the Architect's procedures necessary for certification of Substantial Completion.

1.07 SHOP DRAWINGS

- A. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.
- B. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:
 1. Dimensions.
 2. Identification of products and materials included.
 3. Compliance with specified standards.
 4. Notation of coordination requirements.
 5. Notation of dimensions established by field measurement.
 6. Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2" x 11" but no larger than 30" x 42".
 - a. One of the prints returned shall be marked-up and maintained as a "Record Document".
 7. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.
- C. Number of copies submittals:
 1. Electronic document submittals:
 - a. Small sheet (8-1/2" x 11" and 11" x 17"), submit electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
 2. Hard copy submittals:
 - a. Large sheet, not larger than 30" x 42": submit 3 copies. One to be returned to the contractor for contractor's use and reproduction, with other copies retained by architect and architect's consultant.

1.08 PRODUCT DATA

- A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawings."
 1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information. Delete information, which is not applicable.
 2. Submittals: Submit 2 copies of each required submittal; submit 4 copies where required for maintenance manuals. The Architect will retain one, and will return the other marked with action taken and corrections or modifications required.
 - a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
 3. Distribution: Furnish copies of approved submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.
 - a. Do not proceed with installation until an applicable copy of Product Data applicable is in the installer's possession. Do not permit use of unmarked copies of Product Data in connection with construction.

1.09 SAMPLES

- A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.
 - 1. Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Prepare Samples to match the Architect's Sample. Include the following:
 - a. Generic description of the Sample.
 - b. Sample source.
 - c. Product name or name of manufacturer.
 - d. Compliance with recognized standards.
 - e. Availability and delivery time.
 - 2. Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
 - a. Where variation in color, pattern, texture or other characteristics are inherent in the material or product represented, submit multiple units (not less than 3), that show approximate limits of the variations.
 - b. Refer to other Sections for Samples to be returned to the Contractor for incorporation in the Work. Such Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of Sample submittals.
 - 3. Preliminary submittals: Where Samples are for selection of color, pattern, texture or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.
 - 4. Maintain sets of Samples, as returned, at the Project site, for quality comparisons throughout the course of construction.
 - a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal. Sample sets may be used to obtain final acceptance of the construction associated with each set.
 - 5. Field Samples specified in individual Sections are special types of Samples. Field Samples are full-size examples erected on site to illustrate finishes, coatings, or finish materials and to establish the standard by which the Work will be judged.
 - a. Comply with submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity.

1.10 ARCHITECT'S ACTION

- A. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Architect will review each submittal, mark to indicate action taken, and return promptly.
 - 1. Compliance with specified characteristics is the Contractor's responsibility.

1.11 DISTRIBUTION OF SUBMITTALS AFTER REVIEW

- A. Contractor is to distribute reproductions of Shop Drawings and copies of Product Data which carry the Architect/Engineer stamp to:
 - 1. Job site file.
 - 2. Record Documents file.
 - 3. Other affected contractors.
 - 4. Subcontractors.
 - 5. Supplier or Fabricator.
 - 6. Owner's Inspector.

1.12 TIMING OF SUBMITTALS

- A. Make submittals far enough in advance of scheduled dates for installation to provide the required time for reviews, for securing necessary approvals of DSA if required, for possible revision and resubmittals, for placing orders and securing delivery.

- B. Delays: Cost of delays occasioned by tardiness of Contractor submittals may be back charged as necessary and is not to be borne by the School District or Architect.

PART 2. PRODUCTS

NOT APPLICABLE

PART 3. EXECUTION

NOT APPLICABLE

END OF SECTION

**SECTION 01 40 00
QUALITY CONTROL**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General Quality Assurance.
 - 1. Workmanship.
 - 2. Tolerances
 - a. References.
 - b. Mockup.
 - c. Manufacturers' Field Services and Reports.
- B. RELATED SECTIONS
 - 1. Section 01 30 00 - Administrative Requirements
 - 2. Section 01 41 00 - Testing and Inspections.
 - a. Section 01 25 00 - Substitution Procedures
 - b. Section 01 65 00 - Starting of Systems.
- C. WORKMANSHIP
 - 1. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.
 - a. Comply with manufacturers' instructions, in full detail, including each step in sequence.
 - b. Should manufacturers' instructions conflict with Project Documents, request clarification from Architect before proceeding.
 - c. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
 - d. Perform work by persons qualified to produce workmanship of specified quality.
 - e. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.
- D. 1.4 TOLERANCES
- E. Monitor tolerance control of installed Products to produce acceptable Work. Do not permit tolerances to accumulate to result in unacceptable field conditions.
 - 1. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Project Documents, request clarification from Architect before proceeding.
 - 2. Adjust Products to appropriate dimensions; position before securing Products in place.
- F. MOCK-UP
 - 1. Tests will be performed under provisions identified in this section and identified in the respective product specification sections.
 - 2. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
 - 3. Accepted mock-ups shall be representative of the quality required for the Work.
 - a. here mock-up has been accepted by Architect and is specified in product specification sections to be removed; remove mock-up and clear area when directed to do so.
- G. MANUFACTURERS' FIELD SERVICES AND REPORTS
 - 1. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.
 - a. Manufacturers' representative shall be subject to approval of Architect.
 - b. Manufacturers' representative shall submit a written report of observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

- c. Submit report in duplicate within 30 days of observation to Architect for information.

PART 2 PRODUCTS

2.01 NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

**SECTION 01 41 00
TESTING AND INSPECTION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Selection and payment.
- B. Contractor submittals.
- C. Laboratory responsibilities.
- D. Laboratory reports.
- E. Limits on testing laboratory authority.
- F. Contractor responsibilities.
- G. Schedule of tests and inspections.

1.02 RELATED SECTIONS

- A. Information For Bidders
- B. General Conditions: Inspections, testing, and approvals required by public authorities.
- C. Section 01 33 00 - Submittals: Manufacturer's certificates.
- D. Section 01 65 00 - Starting of Systems
- E. Section 01 70 00 - Contract Closeout: 1.08 Project Record Documents.
- F. Individual Specification Sections: Inspections and tests required, and standards for testing.

1.03 REFERENCES

- A. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete.
- B. ASTM C31 - Making and Curing Concrete Test Specimens in the Field.
- C. ASTM C88 - Soundness of Aggregates by use of Sodium Sulfate or Magnesium Sulfate.
- D. ASTM C140 - Sampling and Testing Concrete Masonry Units.
- E. ASTM C426 - Standard Test Method for Drying Shrinkage of Concrete Block.
- F. ASTM D1556 - Standard Test for Density of Soil in Place by the Sand-Cone Method.
- G. AWS D1.1 - Structural Welding Code - Steel.
- H. AWS D1.4 - Structural Welding Code - Reinforcing Steel.
- I. T24, CCR - Title 24, California Code of Regulations.
- J. CBC - California Building Code, Volume II - Standards

1.04 SELECTION AND PAYMENT

- A. Owner will employ and pay for services of an independent testing laboratory to perform specified testing and review and comment upon welding procedures. Owner will employ and pay for services of a DSA certified inspector to perform specified inspections. The Contractor shall not pay for any laboratory testing or inspections to testing laboratory or inspector.
- B. Testing Laboratory and inspector will be approved by the Division of the State Architect, per T24, CCR, Part I, Section 4-335. Testing lab must have DSA LEA acceptance.
- C. Employment of testing laboratory in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- D. Costs of initial testing and inspection, except as specifically modified herein, or specified otherwise in technical sections, will be paid for by the District, providing such testing and inspection indicates compliance with Contract Documents. Initial tests and inspections are defined as the first tests and inspections as hereinafter specified. The District may be reimbursed by the Contractor for testing costs under the Contract conditions contained herein, and in the General Conditions.

- E. In the event a test or inspection indicates failure of a material or procedure to meet requirements of Contract Documents, costs for re-testing and re-inspection will be paid by the District and deducted from payments to Contractor.
- F. Additional tests and inspections not herein specified but requested by District or Architect, will be paid for by the District, unless results of such tests and inspections indicate non-compliance with Contract Documents, in which case the District will pay all costs for initial testing as well as re-testing and re-inspection and deduct such costs from payments to Contractor.
- G. Costs for additional tests or inspections required because of change in materials being provided or change of source or supply will be paid by District and deducted from payments to the Contractor.
- H. Costs for work required to correct deficiencies shall be borne by the Contractor.
- I. Cost of testing, which is required solely for the convenience of Contractor in his scheduling and performance of work, shall be borne by the Contractor. Overtime costs shall be borne by the Contractor when work is performed during hours other than normal workweek and laboratory inspection is required. District will pay normal cost of laboratory inspection, and Contractor shall pay that portion of laboratory inspection cost due to overtime.
- J. Testing Laboratory will separate and identify on the invoices, the costs covering all testing and inspections that are to be deducted from payments to the Contractor, as specified above.
- K. Testing Laboratory will furnish to District a cost estimate breakdown covering initial tests and inspections required by Contract Documents. Estimate will include number of tests, man-hours required for tests, field and plant inspections, travel time and costs.
- L. The cost of shop fabrication inspection and material testing outside the State of California or outside of a 150-mile radius of the job site shall be paid for by the District and deducted from payments to the Contractor.

1.05 TESTING LABORATORY

- A. Testing and inspection services shall be performed by an independent testing laboratory, and shall be in accordance with requirements of Title 24, CCR, and the requirements specified herein. The duties of the Testing service are described in T24, CCR, Part I, Article 4-335.
- B. Testing and inspection services shall verify that work incorporated into the project meets the requirements of the Contract Documents.
- C. In general, tests and inspections for structural materials shall include all items listed on the Structural Tests and Inspections list for this project as prepared and distributed by the Architect, and approved by the Division of the State Architect.
- D. Test reports shall be signed by a Registered Civil Engineer licensed in the State of California.

1.06 TESTS

- A. Selection of the material to be tested shall be by the laboratory or the District's representative and not by the Contractor.
- B. The Contractor shall notify the District'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 District may arrange for the testing of same at the source of supply.
- C. Any material shipped by the Contractor from the source of supply before having satisfactorily passed such testing and inspection or before the receipt of notice from said representative that such testing and inspection will not be required shall not be incorporated in the job.

1.07 TEST AND INSPECTION REPORTS

- A. Testing Laboratory will certify in writing that all work specified or required to be tested and inspected conforms to or does not conform to drawings, specifications and applicable building codes.

- B. The Testing Laboratory will make the following distribution of all test and inspections reports within 14 days of the date of the test:
- | | |
|---|---|
| 1. Project Inspector of Record | 1 |
| 2. Specialty Inspectors | 1 |
| 3. Architect | 2 |
| 4. Structural Engineer | 1 |
| 5. Contractor | 1 |
| 6. School District/Construction Manager | 2 |
| 7. Division of the State Architect | 1 |
- C. One copy of all test reports shall be forwarded to the Division of the State Architect within 14 days of the date of the test by the testing agency. Such reports shall include all tests made, regardless of whether such tests indicate that the material is satisfactory or unsatisfactory.
1. Samples taken but not tested shall also be reported.
 2. Records of special sampling operations as required shall also be reported.
 3. The reports shall indicate that the material or materials were sampled and tested in accordance with the requirements of T24, CCR and with the approved specifications.
 4. Test reports shall show the specified design strength.
 5. Test reports shall also state definitely whether or not the material or materials tested comply with requirements.

1.08 VERIFICATION OF TEST REPORTS

- A. Each testing agency shall submit to the Division of the State Architect a verified report in duplicate covering all of 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 that project is suspended, covering the tests up to that time, and at the completion of the project, covering all tests.

1.09 REPORTING TEST FAILURES

- A. Immediately upon Testing Laboratory determination of a test failure, the Laboratory will telephone the results of test to Architect. On the same day, Laboratory will send written test results to those named on above distribution list.

1.10 AVAILABILITY OF SAMPLES

- A. Contractor shall make materials required for testing available to Laboratory and assist in acquiring these materials as directed by the District's Inspector. The samples shall be taken under the immediate direction and supervision of the Testing Laboratory.
- B. If work, which is required to be tested or inspected, is covered up without prior notice or approval, such work may be uncovered at the discretion of Architect at no additional cost to the District. Refer to Article 1.04 of this section.
- C. Unless otherwise specified, Contractor shall notify Testing Laboratory a minimum of three working days in advance of all required tests, and a minimum of three working days in advance of all required inspections. Extra laboratory expenses resulting from failure to notify the Laboratory shall be paid for by the District and deducted from payments to the Contractor.
- D. Contractor shall give sufficient advance notice to Testing Laboratory in the event of cancellation or time extension of a scheduled test or inspection. Charges due to insufficient advance notice of cancellations or time extensions shall be paid for by the District and deducted from payments to the Contractor.

1.11 REMOVAL OF MATERIALS

- A. Unless otherwise directed, materials not conforming to the requirements of Contract Documents shall be promptly removed from the job site.

1.12 INSPECTION BY THE DISTRICT

- A. The District 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. B. The District shall have the right to reject materials and workmanship that 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 District. If the Contractor does not correct such rejected work within a reasonable time, fixed by written notice, the District may correct such conditions and deduct the costs from payments to the Contractor.
- C. Should it be considered necessary or advisable by the District at any time before final acceptance of the entire work to make an examination of work already completed by removing or tearing out the same, the Contractor shall on request promptly furnish all necessary facilities, labor and materials. If such work is found to be defective in any respect due to fault of the Contractor or his subcontractor, the Contractor shall bear the expense 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 reimbursed to the Contractor by the District.

1.13 CONTRACTOR RESPONSIBILITIES

- A. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
- B. Verify that all required examinations and test samples have been made prior to covering work.
- C. Provide incidental labor and facilities:
 - 1. To provide access to Work to be tested,
 - 2. To obtain and handle samples at the site or at source of Products to be tested,
 - 3. To facilitate tests and inspections,
 - 4. To provide storage and curing of test samples.

1.14 DISTRICT'S INSPECTOR

- A. A DSA Certified Inspector employed by the District in accordance with the requirements of T24, CCR, will be assigned to the work. The duties of the Inspector are described in T24, CCR, Part I, Article 4-333 & Article 4-342.
- B. Special Inspectors may be employed by the District as required by T24, CCR. They shall be afforded every right of access and cooperation required of the Contractor for the Inspector of Record.
- C. 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 the information as may be necessary to keep him fully informed respecting the progress and manner of the work and the character of the materials. Inspection of the work shall not relieve the Contractor from any obligation to fulfill this Contract.
- D. Contractor shall keep Inspector advised at all times of all work in advance of its execution. Such advance notice shall be in conformance with the time limitations established in the project manual and CCR, T24. The minimum notice shall be 24 hours in advance of performance of the work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 SCHEDULE OF TESTS AND INSPECTIONS

- A. Provide reference to the approved DSA 103 for complete listing structural test and special inspections.
- B. Tests and inspections for the following will be required, as applicable. Section references are to T24 CCR, Part 2.
- C. Concrete
 - 1. Concrete Mix Design:

- a. The District will pay for the sampling of aggregate and preparation of mix design one time for each strength and/or aggregate size specified. Testing cost for additional mix designs will be paid for by the District and deducted from payments to the Contractor. The District will pay continuous batch plant inspection and all tests of materials, but Contractor payments will be reduced accordingly for all tests performed on materials that do not meet specification requirements.
- b. Test concrete aggregates for mix design only.
- c. Deliver samples of approved aggregate to job for comparison with material delivered, if job mixed concrete is used.
- d. Test suitability of aggregates in accordance with ASTM C88 if material is under suspicion and if so directed by Architect or Division of the State Architect.
2. If compressive test of core specimens fail to show compressive strength specified, remove and replace concrete or adequately strengthen in a manner acceptable to Architect and Division of the State Architect.
3. Certification shall be made before a Notary Public that tests, the results of which shall be shown, were made in accordance with provisions of Rules and Regulations of the Division of the State Architect.
4. Make all tests, take samples, and prepare samples in accordance with the latest standards adopted by American Society for Testing and Materials, or ASTM.
5. Concrete mixed at certified automatic concrete batch plants shall have quality control as follows:
 - a. Laboratory designed mixes using adequate cement factors.
 - b. The testing laboratory shall perform continuous batch plant inspection.
6. Concrete mixed at non-certified plants shall have quality control as follows:
 - a. Laboratory designed mixes using adequate cement factors.
 - b. The testing laboratory shall perform continuous batch plant inspection.
 - c. Measure all water, including wash water, so total on truck does not exceed 95 percent of maximum allowed in mix design.
 - d. Legible, certified weighmaster's certificates shall be provided to the Project Inspector for all structural and nonstructural concrete, in accordance with the requirements of the Division of the State Architect.
 - e. At end of job, furnish affidavit to Division of the State Architect on form SSS 411-8, certifying that all concrete furnished conformed in every particular, to requirements of T24, CCR, and approved Contract Documents.
7. Continuous batch plant inspection requirement may be waived by the Architect in accordance with Section 1705A.3.3. Such waiver shall be in writing, with approval of the Division of the State Architect.
8. Reinforcing Steel:
 - a. Tests shall be performed before the delivery of steel to job site. Steel not meeting specifications shall not be shipped to the job.
 - b. Testing procedure shall conform to ASTM A615.
 - c. Sample at the place of distribution, before shipment: Make one tensile test and one bending test from samples out of 10 tons, or fraction thereof, of each size and kind of reinforcing steel, where taken from bundles as delivered from the mill and properly identified as to heat number. Mill analysis shall accompany report.
 - d. Where identification number cannot be ascertained, or where random samples are taken, make one series of tests from each 2-1/2 ton, or fraction thereof, of each size and kind of reinforcing steel. Tests on unidentified reinforcing steel will be paid for by the District and deducted from payments to the Contractor.
 - e. Samples shall include not fewer than two pieces, each 18 inches long, of each size and kind of reinforcing steel.
 - f. Inspection of welding of reinforcing steel shall be done by a specially qualified laboratory inspector and tested in accordance with AWS D1.4
 - g. District's Inspector will inspect all reinforcement for concrete work for size, dimensions, locations and proper placement. Inspector shall be present during

welding of all reinforcing steel.

9. Inspection by District's Inspector:
 - a. Placement of reinforcing steel and concrete at job.
 - b. Obtain load ticket and identify mix before accepting load. Keep daily record of pour, identifying each truckload, time of receipt, and location of concrete in structure. Keep record until completion of structure and have available for inspection. Forward two copies of weighmaster's certificate to the Division of the State Architect immediately.
 - c. During progress of work, samples for strength tests of each class of concrete placed each day shall be taken not less than once a day, or not less than once for each 50 cubic yards (38.2 meters squared) of concrete, or not less than once for each 2,000 square feet (186 meters squared) of surface area for slabs or walls. Additional samples for seven-day compressive strength tests shall be taken for each class of concrete work or whenever the mix or aggregate is changed.
 - d. Each sample shall be taken in three parts from the same batch, one part to be tested at 7 days, and the others to be tested at 28 days.
 - e. Make and store cylinders according to ASTM C31.
 - f. Deliver cylinders to laboratory or store cylinders in a suitable protected environment for pick up by laboratory personnel.
 - g. Make a slump test of wet concrete according to ASTM C143, at least at the same frequency that the test cylinders are taken.
 10. Concrete materials shall be tested to conform to the following:
 - a. General Testing Requirements: Sections 1903A, 1905A, 1913A.1, ACI318, Ch. 5.
 - b. Portland Cement:
 - c. Concrete Aggregates: Section 1903A.6.
 - d. Reinforcing Bars, Tendons, Pipes, or Tubing: Section 1913A.2.
 - e. Admixtures: Section 1903A, 1904A.
 11. Mixed concrete quality shall be tested and inspected to conform to the following:
 - a. Batch Plant Inspection: Section 1705A.3.2.
 - b. Proportions of Concrete: Section 1903A, 1904A.
 - c. Strength Tests of Concrete: ACI 318, Ch. 5.
 12. Placement of concrete shall be inspected to conform to the following:
 - a. Job Site Inspection: Section 1705A.3.5, 1705A.3.6.
 - b. Welding of Reinforcing Bars: Section 1705A.2.2, 1705A.2.2.1.2.
 13. Placement of post-installed concrete anchors.
 - a. Expansion and epoxy anchors, shot pins: Section 1913A.7.
- D. Lightweight Metals
1. Certification that the alloys and tempers of materials used in the work are as called for in Contract Documents shall be provided to the Project Inspector. Certification shall be furnished by an independent testing laboratory approved by the Division of the State Architect and shall conform to CBC Ch. 17A, as for steel, per CBC Ch. 20.
 2. Each member shall be positively identified and marked to indicate alloy and temper, as per Section 2210A.
 3. The Project Inspector shall inspect all fabrication and erection, as required for structural steel.
 4. Welding inspection shall be as required for steel fabrication.
- E. Wood Framing
1. All wood framing, timber, and sheathing shall be identified and graded by the rules adopted in Section 2303. Any members not identified or tested to establish quality of material shall not be integrated into the work.
 2. The Project Inspector shall be furnished affidavits or certification that fasteners and connectors meet the requirements of materials used to generate manufacturers' load tables.
 3. Installation of timber connectors shall be continuously inspected by an inspector approved by the Division of the State Architect for such inspection.

4. Fabrication of glue-laminated timber shall be continuously inspected by an inspector specially approved by the Division of the State Architect for such inspection.
5. Wood materials shall be tested to conform to the following:
 - a. Plywood: PS-1
 - b. Glued Laminated Beams: 2303.1.3, 1705A.5.4.
- F. Gypsum Board and Plaster:
 1. Testing of materials for conformance with reference standards and the requirements of the Contract Documents, shall be performed by the Testing Laboratory if required by the Division of the State Architect or as directed by the Architect.
 2. The Project Inspector shall inspect the attachment of all lath and gypsum plaster prior to covering and finishing.
- G. Fire-Resistive Patching of Penetrations in Fire-Rated Assemblies:
 1. Inspection by District's Inspector:
 - a. Inspector will inspect all locations of Fire-Resistive Patching for conformance with listed requirements of Underwriter's Laboratories.
 - b. Contractor shall not conceal areas patched, until such time as the Inspector accepts the work as conforming to the Contract requirements.
- H. All tests and/or inspections required on the following page(s), Form DSA-103-1, Structural Test & Inspections.

END OF SECTION

**SECTION 01 50 00
CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. A. Temporary Utilities: Electricity, lighting, heat, ventilation, telephone service, water, and sanitary facilities.
- B. Temporary Utilities: Electricity, lighting, heat, ventilation, telephone service, water, and sanitary facilities.
- C. Temporary Controls: Barriers, enclosures and fencing, protection of the Work, and water control.
- D. Construction Facilities: Access roads, parking, progress cleaning, project signage, and temporary buildings.
- E. Furnish and install all required temporary facilities as indicated or specified herein plus such facilities for proper performance of the Contract. All such temporary facilities shall be located where directed and maintained in a safe and sanitary condition at all times until completion of the Contract. Other sections of Division 1 apply to this section as fully as if repeated herein.

1.02 REGULATORY REQUIREMENTS (ALL WORK TO BE IN COMPLIANCE WITH CFC CH. 33 - FIRE SAFETY DURING CONSTRUCTION AND DEMOLITION)

- A. Comply with governing regulations and utility company regulations and recommendations.
- B. Comply with pollution and environmental protection regulations for use of water and energy, for discharge of waste and storm drainage from project site, and for control of dust, air pollution and noise.
- C. Temporary work shall conform to requirements of State, County, and local authorities and underwriters which pertain to operation, health, safety, and fire hazard. Contractor shall furnish and install items necessary for conformance with such requirements, whether or not called for under separate division of these specifications. Comply with 2022 California Fire Code Chapter 33 during all phases of project.
- D. The Contractor shall send proper notices, make all necessary arrangements and perform all other services required in the care and maintenance of all public utilities. The Contractor shall assume all responsibility concerning the same for which the Owner may be liable.
- E. Enclosing or boxing in, for protection of any public utilities equipment, shall be done by the Contractor. Upon completion of the work, the Contractor shall remove all enclosures, fill in all openings in concrete and masonry, and grout the same watertight, and leave in a finished condition.

1.03 TEMPORARY ELECTRICITY

- A. Provide temporary electric feeder from existing building or pole electrical service at location as determined. Do not disrupt Owner's need for continuous service. Owner shall determine closest availability of power.
- B. B. Complement existing power service capacity and characteristics as required.
- C. Provide power outlets for construction operations, with branch wiring and distribution boxes located at each floor and as required. Provide flexible power cords as required.
- D. Provide main service disconnect and overcurrent protection at convenient location.
- E. Permanent convenience receptacles may not be utilized during construction.
- F. Provide adequate distribution equipment, wiring, and outlets to provide single-phase branch circuits for power and lighting.
 - 1. Provide 20 ampere duplex outlets, single-phase circuits for power tools.
 - 2. Provide 20 ampere, single-phase branch circuits for lighting.

1.04 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

- A. Provide and maintain lighting for construction operations to achieve a minimum lighting level of 2-watt/sq ft.
- B. Provide and maintain 1 watt/sq ft lighting to exterior staging and storage areas after dark for security purposes.
- C. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.
- D. Maintain lighting and provide routine repairs.
- E. Permanent building lighting may be utilized during construction.

1.05 TEMPORARY HEAT

- A. Existing facilities shall not be used.
- B. Provide and pay for heating devices and heat as needed to maintain specified conditions for construction operations.
- C. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.
- D. Provide all temporary heat as necessary for the drying of the building, the proper installation of all work and materials, and the protection of all work and materials against injury from dampness and cold. The permanent building heating system shall not be used for any temporary heating unless first approved by the District. If approved for use, filters shall be replaced before final acceptance of work.

1.06 TEMPORARY VENTILATION

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, to prevent accumulation of fungus, mold, dust, fumes, vapors, or gases, and to cure materials.

1.07 TELEPHONE SERVICE

- A. Provide, maintain and pay for telephone service to a designated Contractor's representative who shall be available to answer all calls 24 hours a day, 7 days a week (representative shall be on-call at all times), for emergencies or other communications regarding the project. Telephone service that is monitored only during normal working hours is not acceptable.

1.08 TEMPORARY WATER SERVICE

- A. Provide, maintain and pay for suitable quality water service required for construction operations.
- B. Provide separate metering and reimburse Owner for cost of water used.
- C. Extend branch piping with outlets located so water is available by hoses with threaded connections.
- D. Make arrangements and pay all costs for all water required for construction purposes and for testing, disinfection and flushing of the water supply system. Furnish and install piping or hose to carry water to every point where needed on the project. All water used on the project shall be potable water. The Contractor shall determine closest availability of water.
- E. Provide fire protection for the duration of work in accordance with local codes, ordinances and the State Fire Marshall.
 - 1. The Contractor shall take necessary precaution to guard against and eliminate possible fire hazards and to prevent damage to construction work, building materials, equipment, and public property. The Contractor shall be responsible for providing, maintaining and enforcing fire protection methods.

1.09 TEMPORARY SANITARY FACILITIES

- A. Provide sanitary temporary toilet facilities in no fewer numbers than required by law and such additional facilities as may be directed by the Inspector for the use of all workers. The toilet facilities shall be maintained in a sanitary condition at all times and shall be left at the site until

removal is directed by the Inspector. Use of toilet facilities in the work under construction shall not be permitted.

1.10 BARRIERS AND BARRICADES

- A. Provide barriers and barricades to prevent unauthorized entry to construction areas and to allow for Owner's use of site, and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Provide barriers, barricades and covered walkways as required by governing authorities for public rights-of-way and for public access to new and existing buildings.
- C. Provide protection for plant life designated to remain. Replace damaged plant life to match existing.
- D. Protect non-owned vehicular traffic, stored materials, site, structures, walks, drives and curbs from damage.
- E. Barricades shall be a panelized system, commercial grade chain link fence with vision screen fabric, or approved equal.
- F. Provide 8-foot high barricade around construction site and staging area. Equip with vehicular and pedestrian gates with locks.
- G. Barricades shall include, but not be limited to, that shown on the drawings when so indicated. Additional fencing may be required to secure the work area and direct users of the site to other areas.
- H. When the project is phased or portioned, the construction barricade associated with that work shall be removed upon completion of that phase or portion and construction barricade provided to properly contain the area still under construction.

1.11 WATER CONTROL

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- B. Protect site from ponding or concentrated water flow. Provide water barriers as required to protect site from soil erosion.

1.12 EXTERIOR ENCLOSURES

- A. Provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.
- B. Provide temporary roofing as required to protect work.

1.13 PROTECTION OF INSTALLED WORK

- A. Protect installed Work and provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to prevent damage.
- C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- E. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- F. Prohibit traffic from landscaped areas.
- G. Restore staging area to match pre-construction conditions. Sod, fertilize and maintain turf for 30 days after final acceptance. Re-establish sprinkler systems to full working order.

1.14 SECURITY

- A. Provide security and facilities to protect Work, and existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.
- B. Coordinate with Owner's security program.

1.15 ACCESS ROADS

- A. Maintain temporary roads accessing public thoroughfares to serve construction area.
- B. Extend and relocate as Work progress requires. Provide detours necessary for unimpeded traffic flow.
- C. Provide and maintain access to fire hydrants, free of obstructions. Maintain access to fire roads.
- D. Provide means of removing mud from vehicle wheels before entering streets.

1.16 PARKING

- A. Arrange for temporary surface parking areas to accommodate construction personnel.
- B. When site space is not adequate, provide additional off-site parking.
- C. Do not allow vehicle parking on existing pavement without Owner's written approval.
- D. Coordinate street access and possible partial use of street with City.

1.17 PROGRESS CLEANING AND WASTE REMOVAL

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and rubbish from site periodically and dispose off-site.
- E. Open free-fall chutes not permitted. Terminate closed chutes into appropriate containers with lids.

1.18 PROJECT IDENTIFICATION

- A. Provide a Project Sign, erected on site at a location directed by the Architect.
- B. Project Sign shall be constructed as follows:
 - 1. Supported by wood posts set in secure footings, post and footing size as required to comply with Code and provide for safety, posts painted black.
 - 2. Sign panel constructed of two sheets of 5/8" MDO plywood. Sign panel not less than 4' x 8' and not greater than 8' x 12', size as required to accommodate text and spacing. Set with bottom of panel 3' - 0" above grade, and secured to posts with 3/8" lag screws. Plywood painted white, all sides and edges, primer and two finish coats.
 - 3. Lettering done by a professional sign painter.
 - a. List title of Project, name of Owner, members of Governing Board, school district administrators, Architect, Contractor, source of funding, and other information as directed by Architect.
 - b. Text color: Black
 - c. Text style: Helvetica Medium
 - d. Text Size:

Project Name: 4"

Project Funding Source: 3"

Owner Name: 4"

overning Board, Architect, Contractor Titles: 3"

Governing Board, Architect, Contractor Names: 2"

- e. Text weight: As provided by Architect
- f. Text content: As provided by Architect
- C. Provide shop drawings for approval. Do not construct Project Sign without Architect's approval of shop drawings.
- D. Renew project sign every 6 months of project duration. Original sign may remain without replacement if it is maintained in good condition, and upon acceptance of Owner.
- E. Renew project sign every 6 months of project duration. Original sign may remain without replacement if it is maintained in good condition, and upon acceptance of Owner.

1.19 FIELD OFFICES

- A. Provide on-site, adequate field construction office space for use by construction forces, the District Inspector, and the Architect during the time construction is in progress. The offices shall be conveniently located and shall be watertight and waterproof, clean, insulated, heated, cooled, lockable, provided with windows to give adequate light and ventilation, have electrical service outlets, and have a floor. Minimum size of temporary site construction is 360 square feet.
 - 1. Equip with a minimum of one desk and a layout table. Equip with additional folding chairs for field meetings.
 - 2. The offices, equipment, and furniture shall remain the property of the Contractor and shall be removed by contractor upon completion of work.
 - 3. A complete set of approved plans and specifications shall be kept in the office at all times.
- B. Inspectors Field Office: Contractor is required to provide for the use of the School District's Inspector a temporary office space to be located as directed by the Inspector and to be maintained until removal is authorized by the School District. Space is to have a lockable separate room area with a table for plans and a desk with two chairs. At least one entrance to Inspector office space is to be from the outside and not through the Contractors field office space. Maintain for Inspector until completion of the Contract.

1.20 CONSTRUCTION EQUIPMENT

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

1.21 STORAGE

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

1.22 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion inspection.
- B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.
- C. Clean and repair damage caused by installation or use of temporary work.
- D. Restore existing and permanent facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

1.23 PROJECT ACCESS

A. See Special Conditions, Section 01000 for restrictions placed upon access to the Project.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

**SECTION 01 60 00
PRODUCT REQUIREMENTS**

PART 1. - GENERAL

SECTION INCLUDES

2.01 THIS SECTION ESTABLISHES PROCEDURES FOR SPECIFIED PRODUCT OPTIONS.

- A. . The intent of this section is to ensure that specified product options exceed or equal the quality of the specified products and are furnished and installed in accordance with the design intent.
- B. RELATED SECTIONS
 - 1. General and Supplementary Conditions
 - a. Section 01 30 00 - Administrative Requirements
 - b. Section 01 25 00 - Product Substitution Procedures
 - c. PRODUCT OPTIONS
 - 2. Where product options are included in the specifications sections and are specified by naming more than one, or several acceptable products or manufacturers, select any product or manufacturer listed.
 - 3. Where more than one manufacturer or product is listed in the specifications and only one manufacturer or product is specified in detail with model numbers and features, the one specified in detail shall be considered the standard of quality required for all manufacturers or products listed.
 - a. Where product options are included in the specifications and they are followed by an "or equal " or "approved equal" or equal meeting a specified standard, review and approval by the Architect and School District is required for Contractor proposed equal items. Procedures specified in Section 01630 are to be followed.
 - b. For items specified only by Reference Standards, select any item meeting standards.
 - c. Performance Specifications: For items specified by performance requirements, select any item meeting the performance standards specified.
 - d. Descriptive Specifications: When specifications describe a product or assembly, listing exact components and characteristics, without the use of a brand or trade name, provide a product or assembly that contains the components and characteristics specified.
 - 1) Compliance with Standards Specifications: When specifications only require compliance with a Code, Regulation or Voluntary Standard, Provide products that comply with the specified Codes, Regulations or Standards.
 - 2) Submit request, as required for substitution, for any item or manufacturer not specifically named in the specifications on the Substitution Request Form enclosed with the Bidding Documents.
 - 3) 1. Architect and School District will determine acceptability of proposed substitutions.

PART 2. - PRODUCTS

3.01 NOT APPLICABLE

PART 3. - EXECUTION

NOT APPLICABLE

END OF SECTION

**SECTION 01 63 00
PRODUCT SUBSTITUTION PROCEDURES**

PART 1. GENERAL

1.01 SECTION INCLUDES

- A. This Section establishes procedures for Contractor submittal of substitutions.
- B. This Section provides procedures for review and compliance with Public Contract Code Section 3400 for the "or equal" clause allowing bidders to furnish any equal material, product, thing or service. Or equal items proposed by bidders are considered substitutions and are subject to approval of the Architect and School District. Burden of proof for "Or Equals is the responsibility of the Contractor.
- C. The intent of this section is to insure that proposed substitutions exceed or equal the quality of the specified products and are furnished and installed in accordance with the Contract Documents.

1.02 RELATED SECTIONS

- A. General and Supplementary Conditions
- B. Section 01 60 00 - Product Requirements

1.03 SUBSTITUTIONS

- A. Substitution requests are to be submitted by General Contractors only. Requests submitted by Subcontractors, Material Suppliers, Manufacturers and other interested parties, other than General Contractors, will not be considered. Submit requests on the attached FORM "A", SUBSTITUTION REQUEST FORM at the end of this section.
- B. Comply with provisions of Articles for Substitutions in the General Conditions and any modifications to General Conditions provided in the Supplementary Conditions.
- C. Tabulate products by specification section number and title.
- D. Submit separate request for each substitution. In addition to "FORM A", SUBSTITUTION REQUEST FORM", support each request with a side by side itemized comparison of the proposed substitution with product specified; including significant variations. Substitution requests without side by side itemized comparisons will not be reviewed, not accepted. Support each request with:
 - 1. Complete data substantiating compliance of proposed substitution with requirements stated in Contract Documents:
 - a. Product identification, including manufacturer's name and address.
 - b. Manufacturer's literature; identify:
 - 1) Product description.
 - 2) Reference standards.
 - 3) Performance and test data.
 - 4) Fire resistance and fire ratings.
 - c. Samples, as applicable.
 - d. Name and address of similar projects on which product has been used, and date of each installation.
 - 2. List significant variations.
 - 3. Any effect the substitution may have on other trade contracts.
 - 4. List of changes required in other work or products.
 - 5. Accurate cost data comparing proposed substitution with product specified.
 - a. Amount of any change in cost.
 - 6. Designation of required license fees or royalties.
 - 7. Designation of availability of maintenance services, sources of replacement materials.
 - 8. Comparison of physical size and weight with product specified.
 - 9. Comparison of physical shape and available finishes.
- E. Substitutions will not be considered for acceptance when:

1. They are indicated or implied on shop drawings or product data submittals and where not approved in compliance with the General Conditions and this section.
 2. They are requested after the Contract has been executed.
 3. Substitution request procedures included in this Section and in the General and Supplementary Conditions are not complied with by the Contractor.
 4. The School District has determined that compatibility, standardization, technological sophistication, service and uniformity are necessary with regard to technological and certain safety items across the Schools in the District.
- F. Substitute products shall not be installed in the construction without written acceptance of the Architect and School District.
- G. Architect and School District will determine acceptability of proposed substitutions prior to awarding of the Contract. Substitutions may be approved after award of the contract only where the following conditions exist.
1. Specified item has been discontinued or is not unavailable to meet project schedule.
 2. The School District requested the Substitution.
 3. Substitution will reduce the Contract Amount and Contract Time (Credit Back to the District) without reducing quality.

1.04 CONTRACTOR'S SUBSTITUTION CERTIFICATION

- A. In making formal request for substitution contractor certifies that:
1. He has investigated proposed product and has determined that it is equal to or superior in all respects to that specified.
 2. He will provide same warranties or bonds for substitution as for product specified.
 3. He will coordinate installation of accepted substitution into the work, and will make such changes as may be required for the work to be complete in all respects including modification of the work of other trades.
 4. He waives claims for additional costs caused by substitution which may subsequently become apparent.
 5. Substituted material is similar in physical appearance, size and weight and will install with the same opening and attachments.
 6. Substituted material has the same or better fire rating and fire resistive qualities, including flame spread, smoke developed, UL tested and listing.

1.05 ARCHITECT'S DUTIES

- A. Review contractor's request for substitutions with reasonable promptness.
- B. Consult with District and provide notification to contractor, in writing, of decision to accept or reject requested substitution.

1.06 AVAILABILITY OF SPECIFIED ITEMS

- A. Verify prior to bidding that all specified and substituted items will be available in time for installation during orderly and timely progress of the work.
- B. In the event specified items will not be available, notify the Architect prior to receipt of bids.
- C. Cost of delays because of non-availability of specified items, when such delays could have been avoided by the Contractor, will be back-charged as necessary and shall not be borne by the Architect or School District.

1.07 SUBSTITUTION WARRANTY REQUIREMENTS

- A. The Contractor is to warrant, in writing, that the substituted items are to perform as specified, and assume complete responsibility for the same. This includes responsibility and costs required for modifications to building, other materials, or equipment, and any additional coordination with work of other trades. Testing, of Substitution proposed, if required or requested by the Architect or School District shall be paid for by the Contractor.

PART 2. PRODUCTS
NOT APPLICABLE
PART 3. EXECUTION
NOT APPLICABLE

END OF SECTION

**SECTION 01 65 00
STARTING OF SYSTEMS**

PART 1 GENERAL

SECTION INCLUDES

2.01 STARTING SYSTEMS.

- A. Demonstration and instructions.
- B. Testing, adjusting, and balancing.
- C. RELATED SECTIONS
 - 1. Section 01 40 00 - Quality Control: Manufacturers field reports.
 - a. Section 01 70 00 - Execution and Closeout Requirements: System operation and maintenance data and extra materials.
- D. STARTING SYSTEMS
 - 1. Coordinate schedule for start-up of various equipment and systems.
 - a. Notify Architect and Owner seven days prior to start-up of each item.
 - b. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or for other conditions that may cause damage.
 - c. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
 - d. Verify wiring and support components for equipment are complete and tested.
 - e. Execute start-up under supervision of applicable manufacturer's representative or Contractors' personnel in accordance with manufacturers' instructions.
 - f. When specified in individual specification sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
 - g. Submit a written report in accordance with Section 01400 that equipment or system has been properly installed and is functioning correctly.
- E. DEMONSTRATION AND INSTRUCTIONS
 - 1. Demonstrate operation and maintenance of Products to Owner's personnel two weeks prior to date of Substantial Completion.
 - a. Demonstrate Project equipment and instruct in a classroom environment located at Owner's premises and instructed by a qualified manufacturers' representative who is knowledgeable about the equipment.
 - 1) C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
 - 2) Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owners' personnel in detail to explain all aspects of operation and maintenance.
 - 3) Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time at equipment location.
 - 4) Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
 - b. The amount of time required for instruction on each item of equipment and system is that specified in individual sections. Allow additional time as required to ensure Owner's representative understands all aspects of operation.
 - c. TESTING, ADJUSTING, AND BALANCING
 - d. Contractor to employ services of an independent firm to perform testing, adjusting, and balancing. Contractor shall pay for services.
 - e. The independent firm will perform services specified in Division 15.

- f. Reports will be submitted by the independent firm to the Architect indicating observations and results of tests and indicating compliance or non-compliance with the requirements of the Contract Documents.

PART 2 PRODUCTS

3.01 NOT USED

PART 3 EXECUTION

4.01 NOT USED

END OF SECTION

**SECTION 01 70 00
CONTRACT CLOSEOUT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Closeout Procedures.
- B. Final Cleaning.
- C. Adjusting.
- D. Final Inspections
- E. Project Record Documents.
- F. Operation and Maintenance Data.
- G. Warranties.
- H. Spare Parts and Maintenance Materials.

1.02 RELATED SECTIONS

- A. General Conditions
- B. Section 01 50 00 - Construction Facilities and Temporary Controls: Progress cleaning.
- C. Section 01 65 00 - Starting of Systems: System start-up, testing, adjusting, and balancing.

1.03 CLOSEOUT PROCEDURES

- A. When work is complete, submit written certification that Project Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Project Documents and ready for Inspector, District, and Architect review. Certification shall request final inspection by District.
- B. Submit the following:
 - 1. Division of the State Architect, Verified Report, DSA-6, to the Architect, in duplicate.
 - 2. Close-out submittals as required by State and local agencies.
 - 3. Close-out submittals as required in individual specification sections.
 - 4. Completed Record Drawings.
 - 5. Guarantee: Division 0
- C. Owner may occupy portions of the Work prior to its completion by the Contractor.

1.04 REQUIREMENTS PREPARATORY TO COMPLETION

- A. All temporary facilities shall be removed from the site as specified in Section 01500.
- B. The buildings and site shall be thoroughly cleaned as specified in this Section.
- C. All plumbing and mechanical equipment shall operate quietly and free from vibration. Properly adjust, repair, balance, or replace equipment producing objectionable noise or vibration. Provide additional brackets, bracing, water hammer arrestors, or other methods to prevent objectionable noise or vibration. All systems shall operate without humming, surging, or rapid cycling.
- D. All operating instructions for equipment shall be properly mounted and posted as specified in their respective sections.
- E. Record (As-built) drawings shall be completed, signed, endorsed by the Inspector, and submitted to the Architect as specified herein.
- F. The Material and Equipment maintenance instructions, as specified in the body of the Specifications, shall be submitted to the Architect.
- G. All guarantees and warranties shall be submitted to the Architect.
- H. All tools, which are a permanent part of equipment installed in the Work, shall be delivered to the District.

- I. All keys, construction and permanent, properly identified shall be delivered to the District.
- J. Contractor shall make final gas, water, waste, vent and electrical connections.

1.05 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment. Employ skilled workmen experienced in cleaning construction materials.
- B. Clean interior and exterior surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- C. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- D. Replace filters of mechanical equipment and any other filter installations performed as a part of the work.
- E. Clean debris from roofs, gutters, downspouts, and drainage systems.
- F. Clean site; sweep paved areas, rake clean landscaped surfaces.
- G. Remove waste and surplus materials, rubbish, and construction facilities from the site.
- H. Wash and shine glazing and mirrors.
- I. Polish glossy surfaces to a clear shine.
- J. Vacuum all carpet.
- K. Dust and damp mop all tile and resilient flooring.

1.06 ADJUSTING

- A. Adjust operating products, systems, and equipment to ensure smooth and unhindered operation.

1.07 OBSERVATION OF COMPLETED WORK

- A. When the Work is complete, and after all requirements preparatory to Completion have been performed as herein specified, Contractor shall notify the Architect in writing.
- B. When requested by the District or Architect, the Contractor (and subcontractors as required by District or Architect), shall accompany the District and/or Architect on a tour of the Work.
- C. If corrective work is identified, the Contractor may be provided with a "punch-list" identifying work that is incomplete and/or in need of correction. A "punch-list" shall not relieve the Contractor of any requirement of the Project Documents, nor shall such a list be considered to be all-inclusive of remaining work. The Contractor is responsible for completing all work required by the Project Documents, including all incomplete and corrective work, within the time requirements of the Contract.
- D. If a "punch-list" or other notice of correction is issued to the Contractor, Contractor shall notify the Architect in writing, when all such work is complete. Contractor shall include with the written notification, a copy of all punch-lists issued to him. Each punch-list item shall be annotated with the construction superintendent's initials, and the date that the item was observed by him to have been completed. The Contractor shall reimburse all costs incurred by the District, Architect, or Architect's consultants, associated with reviewing incomplete or corrective work of the Contractor.

1.08 PROJECT RECORD DOCUMENTS

- A. Maintain on site, one set each of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract including, but not limited to, all RFI's, CCD's and CO's.

5. Reviewed Shop Drawings, Product Data, and Samples.
6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress. Do not permanently conceal any work until required information has been recorded.
- E. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
 1. Manufacturer's name and product model and number.
 2. Product substitutions or alternates utilized.
 3. Changes made by Addenda and modifications.
- F. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:
 1. Measured depths of foundations in relation to finish main floor datum.
 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 4. Include all plumbing systems, fire protection systems, and electrical systems. For gravity flow lines such as sewers and storm drains, locate all cleanouts, and indicate invert elevations at building lines, changes in direction, intersections, and property lines.
 5. Field changes of dimension and detail.
 6. Details not on original Contract Drawings.
- G. Methods of documenting changes:
 1. Make reproducible transparencies of the Contract Drawings, and a reproducible copy of the Project Manual, all Addenda, Change Orders, and other Contract Documents.
 2. Legibly mark documents with permanent ink; color code as appropriate to separate various types of work.
 3. Provide all required data for Inspector verification prior to closing in concealed work.
 4. Make all changes, corrections, deletions, or additions on transparencies by a competent draftsman.
 5. The construction superintendent shall endorse the transparencies certifying the record drawings are an accurate illustration of the completed Work.
- H. Remove Architect title block and all registration seals from all documents.
- I. Submit documents to Architect prior to final Application for Payment.

1.09 OPERATION AND MAINTENANCE DATA

- A. Submit data bound in 8-1/2 x 11-inch text pages, three ring (D shape) side binders with durable plastic covers.
- B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project. Include subject matter of binder when multiple binders are required.
- C. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- D. Contents: Prepare a Table of Contents for each volume, with each Product or system description identified, typed on 30-pound white paper, in three parts as follows:
 1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
 2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.

- c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
- 3. Part 3: Project documents and certificates, including the following:
 - a. Shop drawings and product data.
 - b. Air and water balance reports.
 - c. Certificates.
 - d. Photocopies of warranties and bonds.
- E. Data specified in Article 1.07 D above shall incorporate the following:
 - 1. Manufacturer's Manuals: Complete installation, operation, maintenance and service manuals, and printed instructions and parts lists for all materials and equipment where such printed matter is regularly available from the manufacturer. This includes, but is not limited to such service manuals as may be sold by the manufacturer covering the operation and maintenance of his items, and complete replacement parts lists sufficiently detailed for parts replacement ordering to manufacturer. Bound publications need not be assembled in binders.
 - 2. Equipment Nameplate Data: A typewritten list of all mechanical and electrical equipment showing all equipment nameplate data exactly. Identify equipment by means of names, symbols, and numbers used in the contract documents.
 - 3. System Operating Instructions: Typewritten instructions covering operation of the entire system as installed (not duplicating manufacturer's instructions for operating individual components). Include schematic flow and control diagrams as appropriate and show or list valves, control elements, and equipment components using identification symbols and numbers. List rooms, area of equipment served, and show proper settings for valves, controls and switches.
 - 4. System Maintenance Instructions: Typewritten instructions covering routine maintenance of system. List each item of equipment requiring inspection, lubrication, or service and briefly describe such maintenance, including types of lubricants and frequency of service. It is not intended that these instructions duplicate manufacturer's detailed instructions. Give name, address and phone number of nearest firm authorized or qualified to service equipment or provide parts.
- F. Submit 1 draft copy of completed volumes 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
- G. Submit two sets of revised final volumes, within 10 days after final inspection.
- H. Wall-Mounted Data: Frame one set of typewritten system instructions and diagrams as required under Paragraph 3 and 4 above, covered with glass and mounted in locations as directed by the District. This set of instruction is in addition to those required herein before.

1.10 WARRANTIES

- A. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers.
- B. Provide Table of Contents and assemble in three ring (D-shape) side ring binder with durable plastic cover.
- C. Name District as the beneficiary. In addition, for all equipment and machinery, or components thereof, bearing a manufacturer's warranty that extends for a longer time period than the Contractor's warranty, secure and deliver the manufacturer's warranties in the same manner.
- D. Submit prior to final inspection.
- E. Form of Warranty: Written warranties, except manufacturers' standard printed warranties, shall be on the Contractor's, subcontractor's, material suppliers', or manufacturer's own letterhead, addressed to the District. All warranties shall be submitted in duplicate, and in the form shown

on the following page, modified as approved to suit the conditions pertaining to the warranty.

- F. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.

1.11 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification sections.
- B. Deliver to Project site and place in location as directed; obtain receipt prior to final payment.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

**SECTION 01 71 23
FIELD ENGINEERING**

PART 1 - GENERAL

SECTION INCLUDES

2.01 SURVEYING REQUIREMENTS FOR THE WORK.

A. RELATED SECTIONS

1. Section 02310: Grading
 - a. Section 02230: Site Clearing
 - 1) Section 02740: Asphalt Pavement
 - (a) Section 02750: Concrete Pavement
 - (1) Section 02520: Storm Drainage System
 - b. SURVEY SERVICE
 - 1) A. Unless otherwise stated by the Architect or noted in the Special Provisions, the CONTRACTOR shall provide all surveying services.
 - c. PAYMENT FOR SURVEYING
 - 1) The payment for surveying shall be included in respective items of work and shall include, but not to be limited to, construction staking, location and/or relocation of conflicting utilities, locating survey monuments, setting of survey monuments and center line ties, preparing and filing centerline tie sheets and Corner Records, locating Bench Marks and notifying the Office of the County Surveyor of same, professional office services and field calculations, and furnishing all labor, materials, tools, equipment and incidentals for doing all work involved. No additional compensation shall be allowed unless a separate bid item is provided.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 SUBMITTALS

- A. CONTRACTOR shall submit the name and address of the State of California licensed surveyor to CMR, ARCHITECT and OWNER including any changes as they may occur.
 1. CONTRACTOR shall submit to OWNER and/or CMR, ARCHITECT copies of cut sheets, coordinate plots, data collector printouts, and other documentation as available to verify completeness and/or accuracy of field surveying work.
 - a. Statement of Compliance: CONTRACTOR shall submit a statement of certification signed and sealed by Surveyor, counter-signed by CONTRACTOR indicating compliance with grade elevations, slopes and tolerances.
- B. LAYOUT OF THE WORK
 1. CONTRACTOR shall employ a State of California licensed surveyor to lay out the entire Work, set grades, lines, levels, control points, vertical and horizontal control, elevations, grids and positions. Before the commencement of Work, surveyor shall, in conjunction with OWNER and CMR provided engineering survey of the Project site, locate all reference points and benchmarks, then lay out all lines, elevations, and measurements for the entire Work including but not limited to, buildings, grading, paving and utilities.
 - a. All work under this contract shall be built in accordance with the lines and grades shown on the plans. Field survey for establishing these, and for the control of construction, shall be the responsibility of the Contractor. All such survey work including construction staking shall be done under the supervision of a California Licensed Land Surveyor or authorized Civil Engineer. Staking shall be done on all items ordinarily requiring grade and alignment, at intervals normally accepted by the agencies and trade involved.
 - b. The CONTRACTOR shall be responsible for any errors in the finished work, and shall notify the Engineer, in writing, within 24 hours, of any discrepancies, or design errors during the construction staking.

- c. Contractor shall immediately remediate any areas found not to meet specification requirements.

C. PERMANENT SURVEY MARKERS

- 1. Prior to the start of construction, the Contractor's licensed Land Surveyor or qualified Civil Engineer shall, in conformance with Section 8771 of the California State Business and Professions Code, locate all monuments (both of record and not of record), bench marks, and centerline ties within the construction zone, i.e., within one hundred feet of the construction activity. Additional ties to monuments shall be set when ties are missing (min. 4 ties per monument). The Contractor's Surveyor or qualified Civil Engineer shall prepare and submit for review to the City Engineer separate tie sheets and Corner Record sheets (monuments not of record shall have only tie sheets prepared). Corner Records shall conform to the County Engineers' Association of California's "Guide to the Preparation of Records of Survey and Corner Records" document as provided by the County Surveyor's Office. Upon review by the City Engineer, the Land Surveyor shall file the Corner Records with the County Surveyor's Office. Certified Corner Records shall be filed with the City Engineer of the City that the work is being completed in.
 - a. After construction and prior to final acceptance by the Owner of the construction project, the Contractor's land surveyor or qualified Civil Engineer shall re-survey all field monuments and centerline ties within the construction zone, prepare tie sheets and Corner Record sheets as indicated above, and file them with the City Engineer for review. After review by the City Engineer, the Land Surveyor shall file the Corner Records with the County Land Surveyors Office, and file certified copies of the Corner Records with the City Engineer.
 - b. All survey monuments removed or altered as a result of construction shall be reset, Corner Records filed with the County Surveyor's Office, and approved final Corner Records filed with the City Engineer. Centerline ties removed as a result of construction shall be reset and tie sheets filed with the City Engineer.
 - 1) D. The Land Surveyor shall provide a letter of certification for all monuments having four or more existing ties which are within 0.02 ft plus or minus of the original City tie sheet records. When several monuments and ties appear on one tie sheet and one of the ties has changed the Land Surveyor shall re-measure all of the ties and re-file a new tie sheet with the City as required herein.
 - (a) County of Ventura permanent and temporary bench marks within the construction zone shall be located by the surveyor, and the Contractor's Land Surveyor shall send a written notification of impending construction to the County of Ventura Surveyor's Office two weeks prior to construction.

D. SURVEY REQUIREMENTS

- 1. Establish a minimum of two permanent horizontal and vertical control points on the Project site, remote from the building area, referenced to data established by the survey control points.
 - a. Indicate the reference points on the project record drawings with the basis of elevation being the established benchmarks.
 - b. Establish lines, grades, locations and dimensions by instrumentation. From time to time, verify the layout of all Work by the same methods.
 - c. Provide grade stakes and elevations to construct over excavation and re compaction, rough and final grades, paved areas, curbs, gutters, sidewalks, building pads, landscaped areas, and other areas as required.
 - d. Calculate and layout proposed finished elevations and intermediate control as required to provide smooth transitions between the spot elevations indicated in the Contract Documents.
 - e. Provide stakes and elevations for grading, fill, and topsoil placement.
 - f. Provide adequate horizontal and vertical control to locate utility lines, including but not limited to, storm, sewers, water mains, gas, electric and signal and provide vertical control in proportion to the slope of the line as required for accurate

construction. Dry utilities will be based upon adequate horizontal and vertical control layout. Prior to trench closure, survey and record invert and flow line elevations. Survey and record top of curb and flow line elevations on finished concrete or AC surfaces at key locations such as BC's, EC's, grade breaks, corners or angle points in sufficient number to demonstrate the Work complies with the intent of the Contract Documents.

- g. Provide horizontal and vertical control for batter boards for drainage, utility, and other on-site structures as required.
 - 1) Furnish building corner offsets as required to adequately locate building pads. Provide cut and fill stakes within the building pad perimeter adequate to control both over excavation and re-compaction and the final sub-grade elevation of the building pad.
 - (a) Submit a certification, signed by the surveyor, confirming the elevations and locations of improvements are in conformance with the Contract Documents. The statement shall include survey notes for the finish floor and building pad, showing the actual measured elevations on the completed sub-grade, recorded to the nearest 0.01'. Building pad tolerance will be $\pm 0.10'$.
 - (1) ESTABLISHMENT OF GRADES IN HARDSCAPE AREAS
 - 2) A. All work shall conform to the lines, elevations, and grades shown on the Grading Plans. Three consecutive points set on the same slope shall be used together so that any variation from a straight grade can be detected. Any such variation shall be reported to the Engineer. In the absence of such report, the Contractor shall be responsible for any error in the grade of the finished work.
 - (a) Areas having drainage gradients of 2 percent or more shall have elevation stakes, set with instrument, at grid intervals of 25 feet. Intermediate stakes may be set by using a tightly-drawn string line over the tops of adjacent stakes. Grade stakes must be set at all grade breaks, grade changes, etc.
 - (b) Areas having drainage gradients of less than 2 percent shall have elevation stakes, set with instrument, at 10 foot intervals. Grade stakes must be set at all grade breaks, grade changes, etc.
 - (c) Protect and maintain stakes in place until their removal is approved by the Owner. Grade or location stakes lost or disturbed by Contractor, shall be reset by the Surveyor at the expense of Contractor.

E. STORM DRAIN & SANITARY SEWER PIPE INSTALLATION

- 1. A. All storm drain pipelines, sanitary sewer pipelines, trench drains, catch basins, cleanouts and drain inlets shall be staked by a licensed surveyor if slope of grade is less than 2% and a complete set of cut sheets shall be supplied to the inspector. All construction staking shall be installed and verified for grade and alignment prior to the start of construction.
- 2. RECORD DRAWINGS
- 3. Upon Substantial Completion, CONTRACTOR shall obtain and pay for reproducible transparencies of the as built survey drawings. Deliver to ARCHITECT, final "record" drawings of the original drawings and completed
- 4. within specified tolerances.
 - a. Record drawings shall indicate locations by coordinate of all utilities onsite with top of pipe elevations at major grade and alignment changes, rim grate or top-of curb and flow line elevations of all drainage structures and manholes.
 - b. Completed record drawing transparencies shall be signed and certified as correct and within specified tolerances by the licensed surveyor.
 - c. Attention is called to other sections of the Contract Documents requiring verification or measurements of installed Work by survey. Surveyor shall perform and certify all such surveys or verification are completed in accordance with the Contract Documents.

**SECTION 02 41 00
SELECTIVE DEMOLITION**

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED REQUIREMENTS

1.03 DEFINITIONS

- A. Demolition: Dismantle, raze, destroy or wreck any building or structure or any part thereof.
- B. Remove: Detach or dismantle items from existing construction and dispose of them off site, unless items are indicated to be salvaged or reinstalled.
- C. Remove and Salvage: Detach or dismantle items from existing construction in a manner to prevent damage. Clean, package, label and deliver salvaged items to Owner in ready-for-reuse condition.
- D. Remove and Reinstall: Detach or dismantle items from existing construction in a manner to prevent damage. Clean and prepare for reuse and reinstall where indicated.
- E. Existing to Remain: Designation for existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

1.04 REFERENCE STANDARDS

- A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2022, with Errata (2021).

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 DEMOLITION

- A. Remove portions of work as indicated on the drawings and as required to accomplish new work.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 - 1. Obtain required permits.
 - 2. Take precautions to prevent catastrophic or uncontrolled collapse of work to be removed.
 - 3. Provide, erect, and maintain temporary barriers and security devices.
 - 4. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
 - 5. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
 - 6. Conduct operations to minimize obstruction of public and private entrances and exits. Do not obstruct required exits at any time. Protect persons using entrances and exits from removal operations.
- B. Do not begin removal until receipt of notification to proceed from Owner.
- C. Protect existing structures and other elements to remain in place and not removed.
- D. Minimize production of dust due to demolition operations.
- E. Hazardous Materials:

1. If hazardous materials are discovered during removal operations, stop work and notify Owner; hazardous materials include regulated asbestos containing materials, lead, PCBs, and mercury.

3.03 EXISTING UTILITIES

- A. Protect existing utilities to remain from damage.
- B. Do not disrupt public utilities without permit from authority having jurisdiction.
- C. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.
- D. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Existing construction and utilities indicated on drawings are based on casual field observation and existing record documents only.
 1. Verify construction and utility arrangements are as indicated.
 2. Report discrepancies to Architect before disturbing existing installation.
 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Separate areas in which demolition is being conducted from areas that remain occupied.
- C. Maintain weatherproof exterior building enclosure, except for interruptions required for replacement or modifications; prevent water and humidity damage.
- D. Remove existing work as indicated and required to accomplish new work.
- E. Services including, but not limited to, HVAC: Remove existing systems and equipment as indicated.
 1. Maintain existing active systems to remain in operation, and maintain access to equipment and operational components.
 2. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings. Remove back to source of supply where possible, otherwise cap stub and tag with identification.
- F. Protect existing work to remain.
 1. Perform cutting to accomplish removal work neatly and as specified for cutting new work.
 2. Repair adjacent construction and finishes damaged during removal work.
 3. Patch to match new work.

3.05 DEBRIS AND WASTE REMOVAL

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

END OF SECTION

Section 02770
SITE CONCRETE WORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Provisions of Division 01 apply to this section.
- B. Section Includes:
 - 1. Portland cement concrete pavement, cement walks, curbs, gutters, trash pick-up area, ramps, mowing strips, fence post footings, sliding gate concrete tracks, catch basins, pipe bedding and encasements, thrust blocks, transition structures, flagpoles and light standard bases and footings, athletic equipment footings and equipment pads.
- C. Related Sections:
 - 1. Section 02310: Grading.
 - 2. Section 02315: Excavating, Backfilling and Compacting.
 - 3. Section 02316: Excavating, Backfilling and Compacting for Pavement.
 - 4. Section 02319: Base Course.
 - 5. Section 02510: Site Water Distribution Systems.
 - 6. Section 02530: Site Sanitary Sewer Systems.
 - 7. Section 02630: Storm Drainage Systems.
 - 8. Section 02765: Pavement Repair.
 - 9. Section 02821: Chain Link Fences and Gates.
 - 10. Section 03200: Concrete Reinforcement.
 - 11. Division 15: Mechanical.
 - 12. Division 16: Electrical.

1.2 SUBMITTALS

- A. Shop Drawings: Submit plans, elevations and details of concrete site Work.
- B. Product Data: Submit mix designs and manufacturer's technical data for materials and products. Submit 3" x 3" concrete Sample of each specified color.

Section 02770
SITE CONCRETE WORK

- C. Material Sample: Submit one concrete bumper to the PI for destructive testing.

1.3 QUALITY ASSURANCE

- A. Comply with Standard Specifications For Public Works Construction.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Concrete, Mortar and Related Materials: Comply with applicable provisions of Standard Specifications for Public Works Construction, Section 201 - Concrete, Mortar and Related Materials:
1. Concrete: 28-day compressive strength 2,500 psi, unless specified otherwise.
 2. Reinforcing Mesh: ASTM A 185, 4x4/W1.4 x W1.4 welded wire mesh.
 3. Expansion Joint Filler: Preformed expansion joint filler, bituminous type, complying with ASTM D 994.
- B. Form Materials:
1. Side forms: Douglas fir, Construction Grade or Better or metal forms.
 2. Stakes: Douglas fir, Construction Grade or Better or metal stakes.
- C. Concrete Parking Bumpers:
1. Precast concrete, smooth and free of pits and rock pockets, providing a minimum 28-day compressive strength of 3,500 psi. Size at least 7-1/2 inches wide, 5-1/2 inches high and 6 feet long. Reinforce with 2 #5 reinforcing bars. Provide 2-3/4 inch diameter pre-drilled holes for anchor installation.
 2. Bumper Anchors: Provide 1/2-inch diameter x 18-inch long galvanized steel pipe.
 3. Bumper Adhesive: Provide adhesive recommended by bumper manufacturer/installer for fastening bumpers to concrete pavement.

PART 3 - EXECUTION

3.1 CONSTRUCTION OF FORMS FOR CAST-IN-PLACE STRUCTURES

- A. Concrete Pavement: Install Portland cement concrete pavement in compliance with the Standard Specifications for Public Works Construction, Section 302-Roadway Surfacing.

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SITE CONCRETE WORK

- B. Miscellaneous Exposed Concrete: Install concrete curbs, walks, gutters, cross gutters, access ramps, driveways, catch basins, yard boxes, vaults and similar structures, in compliance with the Standard Specifications for Public Works Construction, Section 303 - Concrete and Masonry Construction.
- C. Exposed Concrete Bases: Install bases, such as for post, flagpole, light standards and similar bases, in compliance with the Standard Specifications for Public Works Construction, Section 303 - Concrete and Masonry Construction.
- D. Post, flagpole, light standard footings below grade, underground conduit bedding, encasements, thrust blocks and similar structures may be placed \directly in excavations conforming to the required sizes.
- E. Reinforcement installation and concrete placement, surface finishes, curing and removal of forms shall be performed in compliance with applicable provisions of Standard Specifications for Public Works Construction, Section 303 - Concrete and Masonry Construction. Provide heavy broom finish at slopes exceeding six (6) percent and medium broom finish at slopes up to six (6) percent.

3.03 CLEAN UP

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

3.04 PROTECTION

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

END OF SECTION

**SECTION 03200
CONCRETE REINFORCEMENT**

Part 1 GENERAL

1.1 SECTION INCLUDES

- A.** Reinforcing steel bars and accessories for cast-in-place concrete.
- B.** Related Sections:
 - 1. Section 01420: Testing and Inspection.
 - 2. Section 03100: Concrete Formwork.
 - 3. Section 03300: Cast-In-Place Concrete.

1.2 REFERENCES

- A.** ACI 315 - Details and Detailing of Concrete Reinforcing.
- B.** ACI 318 - Building Code Requirements for Reinforced Concrete.
- C.** ASTM A82 - Standard Specification for Steel Wire, Plain, For Concrete Reinforcement.
- D.** ASTM A184 - Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
- E.** ASTM A185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
- F.** ASTM A496 - Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
- G.** ASTM A497 - Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
- H.** ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
- I.** ASTM A706 - Standard Specification for Low-Alloy Steel Deformed Bars for Concrete

**SECTION 03200
CONCRETE REINFORCEMENT**

Reinforcement.

- J.** AWS D1.4 - Structural Welding Code for Reinforcing Steel.
- K.** CRSI - Concrete Reinforcing Steel Institute Manual of Practice.
- L.** Chapter 19A, California Building Code.

1.3 SUBMITTALS

- A.** Shop Drawings: Submit steel reinforcement Shop Drawings in accordance with ACI 315. Include assembly diagrams, bending charts and slab plans. Indicate lengths and location of splices, size and lengths of reinforcing steel.
- B.** Closeout Submittals: Record exact locations of reinforcing that vary from Shop Drawings.

1.4 QUALITY ASSURANCE

- A.** Provide Testing Laboratory with access to fabrication plant to facilitate inspection of reinforcement. Provide notification of commencement and duration of shop fabrication in sufficient time to allow inspection.
- B.** Comply with the following as a minimum requirement:
 - 1. Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice.
 - 2. American Welding Society (AWS)
 - 3. American Concrete Institute (ACI)
 - 4 CBC, Chapter 19A, Concrete
- C.** Source Quality Control: Refer to Division 01 Sections for general requirements and to the following paragraphs for specific procedures. Testing laboratory retained by the Owner shall select test Samples of Bars, ties, and stirrups from the material at the Project Site or from the place of distribution, with each Sample consisting of not less than two 18 inch long pieces, and perform the following tests according to ASTM A615, or ASTM A706, as applicable:
 - 1. Identified Bars: If Samples are obtained from bundles as delivered from the mill,

**SECTION 03200
CONCRETE REINFORCEMENT**

identified as to heat number, accompanied by mill analyses and mill test reports, and properly tagged with the identification certificate so as to be readily identified, perform one tensile and one bend test for each 10 tons or fraction thereof of each size of bars. Submit mill reports when Samples are selected.

2. Unidentified Bars: When positive identification of reinforcing bars cannot be performed and when random Samples are obtained; perform tests for each 2.5 tons or fraction thereof, one tensile and one bend test from each size of bars.

- D.** Certification of Welders: Shop and project site welding shall be performed by welding operators certified by AWS.

1.5 DELIVERY, STORAGE AND HANDLING

- A.** Avoid exposure to dirt, moisture or conditions harmful to reinforcing material.
- B.** Reinforcing steel bars, wire, and wire fabric shall be stored on the Project site to permit easy access for examination and identification of each shipment. Material of each shipment shall be separated for size and shape.

1.6 COORDINATION

- C.** Coordinate with placement of formwork, formed openings and other Work.

Part 2 PRODUCTS

2.1 MATERIALS

- A.** Reinforcing Steel: ASTM A 615, or ASTM A706, 60 yield grade deformed low alloy steel for No. 4 bars or larger; 40 yield grade, No. 3 bars for ties and stirrups. Conform to Section 1903A, California Building Code 19A.
- B.** Welding Electrodes: Low Hydrogen grade E70XX for Grade 40, E90XX for Grade 60.

2.2 ACCESSORY MATERIALS

- A.** Tie Wire: Minimum 16 gage black annealed type.
- B.** Chairs, Bolsters, Bar Supports, and Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions.
- C.** Special Chairs, Bolsters, Bar Supports, and Spacers Adjacent to Weather Exposed

**SECTION 03200
CONCRETE REINFORCEMENT**

Concrete Surfaces: Plastic coated steel type; size and shape as required.

- D.** Concrete Blocks: Approximately 3 inches dimension each side.

2.3 FABRICATION

- A.** Fabricate concrete reinforcing in accordance with CRSI Manual of Practice and ACI 315 and ACI 318. Wherever possible, make bends to shape in fabricator's shop.
- (1)** Bars reduced in section will not be accepted.
 - (2)** Bars with kinks are unacceptable.
 - (3)** Bars shall not be heated to facilitate bending or for any other purpose.
 - (4)** Bars with bends not indicated on drawings will not be accepted. Perform no forming in a manner which will damage bars.
- B.** Weld reinforcement in accordance with AWS D1.4.
- C.** Locate reinforcing splices not indicated on Drawings at point of minimum stress.

Part 3 EXECUTION

3.1 PLACEMENT

- A.** Place, support and secure reinforcement against displacement. Do not deviate from required position. Install concrete blocks to support reinforcement over grade. Smooth face rocks not permitted.
- B.** Do not displace or damage vapor barrier where vapor barrier is specified or indicated on drawings.
- C.** Accommodate placement of formed openings.
- D.** Prior to placing, thoroughly clean reinforcement of all rust, dirt, dust, oil or any other material deleterious to bonding of concrete.
- E.** Accurately place and securely tie reinforcement at all intersections and splices with black annealed wire and securely hold in position during placing of concrete by means of precast concrete block supports. Point wire tie ends away from the form. Unless otherwise indicated, the number, type, and spacing of supports shall conform to the ACI 315.

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CONCRETE REINFORCEMENT**

- F.** During placing of structural concrete slabs, provide a full-time reinforcing steel placer to repair and replace reinforcing to its proper location. Provide additional chairs of the proper size available to place under bars displaced during the concrete pouring operation.
- G.** Dowels for Walls: Securely tie in place prior to placing of concrete. Do not place dowels in concrete after pour.
- H.** Dowels for Slabs: Securely tie in place prior to placing concrete. Per Plans or Drawings. Do not place dowels in concrete after pour.
- I.** Conform to Section 1907A, California Building Code for concrete cover over reinforcement.

3.2 CLEAN UP

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

3.3 PROTECTION

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

END OF SECTION

**SECTION 03300
CAST-IN-PLACE CONCRETE**

Part 1 GENERAL

1.1 WORK INCLUDED

- A.** Provisions of Division 01 apply to this section.
- B.** Sections Includes:
 - 1. Cast-in-place normal weight and lightweight concrete, placement and finishing.
- C.** Related Sections:
 - 1. Section 02770: Site Concrete Work.
 - 2. Section 03100: Concrete Forms and Accessories.
 - 3. Section 03200: Concrete Reinforcement.

1.2 REFERENCES

- A.** American Concrete Institute (ACI) Publication:
 - 1. ACI 117-Specifications for Tolerances for Concrete Construction and Materials.
 - 2. ACI 301-Specifications for Structural Concrete.
 - 3. ACI 302.1R-Guide for Concrete Floor and Slab Construction.
 - 4. ACI 305.1-Specification for Hot Weather Concreting.
 - 5. ACI 306.1-Standard Specification for Cold Weather Concreting.
 - 6. ACI 318-Building Code Requirements for Structural Concrete, as modified by CBC Sections 1903A and 1908A.
- B.** American Society for Testing and Materials (ASTM) Standards:
 - 1. ASTM C31-Standard Specification for Making and Curing Concrete Test Specimens in the Field.
 - 2. ASTM C33-Standard Specification For Concrete Aggregates.
 - 3. ASTM C39-Standard test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - 4. ASTM C42-Standard Test Method For Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

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CAST-IN-PLACE CONCRETE**

5. ASTM C88-Standard Test Method for Soundness of Aggregates by use of Sodium Sulphate or Magnesium Sulphate.
6. ASTM C94-Standard Specification for Ready-Mixed Concrete.
7. ASTM C143-Standard Test Method for Slump of Hydraulic Cement Concrete.
8. ASTM C150-Standard Specification for Portland Cement.
9. ASTM C171 -Standard Specification for Sheet Materials for Curing Concrete.
10. ASTM C172-Standard Practice for Sampling Freshly Mixed Concrete.
11. ASTM C173-Standard Test Method for Air Content for Freshly Mixed Concrete by the Volumetric Method.
12. ASTM C260-Standard Specification for Air-Entraining Admixtures for Concrete.
13. ASTM C289-Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method).
14. ASTM C309 - Liquid Membrane - Forming compounds for Curing Concrete.
15. ASTM C330-Standard Specification for Lightweight Aggregates for Structural Concrete.
16. ASTM C494-Standard Specification for Chemical Admixtures for Concrete.
17. ASTM C567-Standard Test Method for Determining Density of Structural Lightweight Concrete.
18. ASTM C618-Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
19. ASTM C845-Standard Specification for Expansive Hydraulic Cement.
20. ASTM C856 - Practice for Petrographic Examination of Hardened Concrete.
21. ASTM C989-Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.
22. ASTM C1064-Standard Test Method from Temperature of Freshly Mixed Hydraulic-Cement Concrete.
23. ASTM C1107-Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).

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24. ASTM C1240-Standard Specification for Silica Fume Used in Cementitious Mixtures.
25. ASTM C1567-Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combination of Cementitious Materials and Aggregate. (Accelerated Mortar-Bar Method)
26. ASTM D1751-Standard Test Method for Performed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
27. ASTM E96-Standard Test Methods for Water Vapor Transmission of Materials.
28. ASTM E1155-Standard Test Method for Determining Floor Flatness and Floor Levelness Numbers.
29. ASTM E1643-Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
30. ASTM E1745-Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

1.3 SUBMITTALS

- A.** Shop Drawings: Submit shop Drawings indication locations of cast-in-place concrete work and accessory items such as vapor barriers. Include details and location of reinforcing, embedded items, and interfacing with other Work.
- B.** Mix Design Data: Submit concrete mix designs as specified herein and in Article 2.02.
 1. Submit name, address and telephone number of the concrete production facility which the contractor intends to engage to design the concrete mixes. Submit name and qualifications of the proposed concrete technologist.
 2. Mix Design: Submit a concrete mix design for each strength and type of concrete indicated in the drawings or specified. Include water/cement ratio, source, size and amount of coarse aggregate and admixtures. Predict minimum compressive strength, maximum slump and air content percentage. Clearly indicate locations where each mix design will be used.
 3. Test Reports: Submit Copies of test reports showing that the proposed mixes produce concrete with the strengths and properties specified. Include tests for cement, aggregates and admixtures. Provide gradation analysis.
- C.** Material Samples: Submit Samples illustrating concrete finishes and hardeners,

**SECTION 03300
CAST-IN-PLACE CONCRETE**

minimum 12 X 12 inches in size.

- D.** Certificates: Submit certification that each of the following conforms to the standards indicated:
1. Portland cement: ASTM C150
 2. Normal weight concrete aggregates: ASTM C33.
 3. Lightweight concrete aggregates: ASTM C330
 4. Aggregates: Submit evidence that the aggregate is not reactive in the presence of cement alkalis. In the absence of evidence, aggregate shall be tested per ASTM C289. If results of test are other than innocuous, aggregates shall be tested per ASTM C1567 as required by CBC, Section 1903A.
 5. Curing materials: ASTM C171.
- E.** Admixtures: Submit product data for proposed concrete admixtures.

1.4 Quality Assurance

- A.** Continuous inspection shall be provided at the batch plant and for transit-mixed concrete to run check sieve analysis of aggregate, check moisture content of fine aggregate, check design of mix, check cement being used with test reports, check loading of mixer trucks, and certify to quantities of materials placed in each mixer truck.
- B.** Inspection shall be performed by a representative of a DSA approved testing laboratory selected by the Owner. Owner will pay for inspection costs. Notify the laboratory 24 hours in advance of time concrete is to be mixed. Notify the laboratory of postponement or cancellation of mixing within at least 24 hours of scheduling time.
- C.** Contractor shall assist the testing laboratory in obtaining and handling samples at the project site and at the source of materials.
- D.** Continuous batch plant inspection requirement may be waived in accordance with CBC Section 1704A4.4. Waiver shall be in writing, including DSA approval. When batch plant inspection is waived by DSA, the following requirements shall be met:
1. Approved inspector of the testing laboratory shall check the first batching at the start of work and furnish mix proportions to the licensed weighmaster.
 2. Licensed weighmaster shall positively identify materials as to quantity and certify to each load by a ticket.
 3. Tickets shall be transmitted to the PI by a truck driver with load identified

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thereon. The PI will not accept the load without a load ticket identifying the mix and will keep a daily record of placements, identifying each truck, its load and time of receipt and approximate location of deposit in the structure and will transit a copy of the daily record to DSA.

4. At the end of the project, the weightmaster shall furnish an affidavit to DSA certifying that all concrete furnishes conforms in every particular to proportions established by mix designs.
- E. Special Inspections and Test shall be in accordance with CBC Chapter 17A, CBC Section 1916A and Specification Section 01420.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Store cement and aggregate materials so as to prevent their deterioration or intrusion by foreign matter, Deteriorated or contaminated materials shall not be furnished.
- B. Packaged materials shall bear the manufacturers and brand name label, and shall be stored in their original unbroken package in a weather tight place until ready for use in the work.

1.6 PROJECT CONDITIONS

- A. Cold Weather Requirements: Batching, mixing, delivering and placing of concrete in cold weather shall comply with the applicable requirements of ACI 306.1.
- B. Hot Weather Requirements: Batching, Mixing, delivering and placing of concrete in hot weather shall comply with the applicable requirements of ACI 305R.
- C. Concrete temperature of freshly mixed concrete shall be determined per ASTM C1064.

Part 2 PRODUCTS

2.1 MATERIALS

- A. Cement: ASTM C150, Portland cement.
- B. Aggregates: Conform to the following standards:
 1. Normal weight concrete: ASTM C33
 2. Lightweight concrete: ASTM C330, with fine aggregates per ASTM C33.
 3. Aggregate shall be tested for Potential Alkali Reactivity of Cement-Aggregate Combinations per ASTM C289.

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CAST-IN-PLACE CONCRETE**

4. Nominal maximum size of course aggregate shall be no larger than:
- a. $1/5^{\text{th}}$ the narrowest dimension between sides of forms, nor
 - b. $1/3^{\text{rd}}$ the depth of slabs, nor
 - c. $3/4$ the clear spacing between individual reinforcing bars or wires, of bars, individual tendons, or ducts.
 - d. Contractor may request the Architect and DSA waiver of the above limitations per CBC Section 1903 A.3, provided that the workability and methods of consolidation are such that the concrete can be placed without honeycombs or voids.
- bundles
- C.** Water: Water for concrete mixes, curing and cleaning shall be potable and free from deleterious matter.
- D.** Admixtures: Shall be shown capable of maintaining essentially the same composition and performance throughout the work as the product used in establishing concrete proportions in accordance with ACI 318, Section 3.6.
- 1. Admixtures containing chlorides or sulfides are not permitted.
 - 2. Air-entering admixtures shall comply with ASTM C260, Air-entrained admixtures shall not be used for floor slabs to receive steel trowel finish.
 - 3. Admixtures for water reduction and setting time modification shall conform to ASTM C494.
 - 4. Admixtures for producing flowing concrete shall conform to ASTM C1017.
 - 5. Fly ash, pozzolan and ground granulated blast-furnace slag: Modify ACI 318 Sections 3.6.6 and 3.6.7 as follows:
 - a. Fly ash or other pozzolan used as a partial substitution for ASTM C150 Portland cement shall meet the following requirements:
 - 1) Shall conform to ASTM C618 for Class N or F materials (Class C is not permitted).
 - 2) [] percent by weight of fly ash or other pozzolans shall substitute for

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ASTM C150 Portland Cement Provided the mix design is proportioned per Section 1905A.3 and the durability requirements of Section 1904A are met.

- b. Ground-granulated blast-furnace slag used as a partial substitution for ASTM C150 Portland cement shall meet the following requirements:
 - 6. Admixtures containing ASTM C845 expansive cements shall be compatible with the cement and produce no deleterious effects.
 - 7. Silica fumes used as an admixture shall conform to ASTM C1240.
- E.** Reinforcement Fibers: Chop strands of alkali-resistant polypropylene or nylon fibers added to the concrete mix for protection against shrinkage cracks.
- F.** Expansion Joint Fillers: Performed strips, non-extruding and resilient bituminous type, of thickness indicated, conforming to ASTM D1751.
- G.** Curing Paper: Shall conform to ASTM C171 and consist of two sheets of kraft paper cemented together with a bituminous material in which are embedded cords or strands of fiber running in both directions. The paper shall be light in color, shall be free of visible defects, with uniform appearance.
- H.** Floor Hardener: Water soluble, inorganic, silicate-based curing, hardening, sealing and dustproofing compound. Aquaseal W20 by Monopole Inc., Kure-N-Harden by BASF, Chem Hard by L&M, Liqui-Hard by W. R. Meadows, or equal.
- I.** Underlayment: Two component latex underlayment for filling low spots in concrete for both interior and exterior applications, from feathered edge to maximum of 3/8th inch in thickness. Underlayment shall be non-shrink and suitable for repairing exposed coverings. La_O_Test by Tex Rite, Underlay C or RS by Mer-Krete Systems, Underlayment 962 by C-Cure, or equal.
- J.** Vapor Barrier: Polyolefin-based 15 mils minimum thickness, meeting or exceeding ASTM E1745, 10 feet minimum width. Permeance shall be less than 0.01 perms [grain/(ft²*hr*inHg)] as determined by ASTM E96 or ASTM F1249 and after mandatory conditioning test per ASTM E154 Sections 8, 11, 12, & 13. Include accessories including tape and/or mastic. Stego Wrap by Stego Industries LLC or Perminatory by W.R. Meadows, Ecoshield-E by Epro, or equal.
- K.** Stairs Strips and Nosing:
 - 1. Fabricated from 6063-T5 extruded aluminum, mill finish, Anti-slip filler shall contain at least 60 percent virgin grain aluminum oxide abrasive. Binder shall be fully cured resilient type epoxy, with binder-to filler ratio of 13 percent. The epoxy-abrasive filler shall extend over the curved front edge of the nosing and shall be securely bonded to the extruded aluminum base.

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2. Manufactured by Wooster Products Inc. American Safety Tread Co. Inc., or equal.
3. Nosing and strips for concrete casting shall be provided with Sure-Hold Anchors, chevron shaped continuous full length of nosing or strip.
4. Nosing and anchors for attachments to hydrated concrete stairs and wood stairs shall be similar to those specified below, except they shall be provided with countersunk holes for screws and fasteners.
5. Colors: As selected by Architect to contrast with stair color. Colors shall extend uniformly through the filler.
6. Strip and Nosing Types:
 - a. Nosings for sloped riser steel pan stairs Type WP4J, 4-1/16th inches wide, 3/8th inch thick.
 - b. Nosings for new concrete stairs: Type WP4C, 4-1/16th inches wide, 3/8th inch thick, nose projects down 1/4 inch.
 - c. Nosings for square edge steel pan stairs: Type WP4SP, 4-1/16th inches wide, 3/8th inch thick nose.
 - d. Strips for recessing into concrete stairs: Type WP1A, except 2-1/4 inches wide, 3/8 inch thick. American Safety Tread Co., Type 24, or equal.
 - e. Strips for adhering to existing or hydrated concrete: Flex-Tred anti-safety strips, minimum 2-1/4 inches wide. Cut from rolls and round corners.
 - f. Strips for anchoring into wood or stone: American Safety Tread Co., Type t-24H, or equal, with holes for fasteners, 2-1/4 inches wide.
- L. Grout: ASTM C1107, non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 7,000 psi at 7 days; of consistency suitable for application and a 30 minute working time.

2.2 CONCRETE MIX

- A. Mix shall be signed and sealed by a Civil or Structural Engineer currently registered in the State of California.
- B. Strength of Concrete: Strengths and types of concretes shall be as indicated in the Drawings. Unless otherwise indicated or specified, concrete shall be provided with a minimum 28-day strength of 3000 psi (fc).

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- C.** The required strength and durability of concrete shall be determined by compliance with the proportioning, testing, mixing and placing provisions of CBC Sections 1905A.1 through 1905A.13. Concrete mix shall meet the durability requirements of ACI 318, Chapter 4.
- D.** Concrete proportioning shall be determined on the basis of field experience and/or trial mixtures shall in accordance with ACI 318, Section 5.3. Proportions of materials shall provide workability and consistency to permit concrete to be placed readily into forms and around reinforcement under conditions of placement to be employed, without segregation or excessive bleeding.
- E.** Ready-Mixed Concrete: Mix and deliver in accordance with requirements of ASTM C94.

Part 3 EXECUTION

3.1 GENERAL

- A.** Surfaces to receive concrete shall be free of debris, standing water, and any other deleterious substances before start of concrete placing.
- B.** Time of Placing: Do not place concrete until reinforcement, conduits, outlet boxes, anchors, hanger, sleeves, bolts, and other embedded materials are securely fastened in place. Contact the PI at least 24 hours before placing concrete; do not place concrete until inspected by PI.
- C.** Pouring Record: a record shall be kept on the Project site of time and date of placing concrete in each portion of structure. Such record shall be maintained on the Project site until Substantial Completion and shall be available for examination by the Architect and DSA.

3.2 TOLERANCES

- A.** Concrete construction tolerances shall be as specified in ACI 117 and as modified herein.
- B.** Floor Flatness (F_F) and Floor Levelness (F_L) shall be indicated below:

	Specified Overall Value		Minimum Local Value	
	F_F	F_L	F_F	F_L
Slabs on Ground: mechanical and electrical rooms, parking structures and mortar bed set tile and quarry flooring.	20	15	15	10
Slab on ground: carpet.	25	20	17	15
Slab on Ground: thinset tile and resilient flooring	35	25	24	17
Suspend slabs: mechanical and electrical rooms, parking structures and mortar bed set tile and quarry flooring.	20	15	N/A	N/A

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Suspend slabs: carpet.	25	20	N/A	N/A
Suspend slabs: thinset tile and resilient flooring.	35	20	N/A	N/A

- C.** Refer to ACI 302.1R, Tables 8.1 and 8.2 Slab on Ground and Suspend Flatness/Levelness Construction Guide, for recommended concrete placing and finishing methods.
- D.** Floor Flatness and Floor Levelness shall be tested in accordance to ASTM E1155. Floor measurements shall be made within 48 hours after slab installation, and shall precede removal of shores and forms.

3.3 PREPARATION

- A.** Vapor Barrier: Before Installation of screeds and slab reinforcement, install vapor barrier under slabs on grade, as indicated in the drawings.
 - 1. Install in accordance to ASTM E1643.
 - 2. Place vapor retarder sheeting with the longest dimension parallel with the direction of the concrete pour.
 - 3. Laps or seams shall be overlapped 6 inches, or as recommended by manufacturer. Laps and penetrations shall be sealed with the manufacturer's recommended tape and/or mastic.
 - 4. PI will inspect and mark areas of damage and insufficient installation of the vapor barrier sufficiently in advance of concrete placement.
 - a. Deficiencies shall be corrected before concrete is placed.
 - b. Patch damaged areas with vapor barrier overlapping all four sides 6 inches and adhering with tape.
- B.** Reglets and Rebates:
 - 1. Form reglets and rebates in concrete to receive flashing, frames and other equipment as detailed and required. Coordinate dimensions and locations required with other related Work.
 - 2. If concrete slabs on grade adjoin a wall or other perpendicular concrete surface, form a reglet in wall to receive and carry horizontal concrete Work. Reglet shall be full thickness of the slab and shall be $\frac{3}{4}$ inch wide, unless otherwise indicated. Requirement does not apply to exterior walks, unless specifically indicated.

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- C.** Anchor Slots: Embedded anchor slots in concrete walls to receive masonry veneer shall be set vertically in forms, 24 inches maximum on centers measured horizontally; Anchor slots shall be No. 24 gage galvanized sheet steel with removable fiber filler to prevent seepage of cement in slot.
- D.** Screeds: Install screeds accurately and maintain in required grade or slab elevations after steel reinforcement has been installed, but before starting to place concrete. Install screeds adjacent to walls and in parallel rows not to exceed 8 feet on centers.

3.4 INSTALLATION

A. Conveying and Placing:

- 1.** Concrete shall be placed only under direct observation of the PI. Do not place concrete outside of regular working hours, unless the PI has been notified at least 48 hours in advance.
- 2.** Concrete shall be conveyed from mixer to location of final placement by methods that will prevent separation or loss of materials.
- 3.** Concrete shall be placed as nearly as practicable to its final position to avoid segregation due to re-handling or flowing. No concrete that has partially hydrated or has been contaminated by foreign materials shall be placed, nor shall re-tempered concrete or concrete which has been remixed after initial set be placed.
- 4.** In placing concrete in columns, walls or thin sections, provide openings in forms, elephant trunks, tremies or other recognized devices, to prevent segregation and accumulation of partially hydrated concrete on forms or metal reinforcement above level of concrete being placed. Such devices shall be installed so that concrete will be dropped vertically. Unconfined vertical drop of concrete from end of such devices to final placement surface shall not exceed 6 feet.
- 5.** Concrete shall be placed as a continuous operation until placing of panel or section is completed. Top surfaces of vertically formed lifts shall be level.
- 6.** Concrete shall be thoroughly consolidated by suitable means during placement, and shall be thoroughly worked around reinforcement and embedded fixtures and into corners of forms.
- 7.** Where conditions make consolidation difficult or where reinforcement is congested, batches of mortar containing some proportions of cement, sand, and water as provided in the concrete, shall first be deposited in the forms to a depth of at least one inch.

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B. Cold Weather:

1. Provide adequate equipment for heating concrete materials and protecting concrete during freezing or near-freezing weather. All ground with which concrete is to come in contact shall be free from frost. No frozen materials or materials containing ice shall be used.
2. The temperature of concrete at the time of placement shall not below the minimum temperatures given in Table 3.1 of ACI 306.1.
3. Concrete shall be maintained at a temperature of at least 50°F. for not less than 72 hours after placing or until it has thoroughly hardened. Cover concrete and provide sufficient heat as required. When necessary, aggregates shall be heated before mixing. Special precautions shall be taken for protection of transit-mixed concrete.

C. Hot Weather:

1. Concrete to be placed during hot weather shall comply with the requirements of ACI 318, Section 5.13.
2. Maintain concrete temperatures indicated in Table 2.1.5 of ACI 305R to prevent the evaporation rate from exceeding 0.2 pound of water per square feet of exposed concrete per hour.
3. Cool Concrete using methods indicated in ACI 305R Appendix B.
4. Place and cure concrete as specified in ACI 305R Chapter 4.

D. Compaction and Screeding:

1. Tamp freshly placed concrete with a heavy tamper until at least 3/8 inch of mortar is brought to surface. Concrete shall then be tamped with a light tamper and screeded with a heavy straightedge until depressions and irregularities are eliminated, and surface is true to finish grades or elevations. Remove excess water and debris.
2. Where slabs are to receive separate cement finish or mortar setting bed, continued tamping to raise mortar to surface is not performed. Laitance shall be removed by brushing with a stiff brush or by light sandblasting to expose clean top surface of course aggregate.

E. Floating and Troweling:

1. When concrete has hydrated sufficiently, it shall be floated to a compact and smooth surface. After floating, wait until concrete has reached proper consistency before troweling. Top surfaces shall receive at least 2 troweling operations with steel hand trowel. Prior to and during final troweling, apply a fine mist of water

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frequently with an atomizing type fog sprayer. Omit troweling for slabs to receive a separate cement finish.

2. For interior finish slabs, final troweling shall provide a hard, impervious, and non-slip surfaces, free from defects and blemishes. Finished surface shall be within tolerances indicated in Article 3.02. Avoid burnishing. Do not add cement or sand to absorb excess moisture.
 - a. Floor of Walk-In Refrigerator: Finish as specified above, to a smooth finish.
3. Floor of Gymnasium Locker Rooms: After floating, and while the surface is still plastic, provide a fine textured finish by drawing a fine fiber bristle broom uniformly over the surface in one direction only. Floors sloped for drainage should be brushed in the direction of flow.
4. Exterior Paving and Cement Walks: Finish as specified above, except surface shall be given a non-slip broom finish to match Sample reviewed by the Architect.
5. Vertical concrete surfaces shall be finished smooth and free from marks or other surface defects.

F. Curing Materials:

- 1 Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- 2 Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
- 3 Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- 4 Water: Potable.
- 5 Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
- 6 Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding offloor covering.
- 7 Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
 - a. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- 8 Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

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- a. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

G. Filling, Leveling and Patching:

- 1. Concrete slabs exhibiting high or low spots and indicated to receive resilient floor covering or soft floor covering, shall have surfaces repaired. High spots shall be honed, or ground with power-driven machines to required tolerances. Low spots shall be filled with latex underlayment, installed in strict accordance with manufacturer's written recommendations.
- 2. Holes resulting from form ties or sleeve nuts shall be solidly packed, through exterior walls, by pressure grouting with cement grout, as specified. Grouted holes on exposed surfaces shall be screeded flush and finished to match adjoining surfaces.

- H. Cement Base:** Cement base shall be of the height, thickness, and shape detailed. Base shall be reinforced with one inch mesh, 18 gage, zinc-coated wire fabric. Base finish mixture shall be one part Portland cement, 2 parts of fine aggregate and one part pea gravel. Colored cement base shall include a chemically inert mineral oxide pigment in the mix.

3.5 FINISHING

- A. Soda and Acid Wash:** Concrete surfaces to receive plaster, paint or other finish, and which have been formed by oil coated forms, shall be scrubbed with a solution of 1-1/2 pounds of caustic soda to one gallon of water. Surfaces where smooth wood or waste molds have furnished shall be scrubbed with a solution of 20 percent muriatic acid. Wash with clean water after scrubbing.
- B. Sacking:** exposed concrete curbs, walls, and other surfaces shall be sacked by an application of Portland cement grout, floated, and rubbed. Sacking shall not be performed until patching and filling of holes has been completed. Entire sacking operation for any continuous area shall be started and completed within the same day.
- 1. Mix one part Portland cement and 1-1/2 parts fine sand with sufficient water to produce a grout having a consistency of thick paint. Wet surface of concrete sufficiently to prevent absorption of water from the grout. Apply grout uniformly with a brush or spray gun, then immediately float surface with a cork or other suitable float, scouring wall vigorously.
 - 2. While grout is still plastic, finish surface with a sponge-rubber float, removing excess grout. Allow surface to dry thoroughly, and then rub vigorously with dry burlap to completely remove dried grout. No visible file or grout shall remain after rubbing with burlap.

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- C.** Sandblasting; Exterior concrete surfaces to receive stucco dash coat finish, where ply wood or other smooth forms have been furnished, shall be uniformly sandblasted with sharp quartez sand under sufficient air pressure to remove dirt, form oil and other foreign materials, and roughen surface to provide a proper bond. Such Surfaces shall be thoroughly washed with clean water after sandblasting.
- D.** Abrasive: Concrete stair treads, landings, ramps and steps on interior and exterior of buildings, and interior exposed concrete floors in shop buildings shall receive an abrasive finish.
- E.** Floor Hardener: Exposed interior concrete floors throughout shall be treated with floor hardener.
 - 1. Protect adjacent surfaces. Clean surfaces to receive treatment in accordance with manufacturer's instructions, ensuring that all stains, oil, grease, form release agents, laitance, dust and dirt are removed prior to application.
 - 2. Apply hardener in accordance with manufacturer's instructions as soon as concrete is firm enough to work on after final troweling.
- F.** Cement Grout and Dry-Pack Concrete: Cement grout shall be mixed at the Project site and shall be composed of one volume of Portland cement and 2-1/2 volumes of fine aggregate. Materials shall be mixed dry with sufficient water added to make mixture flow under its own weight. When grout is used as a dry pack concrete, add sufficient water to provide a stiff mixture, which can be molded into a sphere.
- G.** Broom Finish: Exterior stair treads and landing shall be provided with a non-slip broom finish in addition to abrasive finish specified.
- H.** Abrasive Stair Nosing: Nosing shall be installed according to manufacturer's written recommendations.

3.6 EXPANSION AND CONSTRUCTION JOINTS

- A.** Construction Joints: Details and proposed location of Construction joints shall be indicated on the Drawings, located to least impair strength of structure, in accordance with the following:
 - 1. Thoroughly clean contact surface by sand blasting entire surface not earlier than 5 days after initial placement.
 - 2. A mix containing same proportion of sand and cement provided in concrete plus a maximum of 50 percent of coarse aggregate shall be placed to a depth of at least one inch on horizontal joints. Vertical joints shall be wetted and coated with a neat cement grout immediately before placing of new concrete.
 - 3. Should contact surface become coated with earth, sawdust, or deleterious material of any kind after being cleaned, entire surface shall be re-cleaned before applying mix.

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- B.** Expansion Joints: Provide expansion joint where indicated in walks and exterior slabs. Space approximately 20 feet apart, unless otherwise indicated. Joints shall extend entirely through slab with joint filler in one piece for width of walk or slab. Joint filler shall be 3/8 inch thick, unless otherwise indicated.
- C.** Tooled Joints: Slabs, walks and paving shall be marked into areas as indicated with markings made with a V-grooving tool. Marks shall be round-edged, free from burrs or obstructions, with clean cut angles and shall be straight and true. Walks, if not indicated, shall be marked off into rectangles of not more than 12 square feet and shall have a center marking where more than 5 feet wide.

3.7 TESTING

A. Molded Cylinder Tests:

1. Testing lab personnel will prepare cylinders and perform slump tests. Samples for concrete strength shall be taken in accordance to ASTM C172. Each cylinder shall be dated, given a number, point in structure form which sample was obtained, mix design number, mix design strength and result of accompanying slump test noted.
2. Separate tests of molded concrete cylinders obtained at same place and time shall be made at age of 3 days, 7 days, and 28 days. A strength test shall be the average of the compressive strength of 2 cylinders, obtained from the same sample of concrete and tested at 28 days or at test age designed for determination of f_c .
3. Test cylinders shall be prepared at the Project site and stored in testing laboratory in accordance with ASTM C31, and tested in accordance with ASTM C39.

B. Core Test: At request of the Architect, cores of hardened concrete shall be cut from portions of hydrated structures for testing, in accordance with CBC and ASTM C42.

1. Provide 4 inch diameter cores at representative places throughout the structure as designated by the Architect.
2. In general, provide sufficient cores to represent concrete placed with at least one core for each 4,000 square feet of building area, and at least 3 cores total for each Project.
3. Where cores have been removed, fill voids with drypack, and patch the finish to match the adjacent existing surfaces.

C. Concrete Consistency: Measure consistency according to ASTM C143. Test twice each day or partial day's run of the mixer.

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- D.** Adjustment of Mix: If the strength of any grade of concrete for any portion of Work, as indicated by molded test cylinders, falls below minimum 28 days compressive strength specified or indicated, adjust mix design for remaining portion of construction so that resulting concrete meets minimum strength requirements.
- E.** Air Content Testing: Measure in accordance ASTM C173 or ASTM C231, for each composite sample taken in accordance to ASTM C172.
- F.** Defective Concrete:
 - 1. Should strength or any grade of concrete, for any portion of Work indicated by test of molded cylinders and core tests, fall below minimum 28 days strength specified or indicated, concrete will be deemed defective Work and shall be replaced or adequately strengthened in a manner acceptable to the Architect, DSA and Owner.
 - 2. Concrete Work that is not formed as indicated, is not true within 1/250 of span, not true to intended alignment, not plumb or level where so intended, not true to intended grades and levels, contains sawdust shavings, wood or embedded debris, or does not fully conform to the Contract provisions, shall be deemed to be defective Work and shall be removed and replaced.
- G.** Concrete for Equipment Pads, Mechanical and Electrical Work: Unless otherwise indicated, strength shall have a minimum $f_c=3000$ psi. Exposed concrete shall be provided with a hand trowel finish and with radius corners and edges. Form and place concrete where necessary as described in Section 03100: Concrete Forms and Accessories, and reinforced as described in Section 03200: Concrete reinforcement. Calcium chloride shall not be furnished in any concrete mix provided for the installation of underground electrical conduits. For concrete encasement of more than one conduit, furnish $\frac{3}{4}$ inch maximum aggregate.

3.8 CLEAN UP

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

3.9 PROTECTION

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

**SECTION 03310
SLAB ON GRADE CONCRETE**

Part 1 GENERAL

1.1 SECTION INCLUDES

- A.** Cast-in-place concrete.
- B.** Floors and slabs on grade.
- C.** Control, expansion and contraction joint devices associated with concrete work including joint sealants.
- D.** Concrete fill for steel pan stairs.
- E.** Concrete for curbs, gutter, sidewalks and other site-related concrete is specified in Section 02770 Sitework Concrete.
- F.** Under slab termite control as specified in Section 02360.

1.2 REFERENCES

- A.** ACI 301 - Structural Concrete for Buildings.
- B.** ACI 318 - Building Code Requirements for Reinforced Concrete.
- C.** ASTM C33 - Concrete Aggregate.
- D.** ASTM C150 - Portland Cement.
- E.** ASTM C171 - Sheet Materials for Curing Concrete.
- F.** ASTM C330 - Lightweight Aggregates for Structural Concrete.
- G.** ASTM C1107 - Packaged Dry, Hydraulic - Cement Grout (Non-Shrink).
- H.** ASTM D1751 - Preformed Expansion Joint Filler for Concrete (Bituminous Type).
- I.** Chapter 19A, California Building Code.
- J.** UBC Standard No. 19-1 - Portland Cement and Blended Hydraulic Cements.
- K.** UBC Standard No. 19-4 - Concrete made by Volumetric Batching and Continuous Mixing.

1.3 SUBMITTALS

**SECTION 03310
SLAB ON GRADE CONCRETE**

- A.** Placement Schedule: Submit for approval details and/or sketches showing location of each proposed construction joint. Do not deviate from locations of horizontal joints indicated on drawings.
- B.** Submit product data for each type of manufactured material and product included.
- C.** Submit design mix for each concrete mix.
- D.** Submit steel reinforcement shop drawings, including material, grade bar schedules, spacing, bent bar diagrams, arrangement and supports.

1.4 PROJECT RECORD DOCUMENTS

- A.** Accurately record actual locations of embedded utilities and components which are concealed from view.
- B.** Maintain an accurate record showing date and time of concrete placement in each portion of structure. Correlate placing record for test cylinders made by testing laboratory. Maintain a separate record giving date of removal of forms, shoring, including first and second halves and re-shoring, if used. Keep records available for inspection at site. Upon completion, deliver two copies of each to Architect in approved form.

1.5 QUALITY ASSURANCE

- A.** Perform Work in accordance with Section 1905A, California Building Code, and ACI 318.
- B.** Maintain one copy of all records.
- C.** Acquire cement and aggregate from same source for all work.
- D.** Conform to Section 1905A, California Building Code, when concreting during hot weather. No concrete placement permitted above 90 degrees Fahrenheit.
- E.** Conform to Section 1905A, California Building Code, when concreting during cold weather. No concrete placement permitted below 50 degrees Fahrenheit.

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1.6 COORDINATION

- A.** Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

Part 2 PRODUCTS

2.1 CONCRETE MATERIALS

- A.** Cement: ASTM C150, Type I or II. Portland Type, conforming to Section 1903A, California Building Code and UBC Standard No. 19-1.
- B.** Aggregates:
 - (1)** Aggregate for Stone Concrete: ASTM C33.
 - (2)** Combined Aggregate for Stone Concrete: Table 19A-J, California Building Code.
 - (3)** Aggregate for Lightweight Concrete: ASTM C330.
- C.** Conform to requirements specified herein for maximum size of aggregate permitted in individual applications.
- D.** Water: Clean and not detrimental to concrete from domestic source.

2.2 ACCESSORIES

- A.** Bonding Agent: Polyvinyl Acetate Latex emulsion; HIBOND, manufactured by Lambert Corporation, Orlando FL, LOCK BOND NO. 906, manufactured by Macklanburg-Duncan Co., City of Industry, CA, or equal as approved in accordance with Section 01600 for substitutions.
- B.** Curing Film: ASTM C171; 4 mil thick, clear polyethylene film, single sheet, manufactured from virgin resin with no scrap or additives, free of visible defects, uniform in appearance, conforming to the following:
 - (1)** Moisture Loss: 0.055 g per sq. cm.
 - (2)** Tensile Strength: 1700 psi longitudinal, 1200 psi transverse.

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SLAB ON GRADE CONCRETE**

(3) Elongation: 225 percent longitudinal, 350 percent transverse.

- C.** Non-Shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 5,000 psi in 24 hours and 8,000 psi in 7 days; of consistency for application and a 30 minute working time.
- D.** Reinforced Vapor Barrier: Griffolyn Vaporguard as manufactured by Reef Industries, Inc., Houston, TX., use appropriate tape and pipe boots, or equal as approved in accordance with Section 01600 for substitutions.

2.3 JOINT DEVICES AND FILLER MATERIALS

- A.** Expansion Joint Filler: ASTM D1751; Closed cell, bituminous saturated fiberboard; 1/2 inch thick, FIBER EXPANSION JOINT manufactured by The Burke Company, or equal as approved in accordance with Section 01600 for substitutions.
- B.** Expansion Joint Top: Integral extruded polystyrene plastic; 1/2 inch thick, with removable top strip exposing sealant trough, JOINT CAPS manufactured by The Burke Company, or equal as approved in accordance with Section 01600 for substitutions.
- C.** Sealant: Polyurethane multi-component type, non-sagging or self leveling at flatwork, as specified in section 07900.
- D.** Primer: As recommended by sealant manufacturer.
- E.** Saw-Cut Joint Filler: Two-component epoxy resin, gray color, non-hardening, self-leveling, SIKADUR 51 (SL), by Sikacorp., Lyndhurst, NJ, or equal as approved in accordance with Section 01600 for substitutions.

2.4 CONCRETE MIX

**SECTION 03310
SLAB ON GRADE CONCRETE**

A. Mix and deliver concrete in accordance with Section 1905A, California Building Code and UBC Standard No. 19-4. Deliver concrete in transit mixers only. Discharge loads in less than 1-1/2 hours after water is first added.

(1) Design Mix: Method B, by an approved Testing Laboratory, certified by a registered Professional Engineer licensed in California.

(2) Do not exceed 0.45 water-cement ratio by weight for floor slabs and 0.49 for other concrete.

B. Select proportions for concrete in accordance with the approved design mix.

(1) Required Strength: As noted on the structural drawings and below.

(2) Grout Mix: 1:3:2 Portland Cement to pea gravel, to sand, minimum 3000 psi at 28 days.

(3) Fill for Steel Pan Stairs: Same as grout mix, except add minimum amount of water to provide a low slump mix. Minimum 28 day strength: 2,000 psi.

Install ASTM A185 6 x 6 - W1.4 x W1.4 welded wire reinforcing at landing pans and install in tread pans KEYDECK mesh as manufactured by Keystone Steel and Wire Peoria, IL., or equal as approved in accordance with Section 01600 for substitutions.

C. Provide concrete to the following criteria:

Element	Min 28 day Strength PSI	Max Slump	Max Size Aggregate
Grade Beams and Foundations (N.W. Conc)	3,000	4 inch	1-1/2 inch
Flr. Slabs on grade (N.W. Conc)	3,000	4 inch	1 inch

**SECTION 03310
SLAB ON GRADE CONCRETE**

- D.** Miscellaneous Sitework Concrete: Specified in Section 02750, Sitework Concrete.
- E.** Do not use admixtures containing chlorides for floor slabs.

Part 3 EXECUTION

3.1 EXAMINATION

- A.** Verify site conditions.
- B.** Verify requirements for concrete cover over reinforcement.
- C.** Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely and will not cause hardship in placing concrete.

3.2 PREPARATION

- A.** Prepare previously placed concrete by cleaning with sandblasting to remove laitance and expose clean aggregate.
- B.** In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with approved epoxy.
- C.** When approved by the Architect, clean previously placed concrete with steel brush and apply bonding agent in accordance with manufacturer's instructions.
- D.** Under interior slab on grade, unless otherwise noted on the drawings, install 4 inches of sand, place reinforced vapor barrier, and cover vapor barrier with 2 inches of sand, install #3 rebar 18" o.c. each way at mid depth of slab, prior to concrete placement.
- E.** Seal all penetrations of vapor barrier and joints as recommended by manufacturer.

3.3 PLACING CONCRETE

- A.** Place concrete in accordance with Section 1905A, California Building Code. Remove loose dirt from excavations.

**SECTION 03310
SLAB ON GRADE CONCRETE**

- B.** Notify Architect and Project Inspector a minimum of 24 hours prior to commencement of operations. All excavations, forms and reinforcing shall be inspected and approved by the Project Inspector prior to placement.
- C.** Ensure reinforcement, inserts, embedded parts, formed joint fillers, joint devices and accessories are not disturbed during concrete placement.
- D.** Install joint fillers, primer and sealant in accordance with manufacturer's instructions.
- E.** When detailed on the drawings, separate slabs on grade from vertical surfaces with 1/2 inch thick joint filler.
- F.** Extend joint filler from bottom of slab to within 1/2 inch of finished slab surface using two-component polyurethane sealant as specified in Section 07900.
- G.** Install joint devices in accordance with manufacturer's instructions as detailed.
- H.** Install construction joint device in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- I.** Maintain joint device in correct position to allow joint cover flush with finish.
- J.** Install joint covers in longest practical length.
- K.** Place concrete continuously between predetermined expansion, control and construction joints.
- L.** Do not interrupt successive placement; do not permit cold joints to occur.
- M.** Avoid segregation of materials. Perform tamping and vibrating so as to produce a dense, smooth application free of rock pockets and voids. Do not use vibrators to move concrete horizontally.

**SECTION 03310
SLAB ON GRADE CONCRETE**

- N.** Provide special mix prepared by the Testing Laboratory and approved by the Architect utilizing smaller aggregates in areas of reinforcing congestion to prevent the formation of rock pockets.
- O.** Do not allow concrete to fall free from any height which will cause materials to segregate. Maximum height of free fall permitted in any case: 5 feet. Utilize trunks or additional chutes where doubt occurs.
- P.** Construction Joints: Wash surface of each joint shortly after pouring to expose clean, sound aggregate. Sandblast surface to remove laitance remaining or loose aggregate as approved by the Architect. Conform to Section 1906A, California Building Code.
- Q.** Screed floors and slabs on grade level, maintaining surface flatness of maximum 1/8 inch in 10 ft. Slope floors for drains.
- R.** Saw-cut slabs as approved by the Architect at 15 ft oc, maximum 225 sf, within 24 hours after placing, with 3/16 inch thick blade. Cut no deeper than 1/4 depth of slab thickness. Fill cuts with specified non-hardening epoxy. Completely fill cuts to surface of slab.

3.4 SEPARATE FLOOR TOPPINGS

- A.** Prior to placing floor topping, roughen substrate concrete surface and remove deleterious material. Broom and vacuum clean.
- B.** Place required dividers, edge strips, reinforcing and other items to be cast in.
- C.** Apply bonding agent to substrate in accordance with manufacturer's instructions.
- D.** Place concrete floor toppings to required lines and levels. Place topping in checkerboard panels, maximum dimension not to exceed 20 ft.
- E.** Screed toppings level, maintaining surface flatness of maximum 1/8 inch in 10 ft.

3.5 CONCRETE FINISHING

**SECTION 03310
SLAB ON GRADE CONCRETE**

- A.** Provide formed concrete surfaces to be left exposed with smooth rubbed finish, as scheduled.
- B.** Finish all slab on grade/floor surfaces to requirements of Section 03350.

3.6 CURING AND PROTECTION

- A.** Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures and mechanical injury.
- B.** Maintain concrete with minimal moisture loss at above 50 degrees F temperature for period necessary for hydration of cement and hardening of concrete. Dusting with dry cement to absorb excess water is prohibited.
- C.** Cure floor surfaces only as specified herein and in accordance with Section 1905A, California Building Code. Membrane curing compound method not permitted for interior cast-in-place concrete slabs.
- D.** Moisture Cure: Keep surface of floor slabs moist. Spray water over floor slab areas and maintain wet for minimum of seven (7) days or spread polyethylene film over floor slab areas, lapping edges and sides, minimum 6 inches and sealing with pressure sensitive tape; cover with plywood or otherwise protect film from damage; maintain in place for minimum of seven (7) days. Do not permit traffic over floor slabs during the seven (7) day curing period.
- E.** Vertical Surfaces: Spray water over surfaces and maintain wet for 10 days.
- F.** Quality Control: Proper curing of concrete surfaces shall be the responsibility of the Contractor under this section.

3.7 FIELD QUALITY CONTROL

- A.** Provide free access to Work and cooperate with Testing Laboratory.

**SECTION 03310
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- B.** Proposed mix design of each class of concrete shall conform to Section 1905A, California Building Code and shall be approved by the Architect prior to commencement of work.

3.8 PATCHING

- A.** Architect will inspect concrete surfaces and determine imperfections, if any.
- B.** Patch imperfections as approved and in accordance with ACI 301.
 - (1)** Clean all exposed concrete surfaces and all adjoining work stained by leakage of concrete. Remove all fins, butts and projections by grinding. Patch voids, rock pockets, holes, cracks and similar imperfections by chipping loose concrete and exposing clean, sound aggregate.
 - (2)** Fill cone form tie recesses with portland cement mortar flush to finish surface.

3.9 DEFECTIVE CONCRETE

- A.** Defective Concrete: Remove concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B.** Repair or replacement of defective concrete will be determined by the Architect.
- C.** Do not patch, fill, touch-up, repair or replace exposed concrete except upon express approval of Architect for each individual area.

3.10 MOISTURE TEST FOR CONCRETE FLOORS

- A.** It shall be the General Contractor's responsibility to provide a concrete floor slab meeting the maximum moisture vapor emissions here-in specified and the contractor shall exercise care in all aspects of mixing, placing, and curing the concrete floor slabs so that a minimum of mitigation treatment will be required.
- B.** Prior to ordering floor materials that are adhesive applied, contractor shall conduct Calcium-Chloride "Dome" tests to verify that concrete floor slabs are dry with maximum moisture vapor emissions of three lbs. per 1,000 s.f. in 24 hours and that

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slabs exhibit negative alkalinity, carbonization or dusting. Apply the moisture test in four (4) different areas of each floor location, with at least one test for each 1,000 s.f. of floor area.

- C.** Should the moisture emissions exceed three lbs. per 1,000 s.f. in 24 hours as specified here-in at the time of installation of adhesive applied floor coverings, and the Petrographic Analysis, ASTM C856, confirms that the placement of concrete slabs was not in conformance with requirements of this section and that the water cement ratio exceeded 0.45 or the concrete was cured less than 7 days, the General Contractor, at no additional cost to the Owner, shall reduce the moisture emission level to that specified by use of a vapor emission treatment system as specified in Section 07265.

END OF SECTION

SECTION 05120 STRUCTURAL STEEL

PART 1 - GENERAL

1.1 SUMMARY

- A. Provisions of Division 01 apply to this section
- B. Section Includes:
 - 1. Structural steel.
- C. Related Sections:
 - 1. Section 01420: Testing and Inspection.
 - 2. Section 03300: Cast-In-Place Concrete.
 - 3. Section 04820: Concrete Unit Masonry.
 - 4. Section 05300: Metal Decking.
 - 5. Section 05500: Metal Fabrications.
 - 6. Section 07810: Cementitious Fireproofing.
 - 7. Section 09900: Paints and Coatings.

1.2 REFERENCE STANDARDS, SPECIFICATIONS AND CODES

- A. CBC Chapter 22A.
- B. American Institute of Steel Construction (AISC):
 - 1. AISC – Steel Construction Manual, 14th Edition, including:.
 - a. AISC 360 Specifications for Structural Steel Buildings.
 - b. AISC Code of Standard Practice for Steel Buildings and Bridges.
 - c. RCSC –
Specification for Structural Joints Using ASTM A325 or A490 Bolts.
- C. American Society for Testing and Materials (ASTM):
 - 1. ASTM A36 – Standard Specification for Carbon Structural Steel.
 - 2. ASTM A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 3. ASTM A108 – Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
 - 4. ASTM A123 – Standard Specification for Zinc (Hot-Dipped Galvanized)
Coatings on Iron and Steel Products

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5. ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
6. ASTM A307 – Standard Specification for Carbon Steel Bolts and Studs, 60000 PSI Tensile Strength.
7. ASTM A325 – Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 Ksi Minimum Tensile Strength.
8. ASTM A435 - Standard Specification for Straight-Beam Ultrasonic Examination of Steel Plates.
9. ASTM A490 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
10. ASTM A500 – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
11. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
12. ASTM A572 – Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
13. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
14. ASTM A673 - Standard Specification for Sampling Procedure for Impact Testing of Structural Steel,
15. ASTM A780 – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
16. ASTM A992 – Standard Specification for Structural Steel Shapes.
17. ASTM C1107 – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink).
18. ASTM E23 - Standard Test Methods for Notched Bar Impact Testing of Metallic Materials.
19. ASTM E112 - Standard Test Methods for Determining Average Grain Size

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20. ASTM F1554 – Standard Specification for Anchor Bolts, Steel, 36, 55 and 105-Ksi Yield Strength.
 21. ASTM F959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.
 22. ASTM F1852 – Standard Specification for “Twist Off” Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tension Strength.
- D. American Welding Society (AWS):
1. AWS D1.1 – Structural Welding Code - Steel.
 2. AWS D1.8 – Structural Welding Code – Seismic Supplement.
 2. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
 3. AWS B2.1 – Specifications for Welding Procedures and Performance Qualification.
- E. SSPC – Steel Structures Painting Council:
1. SP-2 - Hand Tool Cleaning.

1.3 SYSTEM DESCRIPTION

- A. Regulatory Requirements:
1. Structural steel shall conform to CBC requirements, except that steel manufactured by acid Bessemer process is not permitted for structural purposes.
 2. Sheet and strip steel other than those listed in CBC, if provided for structural purpose, shall comply with DSA requirements.

1.4 SUBMITTALS

- A. Shop Drawings:
1. Submit Shop Drawings, including complete details and schedules for fabrication and shop assembly of members, and details, schedules, procedures and diagrams showing the sequence of erection. Fully detail minor connections and fastenings not shown or specified in the Contract Documents to meet required conditions using similar detailing as shown in the Contract Documents. Include a fully detailed, well controlled sequence and technique plan for shop and field welding that minimizes locked in stresses and distortion; submit sequence and technique plan for review by the Architect.
 - a. Include details of cuts, connections, camber, and holes in accordance with Figure 4.5 of AWS D1.1 or AISC Chapter J, weld position plan and other pertinent data. Indicate welds by standard AWS symbols, and show size, length and type of each weld.

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- b. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed for Work specified in other sections.
 - c. Erection and Bracing Plan and Erection Procedure: Submit an erection and framing plan, including columns, beams, and girders, signed and sealed by a Structural or Civil Engineer registered in the State of California in accordance with Title 8 CCR, Section 1710, Erection of Structures. Maintain a copy at the Project site as required by the California Division of Industrial Safety.
 - d. Submit a list of steel items to be galvanized.
 - e. Include identification and details of AECS members, if applicable.
- B. Product Data:
 - 1. Submit copies of fabricator's specifications and installation instructions for the following products. Include laboratory test reports and other data required demonstrating compliance with these Specifications:
 - a. Structural steel, each type; including certified copies of mill reports covering chemical and physical properties.
 - b. Welding electrodes.
 - c. Welding gas.
 - d. Unfinished bolts and nuts.
 - e. Structural steel primer paint.
 - f. High-strength bolts, including nuts and washers.
- C. Manufacturer's Mill Certificate:
 - 1. Submit, certifying that products meet or exceed specified requirements.
- D. Mill Test Reports:
 - 1. Submit manufacturer's certificates, indicating structural yield and tensile strength, destructive and non-destructive test analysis.
- E. Welding Procedure Specifications (WPS): Submit weld procedures for all welding on project to Owner's testing laboratory for approval. After approval by testing laboratory, submit to Architect for record. Weld procedures shall be qualified as described in AWS D1.5, AISC 341 and AISC 358, as applicable. Weld procedures shall indicate joints details and tolerances, preheat and interpass temperature, post-heat treatment, single or multiple stringer passes, peening of stringer passes for groove welds except for the first and the last pass, electrode type and size, welding current, polarity and amperes and root treatment. The welding variables for each stringer pass shall be recorded and averaged, from these averages the weld heat input shall be calculated. Submit the manufacturer's product data sheet for all welding material used.
- F. Welder's Certificates: Field welders shall be Project certified in accordance with

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AWS D1.1. Shop welders shall be Project certified for FCAW in accordance with AWS D1.1.

- G. Test Reports: Submit reports of tests conducted on shop and field welded and bolted connections. Include data on type of test conducted and test results.
- H. Welding Material Certification: Provide certificate that welding material complies to specifications. Submit to Owner's testing laboratory.

1.5 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement, except as otherwise indicated:
 - 1. Perform welding in accordance with AWS Standards, AWS D1.1, and California Building Code Section 2004A.1 and approved Weld Procedure Specifications (WPS).
- B. Shop fabrication shall be inspected in accordance with CBC.
- C. Erect mock-up panel of fabricated structural steel meeting Architecturally Exposed Structural Steel (AESS) tolerances for exposed areas. Approval by Architect is required. Mock-up to remain for comparison but may not be left as part of the work.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Store structural steel above grade on platforms, skids or other supports.
- B. Protect steel from corrosion.
- C. Store welding electrodes in accordance with AWS D 12.1.
- D. Store other materials in a weather-tight and dry place until installed into the Work.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Stock Materials: Provide exact materials, sections, shapes, thickness, sizes, weights, and details of construction indicated on Drawings. Changes because of material stock or shop practices will be considered if net area of shape or section is not reduced thereby, if material and structural properties are at least equivalent, and if overall dimensions are not exceeded.
- B. All shapes, bars, plates, tubes and pipes shall be made of materials with at least 16% recycled content if produced from Basic Oxygen Furnace (BOF) or at least 67% recycled content if produced from Electric Arc Furnace (EAF).

2.2 MATERIALS

- A. Structural Steel: All wide flange shapes shall conform to ASTM A992 grade 50. Other steel shall conform to ASTM A36.

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- B. Unfinished Threaded Fasteners: ASTM A307, Grade A, regular low carbon bolts and nuts.
- C. High-Strength Threaded Fasteners: ASTM A325, ASTM A490 ASTM F959 or ASTM F1852 quenched and tempered, steel bolts, nuts and washers.
- D. Primer: Lead-free metal primer, Tnemec 10-99, Rust-Oleum X-60, or equal.
- E. Steel Pipe: ASTM A53, Type E or S, Grade B.
- F. Structural Tubing:
 - 1. Hot-formed, ASTM A501.
 - 2. Cold-formed, ASTM A500, Grade B.
- G. Galvanizing: ASTM A123.
- H. Shear stud connectors: ASTM A108, Grade 1015 forged steel, headed, uncoated, granular flux filled shear connector or anchor studs by Nelson Stud Welding Division of TRW, Lorain, OH, or equal.
- I. Grout: ASTM C1107, non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 7,000 psi at 7 days; of consistency suitable for application and a 30 minute working time.

2.3 FABRICATION

- A. Cleaning and Straightening Materials: Materials being fabricated shall be thoroughly cleaned of scale and rust, and straightened before fabrication. Cleaning and straightening methods shall not damage material. After punching or fabrication of component parts of a member, twists or bends shall be removed before parts are assembled.
- B. Cutting, Punching, Drilling and Tapping: Unless otherwise indicated or specified, structural steel fabricator shall perform the cutting, punching, drilling and tapping of Work so that Work of other trades will properly connect to steel Work.
- C. Milling: Compression joints depending on contact bearing shall be furnished with bearing surfaces prepared to a common plane by milling.
- D. Use of Burning Torch: Oxygen cutting of members shall be performed by machine. Gouges greater than 3/16 inch that remain from cutting shall be removed by grinding. Reentrant corners shall be shaped notch free to a radius of at least 1/2 inch. Gas cutting of holes for bolts or rivets is not permitted.
- E. Galvanizing: After fabrication, items indicated or specified to be galvanized shall be galvanized in largest practical sizes. Fabrication includes operations of shearing, punching, bending, forming, assembling or welding. Galvanized items shall be free from projections, barbs, or icicles resulting from the galvanizing process.
- F. Welding:

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1. Type of steel furnished in welded structures shall provide chemical properties suitable for welding as determined by chemical analysis. Welds shall conform to the verification and inspection requirements of CBC Chapter 17A. Conform to AWS D1.1, and CBC Chapter 22A.
 2. Materials and workmanship shall conform to the requirements specified herein and to CBC requirements, modified as follows:
 - a. No welded splices shall be permitted except those indicated on Drawings unless specifically reviewed by the Architect.
 - b. Drawings will designate joints in which it is important that welding sequence and technique be controlled to minimize shrinkage stresses and distortion.
 3. Welding shall be performed in accordance with requirements of the AWS Structural Welding Code.
 4. Architecturally Exposed Structural Steel: Verify that weld sizes, fabrication sequence, and equipment used for Architecturally Exposed Structural Steel will limit distortions to allowable tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Grind smooth exposed fillet welds ½ inch (13 mm) and larger. Grind flush butt welds. Dress exposed welds.
 5. Remove erection bolts on welded, Architecturally Exposed Structural Steel; fill holes with plug welds; and grind smooth at exposed surfaces.
- G. Shop Finish:
1. Notify the PI when Work is ready to receive shop prime coat. Work shall be inspected by the PI before installation of primer.
 2. Structural steel and fittings, except galvanized items, which will be exposed when building is completed, shall receive a coat of primer.
 3. The primer specified shall be spray applied, filling joints and corners and covering surfaces with a smooth unbroken film. The minimum dry film thickness of the primer shall be 2.0 mils.
 4. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete or high strength bolted.
- H. Comply with fabrication tolerance limits of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel.
- I Fabricate Architecturally Exposed Structural Steel with exposed surfaces smooth, square, and free of surfaces blemishes, including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness.
1. Remove blemishes by filling, grinding, or by welding and grinding, prior to cleaning, treating and shop priming.
 2. Comply with fabrication requirements, including tolerance limits of AISC's

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"Code of Standard Practice for Steel Buildings and Bridges" for
Architecturally Exposed Structural Steel.

- J. Architecturally Exposed Structural Steel: use special care in unloading, handling and erecting the steel to avoid marking or distorting the steel members. Minimize damage to any shop paint when temporary braces or erection clips are used. Avoid unsightly surfaces upon removal. Grind smooth tack welds and holes filled with weld metal or body solder. Plan and execute all operations in such a manner that the close fit and neat appearance of the structure will not be impaired.

2.4 SHOP AND FIELD QUALITY CONTROL

- A. A special inspector, approved by DSA to inspect the Work of this section, shall inspect high-strength bolted connections. The Owner will provide a DSA approved independent testing laboratory to perform tests and prepare test reports in accordance with CBC 1704A.3.3. The PI shall be responsible for monitoring the work of the special inspector and testing laboratories to ensure that the testing program is satisfactorily completed.
- B. An AWS CWI certified special inspector, approved by DSA to inspect the Work of this section, shall inspect welded connections in accordance with CBC 1704A.3.1. The Owner will provide a DSA approved independent testing laboratory to perform tests and prepare test reports. The PI shall be responsible for monitoring the work of the special inspector and testing laboratories to ensure that the testing program is satisfactorily completed.
- C. The independent testing laboratory shall conduct and interpret test and state in each report whether test specimens comply with requirements, and specifically state any deviations there from.
- D. Provide access to all places where structural steel Work is being fabricated or produced so required inspection and testing can be performed.
- E. The independent testing laboratory may inspect and/or test structural steel at plant before shipment; however, Architect reserves the right at any time before Contract Completion to deem materials not in compliance with the specified requirements as defective Work.
- F. Correct defects in structural Work when inspections and laboratory test reports indicate noncompliance with specified requirements. Perform additional tests as may be required to reconfirm noncompliance of original Work, and as may be required to show demonstrate compliance of corrected Work.
- G. Welding: Inspect and test during fabrication and erection of structural steel assemblies as follows:
1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in the Work. Record Work required and performed to correct deficiencies.
 2. Inspect welds. Welds shall be visually inspected before performing any non-destructive testing. Groove weld shall be inspected by ultrasonic or other approved non-destructive test methods. Testing shall be performed to AWS D1.1 Table 6.3 cyclically loaded non-tubular connections.

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3. Ultrasonic testing shall be performed by a specially trained and qualified technician who shall operate the equipment, examine welds, and maintain a record of welds examined, defects found, and disposition of each defect. Repair and test defective welds.
 4. Rate of Testing: Completed welds contained in joints and splices shall be tested 100 percent either by ultrasonic testing or by radiography.
 5. Welds, when installed in column splices, shall be tested by either ultrasonic testing or radiography.
 6. Base metal thicker than 1-1/2 inches, when subjected to through-thickness weld shrinkage strains, shall be ultrasonically inspected by shear wave methods for discontinuities directly behind such welds. Tests shall be performed at least 48 hours after completed joint has cooled down to ambient air temperature.
 7. Any material discontinuities shall be reviewed based on the defect rating in accordance with the criteria of AWS D1.1 table 6.3 by the Architect and DSA.
 8. Other method of non-destructive testing and inspection, for example, liquid dye penetrate testing, magnetic particle inspection or radiographic inspection may be performed on weld if required.
 9. Lamellar Tearing: Lamellar-tearing resulting from welding is a crack (with zero tolerance) and shall be repaired in accordance with AWS D1.1.
 10. Lamination: The rejection criteria shall be based on ASTM A435.
 11. Where testing reveals lamination or conditions of lamellar tearing in base metal, the steel fabricator shall submit a proposed method of repair for review by the Architect. Test repaired areas as required.
 12. Magnetic Particle Testing: Magnetic particle testing when required shall be provided in accordance with AWS D1.1 for procedure and technique. The standards of acceptance shall be in accordance with AWS D1.1 – Qualification.
- H. Lamellar Tearing: Prior to welding plates 1 to 1-1/2 inches thick and greater and rolled shapes within the distance from 6 inches above the top of the joint to 6 inches below the bottom of the joint shall be checked by ultrasonic testing for laminations in base metal which may interfere with the inspection of the completed joint. Should these defects occur, members will be reviewed by the Architect and DSA. Welding procedure specifications in sub-section 1.5G specify welding practices to minimize lamellar tearing.
- I. Prior Testing of Base Material: Test material before fabrication.
- J. Lines and levels of erected steel shall be certified by a State of California licensed surveyor as set forth in related Division 01 section.
- K. Welded studs shall be tested and inspected by the special inspector in accordance with requirements of AWS D1.1 – Stud Welding.
- L. Record Drawings: After steel has been erected, correct or revise Shop Drawings and erection diagrams to correspond with reviewed changes performed in the

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field.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify governing dimensions and conditions of the Work before commencing erection Work.
 - 1. Report discrepancies between drawings and field dimensions to Architect before commencing work.
 - 2. Beginning of installation means erector accepts existing conditions and surfaces underlying or adjacent to work of this section.
- B. Provide temporary shoring and bracing, and other support during performance of the Work. Remove after steel is in place and connected, and after cast-in-place concrete has reached its design strength.

3.2 ERECTION

- A. Install structural steel accurately in locations, to elevations indicated, and according to AISC specifications and CBC requirements.
- B. Clean surfaces of base plates and bearing plates.
 - 1. Install base and bearing plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims; cut off flush with edge of base or bearing plate before packing with grout.
- C. Maintain erection tolerances of structural steel within AISC Code of Standard Practice for Steel Buildings and Bridges.
 - 1. Architecturally Exposed Structural Steel members and components, plumbed, leveled and aligned to a tolerance not to exceed one-half the amount permitted for structural steel. Contractor to provide adjustable connections between Architecturally Exposed Structural Steel and the structural steel frame or the masonry or concrete supports, in order to provide the erector with means for adjustment.
- D. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact after assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
- E. Do not permit thermal cutting during erection of structural steel.
- F. Where indicated for field connections, provide standard bolts complying with ASTM A307.
- G. Install high strength steel bolts at locations indicated. Assembly and installation shall be in accordance with CBC requirements.

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1. Allowable hole sizes: 1/16 inch larger than bolt size.
 2. Use friction type connection with standard hardened steel circular, square or rectangular washer under bolt nut.
 3. Thoroughly clean area under bolt head, nut and washer. Remove all paint, lacquer, oil or other coatings except organic zinc-rich paints in accordance with SSPC, SP-2.
 4. Tighten bolts by power torque wrench or hand wrench until twist-off.
- H. Contractor shall be responsible for correcting detailing and fabrication errors and for correct fitting of all members and components.
- I. Erect structural steel plumb and level and to proper tolerances as set forth in the AISC Manual. Provide temporary bracing, supports or connections required for complete safety of structure until final permanent connections are installed.
- J. Install column bases within a tolerance of 1/8 inch of detailed centerlines, level at proper elevations. Support bases on double nuts and solidly fill spaces under bases with cement grout.
- K. Provide anchor bolts with templates and diagrams. Contractor shall be responsible for proper location and installation of bolts. Correct deficiencies and errors.
- L. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and apply galvanizing repair paint according to ASTM A780.

3.3 FITTING

- A. Closely fit members, finished true to line and in precise position required to allow accurate erection and proper joining in the field.
- B. Drilling to enlarge unfair holes will not be allowed. Allow only enough drifting during assembly to bring parts into position, but not enough to enlarge holes or distort the metal. Do not heat rolled sections, unless approved by Architect.

3.4 PUNCHING AND DRILLING

- A. Punch material 1/16 inch larger than nominal diameter of bolt, wherever thickness of metal is equal to or less than the diameter of the bolt plus 1/8 inch.
- B. Drill or sub-punch and ream where metal is equal to or more than the diameter of the bolt plus 1/8 inch. Make diameter for sub-punched and sub-drilled holes 1/16 inch larger than nominal diameter of bolt.
- C. Precisely locate holes to ensure passage of bolt through assembled materials without drifting. Enlarge holes when necessary to receive bolts by reaming; flame cutting to enlarge holes is not acceptable. Structural Steel members with poorly matched holes will be rejected.

3.5 FINISHING

- A. After erection, spots or surfaces where paint has been removed, damaged, or burned off and field rivets, bolts, and other field connections not concealed in the work, shall be cleaned of dirt, oil, grease, and burned paint and furnished with a spot coat of the same primer installed during shop priming.

**SECTION 05120
STRUCTURAL STEEL**

- B. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Install paint to exposed areas with the same material installed during shop painting. Install by brush or spray to provide a minimum dry film thickness of 1.5 mils.

3.6 FIELD QUALITY CONTROL

- A. Owner will provide a special inspector and independent testing laboratory to perform field inspections and tests and to prepare test reports.
- B. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.

3.7 CLEAN UP

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

3.8 PROTECTION

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

3.9 HANDLING

- A. Both in shop and in the field, transport, handle and erect to prevent damage or overstressing of any component.

END OF SECTION

SECTION 05 12 13 - ARCHITECTURALLY-EXPOSED STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Additional requirements for structural steel members designated as architecturally-exposed structural steel (AESS).

1.02 RELATED REQUIREMENTS

- A. Section 05 12 00 - Structural Steel Framing: General requirements for structural steel members, including AESS framing specified in this section.
- B. Section 09 91 13 - Exterior Painting: Finish coat requirements and coordination with primer and surface preparation specified in this section.

1.03 REFERENCE STANDARDS

- A. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges; 2016.
- B. AISC 360 - Specification for Structural Steel Buildings; 2016.
- C. ASTM A6/A6M - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling; 2019.
- D. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2020.
- E. ASTM A1085/A1085M - Standard Specification for Cold-Formed Welded Carbon Steel Hollow Structural Sections (HSS); 2015.
- F. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
- G. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

1.04 SUBMITTALS

- A. Product data for each type of product specified. Submit paint systems in accordance with Section 09 91 13.
- B. Shop Drawings: Detailing for fabrication of AESS components.
 - 1. Provide erection documents clearly indicating which members are AESS members and the AESS category of each part.
 - 2. Include details that clearly identify AESS requirements found in this specification. Provide connections for AESS consistent with concepts shown on drawings.
 - 3. Indicate welds by AWS A2.4 symbols, distinguishing between shop and field welds, and show size, length and type of each weld. Identify grinding, finish and profile of welds as defined by the designated AESS category.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: In addition to those qualifications listed in Section 05 12 00, engage an AISC Certified Fabricator, experienced in fabricating AESS similar to that indicated for this project with a record of successful in-service performance, as well as sufficient production capacity to fabricate AESS without delaying the work.
- B. Comply with applicable provisions of AISC 303, Section 10 for the designated AESS category.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Handle finished pieces in accordance with Section 10 of AISC 303, using nylon-type slings, or chains with softeners, or wire ropes with softeners such that they are not damaged.
- B. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged

materials from erosion and deterioration. Use special care in handling to prevent twisting or warping of AESS members.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Comply with Section 05 12 00, except as amended in this section for aesthetic purposes.

2.02 FABRICATION

- A. Fabricate and assemble AESS in shop to greatest extent possible. Locate field joints in AESS assemblies at concealed locations or as approved by Architect. Detail AESS assemblies to minimize field handling and expedite erection.
- B. Permissible tolerances for member depth, width, out of square, and camber and sweep to be as specified in ASTM A6/A6M, ASTM A500/A500M, and ASTM A1085/A1085M.
- C. Use special care in handling and shipping of AESS both before and after shop painting to minimize damage to any shop finish. Use nylon-type slings or softeners when using chains or wire rope slings.
- D. Fabricate AESS in accordance with categories defined in AISC 303, as follows:
 - 1. AESS 1: Basic elements.
 - 2. AESS 2: Feature elements viewed at a distance greater than 20 feet (feature elements not in close view).
 - 3. AESS 3: Feature elements viewed at a distance less than 20 feet (feature elements in close view).

2.03 PAINT SYSTEM

- A. Compatibility: All components/procedures of AESS paint system to comply with coating system specified, submitted, and approved per Sections 09 91 13, 09 91 23, and 09 96 00. As a minimum, identify required surface preparation, primer, intermediate coat (if applicable), and finish coat. Primer, intermediate coating, and finish coating to be from a single manufacturer combined in a system documented by manufacturer with adequate guidance for fabricator to procure and execute.
- B. Primer: As specified in Sections 09 91 13, 09 91 23, and 09 96 00. Primer to comply with all federal standards for VOC, lead and chromate levels.
- C. Finish Coating: Field apply intermediate and top coats per Sections 09 91 13, 09 91 23, and 09 96 00.

2.04 SHOP PRIMING

- A. Surface Preparation:
 - 1. Provide surface preparations to meet SSPC-SP 6.
- B. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete, or high strength bolted with slip-critical connections.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Erector to check all AESS members upon delivery for twist, kinks, gouges or other imperfections which may result in rejection of appearance of member. Coordinate remedial action with fabricator prior to erecting steel.

3.02 PREPARATION

- A. Provide connections for temporary shoring, bracing and supports only where noted on approved fabrication documents. Temporary connections not shown are to be made at locations not exposed to view in final structure or as approved by Architect.
- B. Handle, lift and align pieces using nylon straps or chains with softeners required to maintain appearance of AESS through process of erection.

3.03 ERECTION

- A. AESS 1 and 2: Basic elements; feature elements not in close view:
 - 1. Employ special care to handle and erect AESS. Erect finished pieces using nylon straps or chains with softeners such that they are not damaged.
 - 2. Place weld tabs for temporary bracing and safety cabling at points concealed from view in completed structure or where approved by Architect during pre-installation meeting. Obtain Architect approval of methods for removing temporary devices and finishing AESS members prior to erection.
 - 3. AESS Erection Tolerances: Erect to standard frame tolerances for structural steel per Chapter 7 of AISC 303.
 - 4. Set AESS accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
 - 5. Remove blemishes or unsightly surfaces resulting from temporary braces or fixtures.
 - 6. Remove all backing and run out tabs.
 - 7. When temporary braces or fixtures are required to facilitate erection, take care to avoid any blemishes, holes or unsightly surfaces resulting from use or removal of such temporary elements.
- B. AESS 3: Feature elements in close view:
 - 1. Erect to requirements of AESS 1 and 2 and as follows:

3.04 CLEANING

- A. Touch-up Painting: Complete cleaning and touch-up painting of field welds, bolted connections, and abraded areas of shop paint to blend with adjacent surfaces of AESS. Perform touch-up work in accordance with manufacturer's instructions and as specified in Section 09 91 13, 09 91 23, and 09 96 00.

END OF SECTION

**SECTION 05500
METAL FABRICATIONS**

Part 1 GENERAL

1.1 SECTION INCLUDES

- A.** Shop fabricated ferrous metal items, galvanized and prime painted.

1.2 REFERENCES

- A.** ASTM A992, Grade 50 - Structural Steel.
- B.** ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.
- C.** ASTM A123 - Zinc Coating (Hot-Dip) on Iron and Steel Products.
- D.** ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- E.** ASTM A167 - Stainless Steel and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
- F.** ASTM A283/A283M - Low and Intermediate Tensile Strength Carbon Steel Plates.
- G.** ASTM A307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile.
- H.** ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
- I.** ASTM C1107 - Packaged Dry Hydraulic - Cement Grout (Non-Shrink).
- J.** AWS A2.4 - Standard Welding Symbols.
- K.** AWS D1.1 - Structural Welding Code.
- L.** AWS A5.1 - Carbon Steel Covered Arc-Welding Electrodes.
- M.** SSPC Paint 21 - Steel Structures Painting Council - White or Colored Silicone Alkyd Paint.

1.3 SUBMITTALS

- A.** Submit Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners and accessories. Include erection drawings, elevations and details where applicable. Indicate welded connections using standard

**SECTION 05500
METAL FABRICATIONS**

AWS A2.4 Welding Symbols. Indicate net weld lengths.

1.4 FIELD MEASUREMENTS

- A.** Verify field measurements.

Part 2 PRODUCTS

2.1 MATERIALS

- A.** Steel Sections: ASTM A992, Grade 50.
- B.** Steel Tubing: ASTM A500, Grade B.
- C.** Plates: ASTM A283; Milled Steel.
- D.** Pipe: ASTM A53, Grade B, Schedule 40.
- E.** Fasteners: Standard commercial quality steel as required for application.
- F.** Bolts, Nuts and Washers: ASTM A307 galvanized to ASTM A153 for galvanized components. Unless noted otherwise on Drawings.
- G.** Shop and Touch-Up Primer: SSPC Paint 21, Series P10-99 modified alkyd, red color, air dried, by Tnemec or equal as approved in accordance with Section 01600 for substitutions.
- H.** Touch-Up Primer for Galvanized Surfaces: Ready mixed Zinc rich galvanizing compound, DEVCON 2, by Devcon Corp., Danvers, MA, GALVICON, by Southern Coatings, Sumter, SC, or equal as approved in accordance with Section 01600 for substitutions.
- I.** Stainless Steel: ASTM A167; Minimum 16 Gage, Type 304, No. 4 Finish.
- J.** Welding Materials: AWS A5.1, E70XX, type and procedures required by electrode manufacturer for materials being welded.
- K.** Grout: ASTM C1107, Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 8,000 psi at 7 days; of consistency suitable for application and a 30 minute working time.

**SECTION 05500
METAL FABRICATIONS**

2.2 FABRICATION

- A.** Fit and shop assemble in largest practical sections for delivery to site.
- B.** Fabricate items with joints tightly fitted and secured.
- C.** Continuously seal joined members by continuous welds.
- D.** Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush and hairline. Ease exposed edges to small uniform radius.
- E.** Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- F.** Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.3 FINISHES

- A.** Clean surfaces of rust, scale, grease and foreign matter prior to finishing.
- B.** Do not prime surfaces in direct contact with concrete or where field welding is required.
- C.** Prime paint items with two coats in accordance with requirements of SSPC-21.
- D.** Galvanize steel items to a zinc coating thickness in accordance with ASTM A123.

Surfaces shall be free of icicles, spangles and puddling. Vent all enclosed spaces. See drawings and schedules for extent of steel items to be provided with a galvanized finish.

Part 3 EXECUTION

3.1 EXAMINATION

- A.** Verify that field conditions are acceptable and are ready to receive work.
- B.** Beginning of installation means erector accepts existing conditions.

3.2 PREPARATION

**SECTION 05500
METAL FABRICATIONS**

- A.** Clean and strip primed steel items to bare metal where site welding is required.
- B.** Supply items required to be cast into concrete or embedded in masonry with setting templates to appropriate sections.

3.3 INSTALLATION

- A.** Install items plumb and level, accurately fitted, free from distortion or defects.
- B.** Allow for erection loads and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C.** Field weld components indicated on shop drawings.
 - (1)** Weld joints using shielded electric arc method. Use coated welded rods, not fluxed, or type recommended by manufacturer for use with parent metal.
 Use only certified welders for structural construction.
 - (2)** Grinding: Grind welds on surfaces subject to traffic or contact to smooth flush joints.
 - (3)** Peening: Remove flux and weld spatter as necessary to eliminate unsightly conditions and grind off sharp projections.
 - (4)** Permanently Concealed Welds: No treatment required other than preparation for painting or galvanizing.
- D.** Perform field welding in accordance with AWS D1.1.
- E.** Obtain Architect approval prior to site cutting or making adjustments not scheduled.
- F.** After erection, prime welds, abrasions and surfaces not shop primed except surfaces to be in contact with concrete.

3.4 ERECTION TOLERANCE

- A.** Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B.** Maximum Offset From True Alignment: 1/4 inch.

3.5 SCHEDULE

- A.** The Schedule is a list of principal items only. Refer to Drawing details for items not specifically scheduled.

**SECTION 05500
METAL FABRICATIONS**

- B.** Fasteners: Provide fasteners and connectors of approved types, whether indicated or not.
- C.** Bumper Posts and Guard Rails: As detailed; galvanized finish.
- D.** Door Frames for Overhead Door Openings and Wall Openings: Channel sections; galvanized finish.
- E.** Steel Backing Plates: 1/4 inch thick x widths and lengths required to support plumbing fixture hanger and equipment. Cope studs and weld plates flush to surface with continuous welds.
- F.** Steel Corner Guards: Provide steel angle corner guards as detailed, complete with weld-on anchors. Hot dip galvanized after fabrication.
- G.** Grates and Frames: Provide all gratings, covers and frames for catch basins, trench and storm drains. All work shall be galvanized or cast iron. Provide heavy-duty traffic trench type gratings, covers and frames in all traffic areas; manufactured by Alhambra Foundry Co., Alhambra, CA, McKinley Iron Works, Fort Worth, TX, or Neenah Foundry Co., Neenah, WI., or equal as approved in accordance with Section 01600 for substitutions.
 - (1)** Gratings in traffic areas shall be narrow slot type, with openings not greater than 1/2" with direction of slots placed perpendicular to direction of traffic.
 - (2)** Covers shall be provided with recessed bolt attachment to frame.

END OF SECTION

SECTION 13 31 00 - FABRIC STRUCTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Custom tensioned fabric structure, including fabric, structural steel supporting members, fittings, and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete foundations.
- B. Section 05 12 00 - Structural Steel Framing: Additional requirements for support steel.

1.03 REFERENCE STANDARDS

- A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, including test reports on fabric showing compliance with specified properties.
- B. Shop Drawings: Submit construction drawings including plans, elevations, details, dimensions, support steel sizing, cables and hardware, clamp/corner plates, fittings, fabric, fabric layout seams, and the following:
 - 1. Exact interface geometry determination and definitions.
 - 2. Coordination between fabric and structural supports
 - 3. Interfaces to foundation supports.
 - 4. Design loads used in structural calculations.
 - 5. Foundation reaction loads.
 - 6. Stamp or seal of design engineer.
- C. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Firm that is capable of assuming complete responsibility for design, engineering, fabrication, delivery, preparation, installation, adjusting, cleaning of structure, and the following:
 - 1. Having minimum of five years experience in design and fabrication of tensioned fabric structures of similar size and complexity to that specified.
 - 2. Employing a professional staff and qualified consultants experienced with tensioned fabric structures of similar size and complexity to that specified.
 - 3. Employing integrated CAD and finite element computer software programs to ensure adequacy of design and accurate 3-dimensional computer generated models for fabrication of structure; using CAD system to prepare construction drawings and interface with the plotting and cutting process, ensuring high precision fabric cutting.
 - 4. Providing installation directly supervised by a superintendent, directly employed by contractor, with five years of experience in installation of tensioned fabric structures of similar size and complexity to that specified.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Store materials in accordance with manufacturer's instructions, in a clean, dry, well ventilated area, above ground on blocking, and do not allow materials to become wet, stained, or dirty.
- C. Handle materials so as to protect materials, coatings, and finishes during handling and installation to prevent damage or staining.
 - 1. Handle fabric in accordance with manufacturer's instructions.
 - 2. Use care in handling of fabric to avoid damage to fabric material and coating.

3. Do not damage, crush, or kink cables.

1.07 WARRANTY

- A. Provide manufacturer's standard ten year fabric warranty.
- B. Provide installer's written one year workmanship warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Tensioned Fabric Structures:
 1. Birdair, Inc; _____: www.birdair.com.
 2. Membrane Structure Solutions, Inc; _____: www.membranestructuresolutions.com.
 3. Span Systems, Inc; _____: www.spansystemsinc.com/#sle.
 4. USA Shade: www.usa-shade.com
 5. Substitutions: See Section 01 60 00 - Product Requirements.
 6. Superior Recreational Products.

2.02 TENSIONED FABRIC STRUCTURES

- A. Tensioned Fabric Structure: Provide a custom tensioned fabric structure consisting of fabric stretched on steel structural supports, with the following characteristics:
 1. Capable of withstanding loads specified in ASCE 7 and local building code without damage or failure; for designer's information, project falls under the following design categories:
 2. Capable of maintaining structural integrity in event of a tear propagating in fabric, without endangering occupants.
 3. Shape geometry selected for equilibrium based on stress in fabric.
 4. Having a smooth uniform fabric surface with even curved edges and interfaces and without wrinkles, cuts, abrasions, stains, marks, surface defects, or seaming aberrations.
 5. Configuration as indicated on drawings.
 6. Made of prefabricated components ready for installation.

2.03 MATERIALS

- A. Supporting Steel Members: As specified in Section 05 12 00, unless otherwise specified in this section; steel members are hot-dipped galvanized after fabrication.
- B. Paint for Structural Steel Members, Tensioning Nuts, and Fabric Plates:
- C. Cables and End Fittings: Provide structural cables of same type having same modulus of elasticity.
 1. Cables in Contact with Fabric: PVC sleeved.
 2. Cable Length Tolerance: As indicated on drawings.
 3. Swaged and Speltered Fittings: Design and install to develop full breaking strength of cable.
 4. Thimble End Fittings: Design and install to develop a minimum of 90 percent of breaking strength of cable.
 5. Swaged End Fittings, Pins, Nuts, and Washers: Stainless steel.
 6. Tensioning Nuts and Fabric Plates: Galvanized steel, finished with two coats of epoxy paint.
- D. Shackles, Rigging Screws, Clamps, and Tensioning Hardware: Stainless steel architectural finished material only.
- E. Interior Lighting: Predrill base plates to allow conduit to be installed and cabling to run inside support steel for mounting lights under canopy.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine area to receive structure; notify Architect if area is not acceptable, and do not begin installation until unacceptable conditions have been corrected.
- B. Examine foundations and anchor bolts for location and elevation; notify Architect of inaccuracies, and do not begin installation until unacceptable conditions have been corrected.

3.02 PREPARATION

- A. Prepare an erection plan for all structural and fabric installation activity, including a detailed sequence of the work.
- B. Prepare a clear, flat, smooth, and clean layout area on ground of sufficient size for assembly of fabric panels; prepare area adjacent to location of structure installation.
- C. Check contact surfaces to remove sharp objects, dirt, grease, oil, and other causes for rips, scratching, or other damage to fabric panels during installation.
- D. Use temporary ground sheets where fabric panels are to be dragged across a surface to prevent chaffing or other damage to fabric panel surface.

3.03 INSTALLATION

- A. Comply with pre-established erection plan.
- B. Do not undertake erection of fabric during inclement weather conditions; installer has sole responsibility to determine when conditions are safe for erection.
- C. Install structure in accordance with manufacturer's instructions at location indicated on drawings.
- D. Install structure in necessary sequence and with sufficient bracing to ensure stability throughout installation.
- E. Architect will inspect installed concrete foundations, support steel, cables, and fittings before installation of fabric only to ensure compliance with data submittals.
- F. Install and tension fabric in accordance with manufacturer's instructions.
 - 1. Use care in installation of fabric to avoid damage to base material, coating, and surface treatment.
 - 2. Ensure surfaces of fabric are smooth, uniform, and clean, with even curved edges and interfaces, and with no cuts, scratches, abrasions, stains, marks, blemishes, or welding irregularities.
- G. Repair or replace defective or damaged materials, coatings, and finishes as directed by Architect.

3.04 ADJUSTING

- A. Make final adjustments to structure as required for structural integrity, geometric shape, and free from objectionable wrinkles when viewed from the normally occupied space.

3.05 CLEANING

- A. Clean structure in accordance with fabric manufacturer's instructions.

END OF SECTION

SECTION 26 00 10
BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SCOPE

- A. This section supplements all sections of this division and shall apply to all phases of work hereinafter specified, shown on the drawings, or required to provide a complete installation of electrical systems for the Project. The work required under this division is not limited to the electrical specifications and drawings. Refer to all bid documents including Civil, Architectural, Structural, and Mechanical documents which may designate Work to be accomplished. The intent of the Specifications is to provide a complete and operable electrical system, which shall include all documents that are a part of the entire Project Contract.
 - 1. Work included: Furnish all labor, material, tools, equipment, facilities, transportation, skilled supervision necessary for, and incidental to, performing operations in connection with furnishing, delivery, and installation of the work in this division complete as shown or noted on the Drawings and specified herein.
- B. Related Work Specified Elsewhere:
 - 1. Refer to all sections in the general contract conditions, Contract Requirements and Division 1, General Requirements.
- C. Work Installed but Furnished by Others:
 - 1. The electrical work includes the installation or connection of certain materials and equipment furnished by others. Verify installation details. Foundations for apparatus and equipment will be furnished by others unless otherwise noted or detailed.

1.02 GENERAL REQUIREMENTS

- A. Guarantee See General Conditions:
 - 1. Except as may be specified under other Sections in the specification, guarantee equipment furnished under the specifications for a period of one year, except for equipment required to have a longer guarantee period, from date of final completion. Guarantee all work against defective workmanship, material, and improper installation. Upon notification of failure, correct deficiency immediately and without additional cost to the Owner.
 - 2. Standard warranty of manufacturer shall apply for replacement of parts after expiration of the above period. Manufacturer shall furnish replacement parts to the Owner or his service agency as approved. Furnish to the Owner, through the Architect, printed manufacturer's warranties complete with material included and expiration dates, upon completion of project. Conform to Division 01.
- B. Equipment Safety: All electrical materials and equipment shall be new and shall be listed by Underwriter's Laboratories and bear their label, or listed and certified by a nationally recognized testing authority where UL does not have an approval. Custom made equipment must have complete test data submitted by the manufacturer attesting to its safety.
- C. Codes and Regulations:
 - 1. Design, manufacturer, testing and method of installation of all apparatus and materials furnished under the requirements of these specifications shall conform to the latest publications or standard rules of the following:
 - a. Institute of Electrical and Electronic Engineers - IEEE
 - b. National Electrical Manufacturers' Association - NEMA
 - c. Underwriters' Laboratories, Inc. - UL
 - d. National Fire Protection Association - NFPA
 - e. American Society for Testing and Materials - ASTM
 - f. American National Standards Institute - ANSI

- g. California Electrical Code - CEC, Title 24, Part 3
 - h. California Code of Regulations, Title 8, Subchapter 5
 - i. California Building Code-CBC, Title 24 Parts 1 &2
 - j. State & Municipal Codes in Force in the Specific Project Area
 - k. Occupational Safety & Health Administration - OSHA
 - l. California State Fire Marshal
 - m. California Fire Code- CFC, Title 24 Part 9
 - n. National Electrical Testing Association - NETA
2. The term "Code", when used within the specifications, shall refer to the Publications, Standards, ordinances and codes, listed above. In the case where the codes have different levels of requirements the most stringent rules shall apply.
- D. Requirements of Regulatory Agencies:
- 1. Codes, Permits, and Fees: Where the Contract Documents exceed minimum requirements, the Contract Documents take precedence. Where code conflicts occur, the most stringent shall apply. The most stringent condition shall be as interpreted by the Engineer.
 - a. Comply with all requirements for permits, licenses, fees and Code. Permits, licenses, fees, inspections and arrangements required for the Contractor at his expense shall obtain the Work, unless otherwise specified.
 - b. Comply with the requirements of the applicable utility companies serving the Project. Make all arrangements with the utility companies for proper coordination of the Work.
- E. Shop Drawings:
- 1. See Division 01 for additional requirements.
 - 2. Time Schedules for Submission and Ordering: The Contractor shall prepare, review and coordinate his schedule of submissions carefully, determining the necessary lead time for preparing, submitting, checking, ordering and delivery of materials and equipment for timely arrival. The Contractor shall be responsible for conformance with the overall construction schedule.
 - 3. Submittals will be checked for general compliance with specifications only. The Contractor shall be responsible for deviations from the drawings or specifications and for errors or omissions of any sort in submittals.
 - 4. Submit a complete list of materials and equipment proposed for the job, including manufacturers names and catalog numbers.
 - 5. Shop drawings shall be submitted in completed groups of materials (i.e., lighting fixtures or switchgear). The Contractor shall add and sign the following paragraph on equipment and materials submitted for review. "It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into the project; is in compliance with the Contract Drawings and specifications and can be installed in the allocated spaces". Failure to add the above written statement for compliance will result in return of submittals without review.
 - a. Bind catalog cuts, plate numbers, descriptive bulletins and drawings, 11" x 17" 10.83 inch x 17.13 inch) or smaller, in sets with covers neatly showing titles.
 - b. The Contractor shall verify dimensions of equipment and be satisfied as to Code compliance for fit prior to submitting shop drawings for approval.
 - c. Where current limiting devices are specified, submit technical data to substantiate adequate protection of equipment cascaded downstream. Submittals shall not be reviewed unless supporting calculations and data are submitted therewith.
 - d. Include complete catalog information such as construction, ratings, insulation systems, as applicable.
 - e. For any material specified to meet UL or trade standards, furnish the manufacturers or vendor's certification that the material furnished for the work does in fact equal or exceed such specifications.

- f. Reference listings to the specifications' Sections and Article to which each is applicable.
 - g. Equipment Floor Plans: After approval of material is secured prepare a floor plan of each electrical and communication equipment space, room or yard, drawn to scale at 1/2 inch equals 1 foot and submit for approval in the same manner as for shop drawings. The layout drawings shall be exact scale.
- 6. Contractor shall prepare coordinated drawings when required by Division 01 or where noted otherwise.
- F. Interpretations: The Contractor through the Architect must make Requests for interpretations of drawings and specifications. Any such requests made by equipment manufacturers or suppliers will be referred to the Contractor.
- G. Standard of Quality
 - 1. The contract Drawings and Specifications establish the "MINIMUM STANDARD OF QUALITY" each product and/or system must meet to be considered acceptable. Products of other manufactures will be considered if the product and/or system meet or exceed the "MINIMUM STANDARD OF QUALITY" established by this Contract Document.
 - 2. Items for similar application shall be of the same manufacturer.
 - 3. The label of listing by UL shall appear on all materials and equipment for which standards have been established by the agency.
 - 4. Where codes as listed in Section General Requirement Section of the Specifications that establish label or approved requirements, furnish all materials and equipment with either the required labels affixed or the necessary written approval.
 - 5. Provide the type and quantity of electrical materials and equipment necessary to complete Work and all systems in operation, tested and ready for use.
 - 6. Provide and install all incidental items that belong to the Work described and which are required for complete systems.
 - 7. All switchboards, distribution boards, panel boards and circuit breakers shall be of the same manufacturer.
 - 8. All wiring devices such as switches and receptacles shall be of the same manufacturer.
- H. Substitutions: Refer to Division 01
- I. Submit comprehensive material list, shop drawings and complete technical data for the following equipment and materials:
 - 1. General Requirements:
 - a. Panelboards.
 - b. Conduits
 - c. Conductors, include all selected insulation types.
 - d. Fuses
 - e. Disconnect switches and Starters.
 - f. Pullboxes, manholes and handholes.
 - g. Standard lighting fixtures, specially fabricated fixtures, ballasts and lamps, with samples and sample of standard finish available (where requested).
 - h. Control devices, standard and special receptacles, switches, outlets and finish device plates.
 - i. Cabinets for signal and telephone system, special terminals and cabinets. Include all cabinet dimensions.
 - j. Fire alarm system.
- J. Utility Service:
 - 1. Contractor shall verify the locations shown on the drawings and shall include extensions of lines to building service from locations which are acceptable to the Owner.
 - 2. Verify electrical, civil, architectural and structural, dimensional and other requirements with the Owner.

3. Should any major modifications to the work indicated be necessary to comply with the Owner requirements, notify the Architect.
- K. Record Drawings: Refer to Division 01, Contract Closeout.
- L. Work Responsibilities:
1. The drawings indicate diagrammatically the desired locations or arrangement of conduit runs, outlets, junction boxes and equipment and are to be followed. Execute the work so as to secure the best possible installation in the available space and to overcome local difficulties due to space limitations. The Contractor is responsible for the correct placing of his work. Where conflicts occur in plans and/or specifications, the most stringent application shall apply and shall be part of the base bid.
 2. Locations shown on architectural plan or on wall elevations shall take precedence over electrical plan locations, but where a major conflict is evident, notify the Architect.
 3. In the event minor changes in the indicated locations or arrangement are necessary due to developed conditions in the building construction or rearrangement of furnishings or equipment or due to interference with other trades, such changes shall be made without extra cost.
 4. Verify dimensions and the correct location of Owner-Furnished equipment before proceeding with the roughing-in of connections.
 5. All scaled and figured dimensions are approximate of typical equipment of the class indicated. Before proceeding with work carefully check and verify dimensions and sizes with the drawings to see that the furnished equipment will fit into the spaces provided without violation of applicable Codes.
 6. Should any changes to the work indicated on the drawings or described in the specifications be necessary in order to comply with the above requirements, notify the Architect.
 7. Contractor shall be responsible for coordination of coordinated drawings when required by the Architect.
 8. Replace or repair, without additional compensation any work which does not comply with or which is installed in violation of any of these requirements.
- M. Installation General: For special requirements, refer to specific equipment under these requirements.
1. Unless otherwise specified elsewhere in the specifications, do all excavating necessary for the proper installation of the electrical work.
 2. Locations of Openings: Locate chases, shafts and openings required for the installation of the electrical work during framing of the structure. Do any additional cutting and patching required. Cutting or drilling in any structural member is prohibited without approval of the Architect. Furnish all access panels to make all boxes, connections and devices accessible as required by CEC.
 3. Location of Sleeves: Where conduits pass through concrete walls, suspended slabs or metal deck floors, install sleeves of adequate size to permit installation of conduit. Sleeves shall be installed prior to pouring of concrete and shall have ends flush with the wall or extend 2 inches above floor surfaces. Verify locations.
 4. Wherever conduit extends through roof, install flashings in accordance with drawings and details.
 5. Contractor shall be responsible for cutting and patching which may be required for the proper installation of the electrical work.
 6. Protect work, materials and equipment and provide adequate and proper storage facilities during the progress of the work. Storage outdoors shall be weather protected and shall include space heaters to prevent condensation. Provide for the safety and good condition of all work until final acceptance of the work. Replace all damaged or defective work, materials and equipment before requesting final acceptance.

7. Conduit and Equipment to be Installed: Clean thoroughly to remove plaster, spattered paint, cement and dirt on both exterior and interior. All underground conduits shall be mandrelled prior to pulling wire.
 8. Conduit and Equipment to be Painted: Clean conduit exposed to view in completed structure by removing plaster and dirt. Remove grease, oil and similar material from conduit and equipment by wiping with clean rags and suitable solvents in preparation for paint.
 9. Items with Factory Finish: Remove cement, plaster, grease and oil, and leave surfaces, including cracks and corners, clean and polished. Touch up scratched or bare spots to match finish.
 10. Site Cleaning: Remove from site all packing cartons, scrap materials and other rubbish on a weekly basis. Vacuum out all cabinets, switchgear and panels and junction boxes prior to pulling any conductors.
 11. Electrical equipment and materials exposed to public and in finished areas shall be finish-painted after installation in accordance with the Painting Section. All exposed screw-type fasteners, exterior, or interior in restrooms, shall be vandal-resistant spanner type; include tool.
- N. Excavation, Cutting and Patching:
1. Excavating, trenching and backfilling required for the work of this Division in accordance with the applicable requirements of Division 2. Excavating and backfilling connected with electrical work, repaving cuts and providing and maintaining protective measures for the electrical work excavation required by the governing authorities having jurisdiction shall be performed as a part of the work of this Division.
 2. Verify openings indicated on the drawings. Provide all cutting, patching and reinforcement of the construction of the building as required to install electrical work.
- O. Tests
1. Equipment and systems for which the National Electrical Testing Association (NETA) has an approved or recommended procedure, shall be tested in accordance with that procedure. Test values shall equal values recommended by NETA. Copies of test reports shall be submitted as required under shop drawing submittals.
 2. Resistance to ground tests shall be accomplished by a qualified independent testing firm to measure resistance to ground at grounding electrodes. Make tests before slabs or affected areas are poured in order that corrective measures, if required, may be taken. Submit a report showing the results of these measurements. If the resistances exceed values specified elsewhere or NETA test procedure recommendations, perform corrective measures required to reduce resistance to acceptable values.
 3. Prior to energizing any motor, measure the service voltage for phase balance and report if unbalance exceeds 1% from mean.
 4. Measure the three-phase voltage at no load and at maximum load conditions and submit to the engineer a report showing the results of these measurements.
 5. Upon completion of the work and adjustment of all equipment, conduct an operating test. Conduct the test in the presence of an authorized representative of the Owner's Representative. Demonstrate system and equipment to operate in accordance with requirements of the Contract Documents and to be free from electrical and mechanical defects. Provide systems free from short circuits and grounds and show an insulation resistance between phase conductors and ground not less than the requirements of the governing electric code. Test circuits for proper neutral connection.
 6. Complete tests prior to final inspection of project, including corrective work based on the results of the tests.
 7. Perform special tests on systems and equipment as specified herein using personnel qualified to perform such tests.

- P. Protection: Protect finish parts of the materials and equipment against damage during the progress of the work and until final completion and acceptance. Cover materials and equipment in storage and during construction in such a manner that no finished surfaces will be damaged or marred. Keep moving parts clean, dry and lubricated.
- Q. Cleaning Up:
1. Upon completion of the work and at various time during the progress of the work, remove from the building all surplus materials, rubbish and debris resulting from the work of this Division.
 2. Thoroughly clean switchgear including busses, apparatus, exposed conduit, metal work including the exterior and interior, and accessories for the work of this Division, of cement, plaster and other deleterious materials; remove grease and oil spots with cleaning solvent; carefully wipe surfaces and scrape cracks and corners clean.
 3. Thoroughly polish chromium or plated work. Remove dirt and stains from lighting fixtures.
 4. Leave the entire installation in a clean condition.
- R. Completion:
1. The work will not be reviewed for final acceptance until operating and maintenance data, manufacturer's literature, panel directories and nameplates specified herein have been approved and properly posted or installed and final cleaning of equipment and premises has been completed.
 2. When the installation is complete and adjustments have been made, operate the system for a period of one week, during which time demonstrate that systems are completed and operating in conformance with the specifications.
- S. Operating and Maintenance Data: Submit complete and at one time, prior to acceptance of the installation, 4 copies of manufacturer's instructions for operation and maintenance of electrical equipment, including replacement parts lists. As specified in Division 01
- T. Inspection and Acceptance Procedures: The Architect will submit observation reports periodically during the construction phase detailing Contract deficiencies. The Contractor is responsible for making corrections immediately. Notice of Completion of the project will not be made until all items have been corrected.
- U. Final Completion of Electrical Systems:
1. Prior to Final Completion of operating electrical systems, the Contractor shall:
 - a. Provide materials of the type and quality specified and as necessary for proper operation, tested and ready for use.
 - b. Furnish the required Operating and Maintenance Data/Manuals.
 - c. Clean up of the project pertaining to this Division of the work.
 - d. After installation has been completed and adjustments made, operate the system for a period of one week, during which time, demonstrate to the Architect that systems are complete and operating in conformance with Contract Documents.
 - e. Conduct tests required and as specified in this Division and submit test reports and corrective actions taken.
 - f. Submission of warranties and guarantees.
 2. Final Completion of Work Shall be Contingent On:
 - a. Contractor replacing defective materials and workmanship.
 - b. Upon completion of work and adjustments made, Contractor shall conduct an operating test for each system for approval at such time as Architect directs. Conduct test in presence of authorized representative of Architect and demonstrate that systems and equipment do operate in accordance with requirements of the Contract Documents and are free from electrical and mechanical defects.
 - c. Contractor shall provide the necessary training programs and instructions to the Owner's representative. Number of hours shall be a minimum of four (4) hours for each system or days as required under separate Sections of these Specifications.

Complete operation and maintenance manuals shall be provided at least two (2) weeks prior to training.

- d. Submit copies of manufacturer's instructions and maintenance of electrical equipment including replacement parts lists. Each set shall include one set of shop drawings of equipment installed.
- V. Submittals for Change Orders: When changes are made during the construction phase, deletions and additions shall be presented in a manner that will indicate the cost of each item of material and corresponding labor. Markup shall be then added in accordance with the requirements of the General Conditions as modified by the Supplementary Conditions.
- W. The Contractor at a time convenient to the Owner shall provide instruction to the Owner's operating personnel in the proper operation and maintenance of all equipment and systems. The instructors shall have received factory training and shall be thoroughly familiar with the equipment installed. The operating personnel shall receive the number of days instruction as indicated in other sections.

1.03 PROJECT RECORD DOCUMENTS

- A. Record Drawings: CAD: Use a computer aided drafting (CAD) system in the preparation of record drawings for this Project. Acceptable CAD systems shall be capable of producing files in AutoCAD Version 2012 compatible DWG or DXF format. Owner's consultant will furnish CAD backgrounds for use by the Contractor after construction is 85% complete except where prohibited by Contract.
- B. Record Set During the Work: At site, maintain at least one set of Drawings as a Field Record Set. Also maintain at least one copy of all Addenda, Modifications, approved submittals, correspondence, and transmittals at site. Keep Drawings and data in good order and readily available to Architect and Owner.
- C. Changes: Clearly and correctly mark Record Drawings to show changes made during the construction process at the time the changed work is installed. No such changes shall be made in the work unless authorized by the Architect.
- D. Final Record Drawings: Conform to Division 01 requirements.
- E. Preparation of Final Record Drawings: Contractor shall transfer recorded changes in the work indicated on the Field Record Set to the record set. Changes shall be neatly and clearly drawn and noted by skilled draftsmen, and shown technically correct.
- F. Approval: Prior to Architect's inspection for Substantial Completion, submit the Final Record Drawings to the Architect for review, and make such revisions as may be necessary for Final Record Drawings to be a true, complete, and accurate record of the work.
- G. Manuals: Obtain data from the various manufacturers and submit instruction, operation, and maintenance manuals as required and to the extent required under other Sections.
- H. At all times when the work is in progress, maintain at the workplace, fabrication shop or Project Site as applies, a complete separate, clean, undamaged set of the latest stamped, actioned submittals. As work progresses, maintain records of "as installed" conditions on this set in suitable ink or chemical fluid. Update the set daily. After successful completion of Project Site testing specified herein, and after completion of Punch List corrections, copy all records of "as installed" conditions on to originals.
- I. Quantity:
 - 1. Review sets: As for Shop and Field Drawings.
 - 2. Record set: Refer to Division 01.
- J. Content: All drawings required under "Field and Shop Drawings". Show "as installed" condition. Where room designations according to Project permanent signage differ from construction designations in the Contract Documents, show both designations.
- K. Warranty Certificates: Comply with Division 01.

PART 2 - COMMISSIONING**2.01 COMMISSIONING OF ELECTRICAL SYSTEMS**

- A. Include cost for commissioning requirements in the contract price.
- B. Attend commissioning meetings scheduled by the CxA.
- C. Prepare preliminary schedule for indoor lighting system inspections, O&M manual submission, training sessions, lighting controls testing, system verification, performance testing, and system completion for use by the CxA. Update schedule as appropriate throughout the construction period and provide updated schedule to the commissioning team.
- D. Verify proper installation and performance of all electrical services provided.
- E. Complete Title 24 Certificate(s) of Installation and manufacturer's pre-start checklists prior to scheduling startup of HVAC and electrical equipment.
 - 1. Retain Certificate(s) of Installation in a 3-ring binder in an organized fashion. Binder is to remain on the job site
 - 2. Make Certificate(s) of Installation available for CxA review upon request.
 - 3. Retain calibration records for equipment provided with manufacturer calibrated sensors in the Certificate(s) of Installation binder.
- F. Where applicable, complete the Certificate(s) of Acceptance per the contract documents.
 - 1. Retain Certificate(s) of Acceptance in a 3-ring binder in an organized fashion. Binder is to remain on the job site
 - 2. Provide copies of all Certificate(s) of Acceptance to the CxA.
 - 3. Certificate(s) of Acceptance shall be conducted by companies who are certified as California Advanced Lighting Controls Training Program Acceptance Technician (CALCTP-AT) employer and only completed by those employees of said company who are certified to complete the respective acceptance test.
- G. Monitor and respond to Resolution Tracking Forms distributed by the CxA in order to expedite corrective actions necessary to achieve design intent.
- H. Participate in the Certificate(s) of Acceptance and Functional Performance Tests as required to achieve design intent.
- I. Participate in the opposite-season testing as required to achieve design intent.
- J. Participate in O&M Training as required by project specifications.
- K. Ensure participation of major equipment manufacturers and their representatives as applicable.
- L. Obtain O&M data on all equipment and assemble in binders using tabs as required.
- M. Conduct a maintenance orientation and inspection with hands on training per the contract documents.
- N. Provide written certification and completed Certificate(s) of Installation forms and checklists documenting that the following work has been completed in accordance with the plans and specifications and that they are functioning as designed.
 - 1. Correct labeling of all circuits with connected equipment.
 - 2. Lighting system controls operations, including occupancy sensors, automatic time controls or Energy Management control, override timers, manual dimming controls, exterior lighting controls, multi-level switching, as applicable to the Work.

END OF SECTION

SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 2 PRODUCTS

1.01 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- D. Comply with NEMA WC 70.
- E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- G. Conductor Material:
 - 1. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
 - 2. Tinned Copper Conductors: Comply with ASTM B33.
- H. Conductor Color Coding:
 - 1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
 - 2. Color Coding Method: Integrally colored insulation.
 - 3. Color Code:
 - a. Equipment Ground, All Systems: Green.

1.02 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

END OF SECTION

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 2 PRODUCTS

1.01 GROUNDING AND BONDING REQUIREMENTS

- A. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

1.02 GROUNDING AND BONDING COMPONENTS

- A. General Requirements:
 - 1. Provide products listed, classified, and labeled as suitable for the purpose intended.
 - 2. Provide products listed and labeled as complying with UL 467 where applicable.
- B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 05 26:
 - 1. Use insulated copper conductors unless otherwise indicated.
 - a. Exceptions:
 - 1) Use bare copper conductors where installed underground in direct contact with earth.
 - 2) Use bare copper conductors where directly encased in concrete (not in raceway).
- C. Connectors for Grounding and Bonding:
 - 1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
 - 2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
 - 3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.

END OF SECTION

SECTION 26 05 29
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 2 PRODUCTS

1.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 - 1. Comply with the following. Where requirements differ, comply with most stringent.
 - a. NFPA 70.
 - b. Requirements of authorities having jurisdiction.
 - 2. Provide required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for complete installation of electrical work.
 - 3. Provide products listed, classified, and labeled as suitable for purpose intended, where applicable.
 - 4. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for load to be supported with minimum safety factor of _____. Include consideration for vibration, equipment operation, and shock loads where applicable.
 - 5. Do not use products for applications other than as permitted by NFPA 70 and product listing.
 - 6. Steel Components: Use corrosion-resistant materials suitable for environment where installed.
 - a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps and clamps suitable for conduit or cable to be supported.
 - 1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
 - 2. Conduit Clamps: Bolted type unless otherwise indicated.
- C. Outlet Box Supports: Hangers and brackets suitable for boxes to be supported.
- D. Metal Channel/Strut Framing Systems:
 - 1. Description: Factory-fabricated, continuous-slot, metal channel/strut and associated fittings, accessories, and hardware required for field assembly of supports.
 - 2. Comply with MFMA-4.
- E. Hanger Rods: Threaded, zinc-plated steel unless otherwise indicated.
- F. Anchors and Fasteners:
 - 1. Unless otherwise indicated and where not otherwise restricted, use anchor and fastener types indicated for specified applications.

END OF SECTION

**SECTION 26 05 33.13
CONDUIT FOR ELECTRICAL SYSTEMS**

PART 2 PRODUCTS

1.01 CONDUIT - GENERAL REQUIREMENTS

- A. Comply with NFPA 70.
- B. Provide conduit, fittings, supports, and accessories required for complete raceway system.
- C. Provide products listed, classified, and labeled as suitable for purpose intended.
- D. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

END OF SECTION

SECTION 26 05 33.16
BOXES FOR ELECTRICAL SYSTEMS

PART 2 PRODUCTS

1.01 BOXES

- A. General Requirements:
1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
 2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
 3. Provide products listed, classified, and labeled as suitable for the purpose intended.
 4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
 5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
 2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
 3. Use suitable concrete type boxes where flush-mounted in concrete.
 4. Use suitable masonry type boxes where flush-mounted in masonry walls.
 5. Use raised covers suitable for the type of wall construction and device configuration where required.
 6. Use shallow boxes where required by the type of wall construction.
 7. Do not use "through-wall" boxes designed for access from both sides of wall.
 8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
 9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
 10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
 11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
 12. Wall Plates: Comply with Section 26 27 26.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
1. Comply with NEMA EN 10250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
 2. NEMA EN 10250 Environment Type, Unless Otherwise Indicated:
 3. Junction and Pull Boxes Larger Than 100 cubic inches:
 - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.

END OF SECTION

**SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS**

PART 2 PRODUCTS

1.01 IDENTIFICATION REQUIREMENTS

- A. Identification for Equipment:
 - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
 - 2. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70 including but not limited to the following.
 - a. Service equipment.
 - b. Industrial control panels.
 - c. Motor control centers.
 - d. Elevator control panels.
 - e. Industrial machinery.
- B. Identification for Conductors and Cables:
 - 1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 05 19.
 - 2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

1.02 IDENTIFICATION NAMEPLATES AND LABELS

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

1.03 WARNING SIGNS AND LABELS

- A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
- B. Warning Signs:
 - 1. Materials:
 - 2. Minimum Size: 7 by 10 inches unless otherwise indicated.
- C. Warning Labels:
 - 1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
 - 2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
 - 3. Minimum Size: 2 by 4 inches unless otherwise indicated.

END OF SECTION

SECTION 31 22 00 GRADING

PART 1 - GENERAL

1.1 SUMMARY

- A. Provisions of Division 01 apply to this section.
- B. Section Includes:
 - 1. General exterior grading, cutting and filling, including grading for building area, paving, planting areas, banks and hillsides.

1.2 SYSTEM DESCRIPTION

- A. General:
 - 1. Fees: Pay as required by authorities having jurisdiction over the area.
 - 2. Bonds: Post as required by authorities having jurisdiction over the area.
 - 3. Haul Routes and Restrictions: Comply with requirements of authorities having jurisdiction over the area.
 - 4. Before grading, contact Underground Service Alert of Southern California (USASC) for information on buried utilities and pipelines.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials shall conform to requirements specified in this and related sections.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain installed stakes until their removal is required for the Work. Provide replacement grade or location stakes lost or disturbed.
- B. Install grade stakes and compare to indicated grades. If discrepancies are found between existing grades and grades indicated on Drawings, do not proceed until discrepancies are resolved.

3.2 ROUGH AND FINE GRADING

- A. Rough grade area sufficiently high to require cutting by fine grading:
 - 1. Grade area for bituminous surfacing and other paving to the indicated

**SECTION 31 22 00
GRADING**

grades, equal to the section of the indicated base and pavement.

2. Slope banks to required finish grades as cut progresses or leave cuts full and finish grade by mechanical equipment to provide grades and soil densities indicated on the Drawings.
3. Rough grade, fill and compact banks beyond indicated finish grades. Finish grade banks and slopes to indicated grades and specified soil densities.
4. Grade Only Areas: In areas not indicated to receive pavement, rough grade to approximate finish grades and then scarify, moisten and roll to obtain required density and indicated finish grades.
5. Tolerances: Finish grades shall be within a tolerance of 0.05 inch per foot above or below grades indicated. Provide an average grade as indicated.

B. Base or Subgrade:

1. After subgrade has been constructed to approximate required grades, scarify to a depth of at least 6 inches:
 - a. After scarifying, process loosened material to a finely divided condition and adjust moisture content to optimum condition by addition of water, addition and blending of dry suitable material, or by drying of existing material.
 - b. Subgrade material shall be compacted by tamping, sheepsfoot rollers or pneumatic tire rollers. Required relative compaction shall be 95 percent minimum for the top 6 inches below subgrade.
 - c. Base Course.
2. Tolerance of completed grades of base or subgrade shall not vary more than 0.03 inch per foot from grades indicated. Provide an average grade as indicated.

3.3 SHORING

- A. Provide shoring as necessary to properly and safely support earth sides of excavations, and existing curbs, sidewalks, gutter, drives and stairs, against movement and collapse.
- B. Design and Calculations: Provide in accordance with requirement of governing California Building Code and Safety Orders of State of California, Division of Industrial Safety; Title 8, Subchapter 4, Article 6, Sections 1530 and 1541.
- C. Remove shoring upon completion of the Work of this section or when no longer needed unless required otherwise by authorities having jurisdiction.

**SECTION 31 22 00
GRADING**

3.4 EXCESS MATERIAL DISPOSAL

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

3.5 PROTECTION

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

END OF SECTION

SECTION 31 23 00
EXCAVATION, BACKFILLING and COMPACTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Provisions of Division 01 apply to this section.
- B. Section Includes:
 - 1. Excavating, filling, backfilling, and compacting for Project site pavement, planting areas, buildings, and other structures.
 - 2. Trenches for utility lines such as water, gas, irrigation, storm drain and sewer lines, concrete-encased conduits, manholes, vaults, valve boxes, catch basins, underground tanks, thrust blocks, yard boxes, pull boxes, and other utility appurtenances.

1.2 SYSTEM DESCRIPTION

- A. Import and Export of Earth Materials:
 - 1. Fees: Pay as required by authorities having jurisdiction over the area.
 - 2. Bonds: Post as required by authorities having jurisdiction over the area.

**SECTION 31 23 00
EXCAVATION, BACKFILLING and COMPACTING**

3. Haul Routes and Restrictions: Comply with requirements of authorities having jurisdiction over the area.

1.3 SUBMITTALS

- A. Imported Soils: A geotechnical engineer, retained by the Owner as an Owner Consultant, shall obtain initial product Sample for testing in accordance with the terms of sub-section 3.05 of this section.
- B. Shoring calculations as required in sub-section 3.03 of this section.

1.4 QUALITY ASSURANCE

- A. Comply with the Standard Specifications for Public Works Construction, current edition, except as modified herein.
- B. Sampling, testing, and certification of imported and/or exported soils shall be performed in accordance with Section 01440.

1.5 PROJECT CONDITIONS

- A. Information on Drawings or in soil investigation report does not constitute a guarantee of accuracy or uniformity of soil conditions over the Project site.
- B. A copy of the foundation investigation and soils report is available for examination at the Architect's office during regular office hours of Architect.

PART 2 - PRODUCTS

2.1 FILL AND BACKFILL MATERIALS

- A. Fill and backfill material shall be a granular material previously removed from excavation or imported fill material, free of clods and stones larger than 3 inches, (2½ inches for utility trenches) foreign materials, vegetable growths, sod, expansive soils, rubbish and debris. Material shall conform to these specified requirements and related sections.
- B. Fill material exhibiting a wide variation in consistency and/or moisture content shall be blended and/or aerated to stabilize and upgrade the material.
- C. Bedding material from trench bottom to one foot above the pipe:
 1. Sand, gravel, crushed aggregate or native free-draining granular material providing a sand equivalent of at least 30 or a coefficient of permeability greater than 1.4 inches per hour.
 2. Sand complying with the Specifications for cement concrete aggregates.
- D. Other Fill Materials: Brick rubble and broken concrete originating from the Project site may be legally disposed of off the Project site, or incorporated in fill, if reviewed by a geotechnical engineer, retained by the Owner as an Owner Consultant. Unless otherwise indicated, no such material shall be imported from outside the Project site.

**SECTION 31 23 00
EXCAVATION, BACKFILLING and COMPACTING**

E. Permeable Backfill:

1. Provide permeable backfill material behind retaining structures consisting of gravel, crushed gravel, crushed rock, natural sands, manufactured sand, or combinations of these materials conforming to the following gradations:

<u>Sieve Size:</u>	<u>Percentage Passing:</u>
3/4 inch (19mm)	100
3/8 inch (10mm)	80-100
No. 100	0-8
No. 200	0-3

2. Those portions of fill material passing a No. 4 sieve shall provide a sand equivalent of at least 60.
3. Provided backing for weep-holes shall consist of 2 cu. ft. of aggregate in burlap sacks, securely tied. Aggregate shall conform to requirements for No. 3 concrete aggregate as specified in subsection 200-1.4 of the Standard Specifications for Public Works Construction.
4. Permeable Backfill Alternate Materials: Instead of the materials specified for retaining structures backfill, a drainage matting system such as Miradrain by Mirafi, Inc., or equal, may be provided if reviewed by the Architect.

- F. Cement-sand slurry shall be provided with 1 sack of cement per cubic yard of the mixture.

2.02 BASE MATERIALS

- A. Concrete Slabs on Grade: Provide "Crushed Aggregate Base" as specified in Standard Specifications for Public Works Construction, Section 200 - Rock Materials, with 3/4 inch maximum size aggregates. Provide 3 inch thick base, unless noted otherwise.
- B. Bituminous Surfacing: Provide as indicated on Drawings and specified in Section 32 11 23 - Base Course.

PART 3 - EXECUTION

3.1 GENERAL

- A. Before excavation, contact Underground Service Alert of Southern California (USASC) for information on buried utilities and pipelines.
- B. Where the Work includes a building extension or addition on an occupied Project site, perform Work in such a manner, and at such times, as not to disrupt performance of existing utility services to existing Project site facilities. Where an interruption is necessary, obtain review from the OAR before proceeding.
- C. Remove concrete or bituminous pavement to straight lines by saw cutting.

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3.2 PROTECTION

- A. Protect and guard excavations against danger to life, limb, and property as required by, but not limited to, OSHA regulations.
- B. Protect existing improvements including landscaping against damage. Repair or replace damaged items.
- C. Protect existing utility services and distribution systems from damage or displacement.
- D. Remove conduits or pipes not in service, exposed during Work, unless a minimum cover of 2 feet is provided. Remove concrete, clay or other non-metallic pipe over 8 inches in diameter, unless otherwise indicated.
- E. Shore, crib, or lag excavations and earthen banks as necessary to prevent cave in, erosion or gulying of sides.
- F. Provide excavations free from standing water by pumping, draining, or providing protection against water intrusion. If soil becomes soft, soggy, or saturated, excavate to firm undisturbed earth and fill as required. Slope adjacent grades away from excavations to minimize entry of water.

3.3 SHORING

- A. Provide shoring as necessary to properly and safely support earth sides of excavations, and existing curbs, sidewalks, gutter, drives and stairs, against movement and collapse.
- B. Design and Calculations: Provide in accordance with requirement of governing California Building Code and Safety Orders of State of California, Division of Industrial Safety; Title 8, Subchapter 4, Article 6, Sections 1530 and 1541.
- C. Remove shoring upon completion of the Work of this section or when no longer needed unless required otherwise by authorities having jurisdiction.

3.4 EXCAVATION

- A. Unclassified Excavations: Comply with the Standard Specifications for Public Works Construction, Section 300: "Earthwork", except as modified herein.
- B. Form sides of footings, pads, grade beams, and slab foundations, unless otherwise indicated. Provide excavations of sufficient size to permit installation and removal of forms and other required Work.
- C. Machine-drill excavation for round footings to size and depth indicated. Provide a collar or casing, or other adequate protection, to exclude dirt and debris. Protect excavations with plank covers until concrete is placed.
- D. Provide excavation bottoms level and free from loose material. Excavate to indicated or required elevations of undisturbed earth.

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- E. Barricade trenches, ditches, pits, sumps, and similar Work outside the barricaded working area with chain link fence as specified in Section 01500: Construction Facilities and Temporary Controls, and in accord with Cal-OSHA standards and requirements.
- F. Trenches over 5 feet in depth shall comply with the Construction Safety Orders of the California Division of Industrial Safety.
- G. Where indicated and/or required to excavate in lawn areas, protect adjoining lawn areas outside of the Work area. Replace or install removed sod upon completion of backfill by installing sod level with adjacent lawns. If installation of removed sod fails, furnish sod and install to match existing lawns.
- H. For Structures:
 - 1. Calculate excavation quantities based on elevations or depths indicated on Drawings.
 - 2. Provide 2000 psi concrete for backfill of over-excavated areas to indicated or required elevations.
 - 3. Special preparation of B.E.P. areas: Excavate areas designated on Drawings as bottom of excavated planes (B.E.P.), by excavating and filling to indicated grades and elevations.
- I. For Utilities:
 - 1. Excavate trenches to required depth for utility lines, such as pipes, conduits, and tanks, with minimum allowance of 6 inches at the bottom and 6 inches at the sides for bedding or concrete encasement as indicated on Drawings. Grade bottom of trenches to a uniform smooth surface. Remove loose soil from the excavation before placing sand bedding or concrete encasement.
 - 2. Do not install piping lengthwise under concrete walks without review by the Architect.
 - 3. Do not excavate trenches parallel to footings closer than 18 inches from the face of the footing or below a plane having a downward slope of 2 horizontal to one vertical, from a line 9 inches above bottom of footings.
 - a. Unless otherwise indicated on Drawings, depth of excavations outside buildings shall provide for a minimum coverage above top of piping, tank or conduit measured from the lowest adjoining finished grade, as follows:

Steel Pipe	24 inches below finish grade
Copper Water Tube	18 inches below finish grade
Cast-Iron, Pressure Pipe	36 inches below finished grade
Plastic Pipe (other than waste)	30 inches below finished grade
Tanks or other structure	36 inches below finished grade

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EXCAVATION, BACKFILLING and COMPACTING

Soil, sewer & storm drain	minimum 18 inches below finished grade, and as required for proper pitch and traffic load. Install polypropylene sewer pipe with at least 24 inches of coverage.
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Irrigation Pipe:	Non-pressure pipe - 12 inches, pressure pipe - 24 inches.
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- b. Trench width shall provide space for fitting and joining. Excavate for piping bells and fittings, bell and spigot pipe and other fittings.
- 4. Where portions of existing structures, walks, paving, or other improvements are removed or cut for piping or conduit installation, replace the material with equal quality, finished to match adjoining existing improvements. Repair pavement as specified in Section 32 10 00 - Pavement Repair.
- 5. Provide a minimum clear dimension of 2 inches from sides of wall excavation to outer surfaces of buried pipes or conduits placed in the same trench or outside surfaces of containers and/or tanks.

3.5 IMPORT/EXPORT OF MATERIALS

- A. Unclassified Fill and Compaction: Comply with the Standard Specifications for Public Works Construction, Section 300 - Earthwork, except as modified herein. Install and compact fill in layers not to exceed 6 inches in thickness.
- B. Provide fill materials as specified in Part 2- Products. If excavated materials from the Project site are not of required quality or sufficient quantity, import additional materials as necessary.
- C. In addition to the requirements of this section, import and/or exported materials shall comply with the requirements of Section 32 24 00.
- D. Imported fill materials shall be sampled by a geotechnical engineer, retained by the Owner as an Owner Consultant, for compliance with the requirements of Part 2 of this section.
- E. A geotechnical engineer, retained by the Owner as an Owner Consultant, shall submit the samples to a independent DSA approved testing laboratory for testing.
- F. Initial sampling and testing shall be performed before importing material to the Project site. Identify the location of the source site in addition to the address, name of the person and/or entity responsible for the source site. A geotechnical engineer, retained by the Owner as a Owner Consultant, shall obtain both the initial and additional samples from the identified site and submit all samples for required testing.
- G. The geotechnical engineer, retained by the Owner as an Owner Consultant, shall perform additional sampling during import operations. If the total quantity of import is determined to be greater than 1000 cubic yards of material, one sample shall be obtained and submitted for testing for each 250 cubic yards of imported

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material. If the total quantity of import is determined to be less than 1000 yards, one sample shall be obtained and submitted for testing for each 100 cubic yards of imported material.

- H. The independent approved testing laboratory shall perform the required tests and report results of all tests noting if the tested material passed or failed such tests and shall furnish copies to the PI, Architect, OAR, DSA, Contractor, and others as required. Report shall state tests were conducted under the responsible charge of a licensed State of California professional engineer and the material was tested in accordance with applicable provisions of the Contract Documents, Title 24, CCR and the DSA. Upon completion of the Work of this section, the independent testing laboratory and geotechnical engineer shall submit a verified report to the DSA as required by Title 24, CCR.
- I. Bills of lading or equivalent documentation will be submitted to the PI on a daily basis.
- J. Upon completion of import operations, provide the OAR a certification statement attesting that all imported material has been obtained from the identified source site.

3.6 INSTALLATION OF MATERIALS

- A. Pavement: Fill or backfill materials shall be installed in horizontal layers of 6 inches, unless otherwise required. Each layer shall be evenly placed and moistened or aerated as necessary. Unless otherwise reviewed by the geotechnical engineer, retained by the Owner as an Owner Consultant, each layer of fill material shall cover the length and width of the area to be filled before the next layer of material is installed. Top surface of each layer shall be installed to an approximate level with a crown or crossfall of at least 1 in 50, but not more than 1 in 20. Provide adequate drainage at all times during installation of the Work of this section.
- B. Structures:
 - 1. After concrete has been placed, forms removed, and concrete Work inspected, backfill excavations with earth to indicated or required grades. Backfill simultaneously on each side of walls or grade beams. Remove rubbish, debris and other waste materials from excavations before placing backfill.
 - 2. Before placing any backfill, adequately cure concrete and provide bracing, if required to stabilize structure. Protect waterproofing or damp-proofing against damage during backfilling operations, with required protection board. Remove bracing as backfill operation progresses.
 - 3. Do not furnish or install expansive soils for retaining wall backfill.
 - 4. Rigidly control the amount of water to be installed to provide optimum moisture content for type of fill material furnished. Do not over-saturate or compact by flooding or jetting.
 - 5. Install wall backfill before installing railings and fences on walls.

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6. Install weep hole drainage at the backside of walls so the backing completely covers the weep holes, is horizontally centered and extends at least 12 inches above the bottom of the weep opening. Provide an 8 inch square section of 1/4 inch galvanized or aluminum screen, with a minimum wire diameter of 0.03 inch, and install at the backside of each weep hole before installing the backfill material.
 7. Where a reviewed drainage matting system is provided instead of permeable backfill for retaining structures, install in accordance with the manufacturer recommendations.
- C. Utilities:
1. Do not install backfill until the Work of this section has been inspected and tested. Do not furnish or install materials excavated from the Project site containing materials not permitted for backfill.
 2. Backfill electrical or other excavated utility trenches located outside of barricaded installation areas within 24 hours after inspection by the PI.
 3. Install backfill in layers not exceeding 4 inches in thickness, except cement-sand slurry.
 4. If materials excavated from the Project site are not permitted for trench backfill in paved areas, backfill trenches with a cement-sand slurry mix. Install backfill to an elevation of the existing undisturbed grades plus one inch.

3.7 COMPACTING

- A. Each layer of fill material shall be compacted by tamping, sheep foot rollers, or pneumatic-tired rollers to provide specified relative compaction. At inaccessible locations, provide specified compaction by manually held, operated and directed compaction equipment.
- B. Install and compact sand bedding to provide a uniform bearing under the full length of piping and conduits.
- C. Unless otherwise indicated, compact each layer of fill material to a relative compaction of at least 95 percent.
- D. When fill materials, or a combination of fill materials, are encountered or provided which develop densely packed surfaces as a result of installation or compacting operations, scarify each layer of compacted fill before installing the next succeeding layer.

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EXCAVATION, BACKFILLING and COMPACTING**

3.8 INSPECTION AND TESTING

- A. The geotechnical engineer, retained by the Owner as an Owner Consultant, will inspect and test excavations, sample material quality for testing as set required in Part 2, and observe installation/compaction of fill materials.
- B. The geotechnical engineer, retained by the Owner as an Owner Consultant, will sample imported fill materials from their designated source and submit all samples to the independent approved testing laboratory before delivery to the Project site.
- C. Installation of backfill shall be observed by the geotechnical engineer, retained by the Owner as an Owner Consultant.
- D. The geotechnical engineer, retained by the Owner as an Owner Consultant, will inspect and test excavation Work before the installation of fill and/or other materials.
- E. Compaction: Test compaction in accordance with ASTM D 1557, Method C.
- F. DSA will inspect foundation excavations when completed and ready for forms, after forms are in place, and before first placement of concrete.

3.9 PROTECTION

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

3.10 CLEANING

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

END OF SECTION

SECTION 31 23 16
EXCAVATION, BACKFILLING and COMPACTING for PAVEMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Provisions of Division 01 apply to this section.
- B. Section Includes:
 - 1. Excavating, backfill, and compacting for paved areas.
 - 2. Installation of fill materials.

1.2 SYSTEM DESCRIPTION

- A. Import and Export of Earth Materials:
 - 1. Fees: Pay as required by authorities having jurisdiction over the area.
 - 2. Bonds: Post as required by authorities having jurisdiction over the area.
 - 3. Haul Routes and Restrictions: Comply with requirements of authorities having jurisdiction over the area.

1.3 SUBMITTALS

- A. Imported Soils: A geotechnical engineer, retained by the Owner as a Owner Consultant, shall obtain initial product Sample for testing in accordance with the terms of sub-section 3.05 of this section.

SECTION 31 23 16
EXCAVATION, BACKFILLING and COMPACTING for PAVEMENT

1.4 QUALITY ASSURANCE

- A. Comply with Standard Specifications for Public Works Construction, current edition, except as modified herein.
- B. Sampling, testing, and certification of imported and/or exported soils shall be performed in accordance with Section 32 24 00.

1.5 PROJECT CONDITIONS

- A. Information on Drawings or in soils report does not constitute a guarantee of accuracy or uniformity of soil conditions over the Project site.
- B. A copy of the foundation investigation and soils report is available for examination at the Architect's office during regular office hours of Architect.

PART 2 - PRODUCTS

2.1 BASE MATERIALS

- A. Concrete Slabs On Grade: Provide "Crushed Aggregate Base " as specified in the Standard Specifications for Public Works Construction, Section 200: "Rock Materials," with $\frac{3}{4}$ inch maximum size aggregates. Provide 3 inch thick base, unless noted otherwise.
- B. Bituminous Surfacing: As indicated on Drawings and specified in Section 32 11 23 - Base Course.

2.2 FILL AND BACKFILL MATERIALS

- A. Fill and backfill materials shall be previously excavated materials or imported fill material, free of clods and stones larger than 3 inches, foreign materials, vegetable growths, sod, expansive soils, rubbish and debris. Material shall conform to these specified requirements and related sections.
- B. Fill material exhibiting a wide variation in consistency and/or moisture content shall be blended and/or aerated to stabilize and upgrade the material.
- C. Imported Fill Material:
 - 1. Provide suitable materials obtained from Project site excavations for earthwork and fill materials. If excavated materials are not of suitable quality or sufficient quantity, import additional materials as necessary.
 - 2. Imported fill shall be a granular material with sufficient binder to form a firm and stable unyielding subgrade and shall not have more than 60 percent of fines passing 200 mesh sieve. Material shall have a coefficient of expansion of not more than 2 percent from air dry to optimum moisture content and not more than 6 percent from air dry to saturation. Imported material shall be clean and free of rubbish, debris, and toxic or hazardous contaminants. Adobe or clay soils are not permitted.

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EXCAVATION, BACKFILLING and COMPACTING for PAVEMENT

- D. Other Fill Materials: Brick rubble and broken concrete originating from the Project site may be legally disposed of off the Project site or incorporated in fill, if reviewed by a geotechnical engineer, retained by the Owner as an Owner Consultant. Unless otherwise required, no such materials may be imported from outside the Project site.
- E. Permeable Backfill:
1. Provide permeable backfill material behind retaining structures consisting of gravel, crushed gravel, crushed rock, natural sands, manufactured sand, or combinations of these materials conforming to the following gradations:

Sieve Size:	Percentage Passing:
3/4 inch (19mm)	100
3/8 inch (10mm)	80-100
No. 100	0-8
No. 200	0-3
 2. Those portions of fill material passing a No. 4 sieve shall provide a sand equivalent of at least 60.
 3. Provided backing for weep-holes shall consist of 2 cu. ft. of aggregate in burlap sacks, securely tied. Aggregate shall conform to requirements for No. 3 concrete aggregate as specified in subsection 200-1.4 of the Standard Specifications for Public Works Construction.
 4. Permeable Backfill Alternate Materials: Instead of the materials specified for retaining structures backfill, a drainage matting system such as Miradrain by Mirafi, Inc., or equal, may be provided if reviewed by the Architect.

PART 3 - EXECUTION

3.1 SITE PREPARATION

- A. Clear the Project site as required in Section 31 10 00: Site Clearing.

3.2 PROTECTION

- A. Protect and guard excavations against danger to life, limb, and property as required by, but not limited to, OSHA regulations.
- B. Protect adjacent existing improvements including landscaping against damage.

3.3 EXISTING UTILITY LINES

- A. Protect existing utility lines from damage or displacement.
- B. Remove conduits or pipes not in service, exposed during Work, unless a minimum cover of 2 feet is provided. Remove concrete, clay or other non-metallic pipe over 8 inches in diameter, unless otherwise indicated.

SECTION 31 23 16
EXCAVATION, BACKFILLING and COMPACTING for PAVEMENT

3.04 EXCAVATION

- A. Unclassified Excavations: Comply with the Standard Specifications for Public Works Construction, Section 300: "Earthwork," except as modified herein.

3.05 FILL

- A. Unclassified Fill and Compaction: Comply with the Standard Specifications for Public Works Construction, Section 300: "Earthwork," except as modified herein.
- B. Provide fill materials as specified in Part 2 – Products. If excavated materials from the Project site are not of required quality or sufficient quantity, import additional materials as necessary.
- C. In addition to the requirements of this section, import and/or exported materials shall comply with the requirements of Section 32 24 00.
- D. Imported fill materials shall be sampled by a geotechnical engineer, retained by the Owner as an Owner Consultant, for compliance with the requirements of Part 2 of this section.
- E. The geotechnical engineer, retained by the Owner as an Owner Consultant, shall submit all samples to a DSA approved independent approved testing laboratory for testing.
- F. Initial sampling shall be performed by the geotechnical engineer, retained by the Owner as an Owner Consultant, before importing material to the Project site. Identify the location of the source site in addition to the address, name of the person and/or entity responsible for the source site. The geotechnical engineer, retained by the Owner as an Owner Consultant, shall obtain both the initial and additional samples from the identified site and shall submit all samples to the approved independent testing laboratory for testing.
- G. The geotechnical engineer, retained by the Owner as an Owner Consultant, shall perform additional sampling during import operations. If the total quantity of import is determined to be greater than 1000 cubic yards of material, one sample shall be obtained and submitted for testing tested for each 250 cubic yards of imported material. If the total quantity of import is determined to be less than 1000 yards, one sample shall be obtained and submitted for testing for each 100 cubic yards of imported material.
- H. The independent approved testing laboratory shall perform the required tests and report results of all tests noting if the tested material passed or failed such tests and shall furnish copies to the PI, Architect, OAR, DSA, Contractor, and others as required. Report shall state tests were conducted under the responsible charge of a licensed State of California professional engineer and the material was tested in accordance with applicable provisions of the Contract Documents, Title 24, CCR and the DSA. Upon completion of the Work of this section, the independent testing laboratory and geotechnical engineer shall submit a verified report to the DSA as required by Title 24, CCR.

SECTION 31 23 16
EXCAVATION, BACKFILLING and COMPACTING for PAVEMENT

- I. Bills of lading or equivalent documentation will be submitted to the IOR on a daily basis.
- J. Upon completion of import operations, provide the OAR a certification statement attesting that all imported material has been obtained from the identified source site.

3.6 INSTALLATION OF MATERIALS

- A. Fill or backfill materials shall be installed in horizontal layers of 6 inches, unless otherwise required. Each layer shall be evenly placed and moistened or aerated as necessary. Unless otherwise reviewed by the geotechnical engineer, retained by the Owner as an Owner Consultant, each layer of fill material shall cover the length and width of the area to be filled before the next layer of material is installed. Top surface of each layer shall be installed to an approximate level with a crown or crossfall of at least 1 in 50, but no more than 1 in 20. Provide adequate drainage at all times during construction of the Work of this section.

3.7 COMPACTING

- A. Each layer of fill material shall be compacted by tamping, sheepfoot rollers, or pneumatic-tired rollers to provide specified relative compaction. At inaccessible locations, provide specified compaction by manually held, operated and directed compaction equipment.
- B. Unless otherwise indicated, compact each layer of earth fill to a relative compaction of at least percent.
- C. When fill materials, or a combination of fill materials, are encountered or provided which develop densely packed surfaces as a result of installation or compacting operations, scarify each compacted layer before installing the next succeeding layer.

3.8 INSPECTION AND TESTING

- A. The geotechnical engineer, retained by the Owner as an Owner Consultant, will inspect and test excavations, sample material quality as required in Part 2, and observe installation and compaction of fill materials.
- B. The geotechnical engineer, retained by the Owner as an Owner Consultant, will sample imported fill materials from their designated source before delivery to the Project site.
- C. Installation of backfill shall be observed by the geotechnical engineer, retained by the Owner as an Owner Consultant.
- D. The geotechnical engineer, retained by the Owner as an Owner Consultant, will inspect and test excavation Work before the installation of fill and/or other materials.

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EXCAVATION, BACKFILLING and COMPACTING for PAVEMENT

- E. Compaction: Test compaction in accordance with ASTM D 1557, Method C.

3.09 PROTECTION

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

3.10 CLEANING

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

END OF SECTION

SECTION 31 23 17
EXCAVATION, BACKFILLING and COMPACTING for STRUCTURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Provisions of Division 01 apply to this section.
- B. Section Includes:
 - 1. Excavating, backfilling, and compacting for buildings and structures.
 - 2. Fill materials.

1.2 SYSTEM DESCRIPTION

- A. Import and Export of Earth Materials:
 - 1. Fees: Pay as required by authorities having jurisdiction over the area.
 - 2. Bonds: Post as required by authorities having jurisdiction over the area.
 - 3. Haul Routes and Restrictions: Comply with requirements of authorities having jurisdiction over the area.

1.3 SUBMITTALS

- A. Imported Soils: A geotechnical engineer, retained by the Owner as a Owner Consultant, shall obtain initial product Sample for testing in accordance with the terms of sub-section 3.05 of this section.
- B. Shoring calculations as required in sub-section 3.03 of this section.

1.4 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement: Standard Specifications for Public Works Construction, current edition, except as modified herein.

SECTION 31 23 17
EXCAVATION, BACKFILLING and COMPACTING for STRUCTURES

- B. Sampling, testing, and certification of imported and/or exported soils shall be performed in accordance with Section 01440.

1.5 PROJECT CONDITIONS

- A. Information on Drawings or in soils report does not constitute a guarantee of accuracy or uniformity of soil conditions over the Project site.
- B. A copy of the foundation investigation and soils report is available for examination at the Architect's office during regular office hours of Architect.

PART 2 - PRODUCTS

2.1 FILL AND BACKFILL MATERIALS

- A. Fill and backfill materials shall be a granular material previously removed from excavation, or imported fill material, free of large clods and stones larger than 3 inches, foreign materials, vegetable growths, sod, expansive soils, rubbish and debris. Material shall conform to these specified requirements and related sections.
- B. Fill material exhibiting a wide variation in consistency and or moisture content shall be blended and/or aerated to stabilize and upgrade the material.
- C. Imported Fill Material:
 - 1. Provide suitable materials obtained from Project site excavations for earthwork and fill materials. If excavated materials are not of suitable quality or sufficient quantity, import additional materials as necessary.
 - 2. Imported fill shall be a granular material with sufficient binder to form a firm and stable unyielding subgrade and shall not have more than 60 percent of fines passing 200 mesh sieve. Material shall have a coefficient of expansion of not more than 2 percent from air dry to optimum moisture content and not more than 6 percent from air dry to saturation. Imported material shall be clean and free of rubbish, debris and toxic or hazardous contaminants. Adobe or clay soils are not permitted.
- D. Other Fill Materials: Brick rubble and broken concrete originating from the Project site may be legally disposed of off the Project site, or incorporated in fill, if reviewed by the geotechnical engineer, retained by the Owner as an Owner Consultant. Unless otherwise provided, no such materials may be imported from outside the Project site.
- E. Permeable Backfill:
 - 1. Provide permeable backfill material behind retaining structures consisting of gravel, crushed gravel, crushed rock, natural sands, manufactured sand, or combinations of these materials conforming to the following gradations:

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EXCAVATION, BACKFILLING and COMPACTING for STRUCTURES

<u>Sieve Size</u>	<u>Percentage Passing</u>
3/4 inch	100
3/8 inch	80-100
No. 100	0-8
No. 200	0-3

2. Those portions of fill material passing a No. 4 sieve shall provide a sand equivalent of at least 60.
3. Provided backing for weep-holes shall consist of 2 cu. ft. of aggregate in burlap sacks, securely tied. Aggregate shall conform to requirements for No. 3 concrete aggregate as specified in subsection 200-1.4 of the Standard Specifications for Public Works Construction.
4. Permeable Backfill Alternate Materials: Instead of the materials specified for retaining structures backfill, a drainage matting system such as Miradrain by Mirafi, Inc., or equal, may be provided if reviewed by the Architect.

PART 3 - EXECUTION

3.1 SITE PREPARATION

- A. Clear the Project site as required in Section 31 10 00: Site Clearing.

3.2 PROTECTION

- A. Protect and guard excavations against danger to life, limb, and property as required by, but not limited to, OSHA regulations.
- B. Protect adjacent existing improvements including landscaping against damage.
- C. Shore, crib, or lag excavations and earthen banks as necessary to prevent caving-in, erosion or gullyng of sides.
- D. Divert or de-water excavations until concrete is placed, forms are removed, and backfilling is complete.

3.3 SHORING

- A. Provide shoring as necessary to properly and safely support earth sides of excavations, curbs, sidewalks, gutter, drives and stairs, against movement and collapse.
- B. Design and Calculations: Provide in accordance with requirement of governing California Building Code and Safety Orders of State of California, Division of Industrial Safety, Title 8, Subchapter 4, Article 6, Sections 1530 and 1541.
- C. Remove shoring upon completion of Work, or when no longer needed, unless otherwise required by authorities having jurisdiction over the Work.

SECTION 31 23 17
EXCAVATION, BACKFILLING and COMPACTING for STRUCTURES

3.4 EXCAVATION

- A. Form sides of footings, pads, grade beams, and slab foundations, unless otherwise indicated. Provide excavations of sufficient size to permit installation and removal of forms and other Work as required.
- B. Machine-drill excavation for round footings to size and depth indicated. Provide a collar or casing, or other adequate protection, to exclude dirt and debris. Protect excavations with plank covers until concrete is placed.
- C. Provide excavation bottoms level and free from loose material. Excavate to indicated or required elevations of undisturbed earth.
- D. Provide excavations free from standing water by pumping, draining, or providing protection against water intrusion. If soil becomes soft, soggy, or saturated, excavate to firm undisturbed soil and fill as required. Slope adjacent grades away from excavations to minimize entry of water.
- E. Calculate excavation quantities based on elevations or depths indicated on Drawings.
- F. Provide 2000 psi concrete for backfill of over-excavated areas to indicated or required elevations.
- G. Special preparation of B.E.P. areas: Excavate areas designated on Drawings as bottom of excavated planes (B.E.P.), by excavating and filling to indicated grades and elevations.

3.5 IMPORT/EXPORT OF MATERIALS

- A. Provide fill materials as specified in Part 2- Products. If excavated materials from the Project site are not of required quality or sufficient quantity, import additional materials as necessary.
- B. In addition to the requirements of this section, import and/or exported materials shall comply with the requirements of Section 32 24 00.
- C. Imported fill materials shall be sampled by the geotechnical engineer, retained by the Owner as an Owner Consultant, for compliance with the requirements of Part 2 of this section.
- D. The geotechnical engineer, retained by the Owner as an Owner Consultant, shall submit all samples to a DSA approved independent testing laboratory for testing.
- E. Initial sampling shall be performed by a geotechnical engineer, retained by the Owner as an Owner Consultant, before importing material to the Project site. Identify the location of the source site in addition to the address, name of the person and/or entity responsible for the source site. The geotechnical engineer, retained by the Owner as an Owner Consultant, shall obtain both the initial sample and additional samples from the identified site and shall submit all samples to the approved independent testing laboratory for testing.

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- F. The geotechnical engineer, retained by the Owner as an Owner Consultant, shall perform additional sampling during import operations. If the total quantity of import is determined to be greater than 1000 cubic yards of material, one sample shall be obtained and submitted for testing for each 250 cubic yards of imported material. If the total quantity of import is determined to be less than 1000 yards, one sample shall be obtained and submitted for testing for each 100 cubic yards of imported material.
- G. The independent approved testing laboratory shall perform the required tests and report results of all tests noting if the tested material passed or failed such tests and shall furnish copies to the PI, Architect, OAR, DSA, Contractor, and others as required. Report shall state tests were conducted under the responsible charge of a licensed State of California professional engineer and the material was tested in accordance with applicable provisions of the Contract Documents, Title 24, CCR and the DSA. Upon completion of the Work of this section, the independent testing laboratory and geotechnical engineer shall submit a verified report to the DSA as required by Title 24, CCR.
- H. Bills of lading or equivalent documentation will be submitted to the PI on a daily basis.
- I. Upon completion of import operations, provide the OAR a certification statement attesting that all imported material has been obtained from the identified source site.

3.6 BACKFILLING

- A. After concrete has been placed, forms removed and concrete Work inspected, backfill excavations to indicated or required grades. Backfill simultaneously on each side of walls or grade beams. Remove rubbish, debris, and other waste materials from excavations before placing backfill.
- B. Before installing any backfill, adequately cure concrete and provide bracing to stabilize structures. Protect waterproofing or dampproofing against damage during backfilling operations with required protection board. Remove bracing as backfill operation progresses.
- C. Do not furnish or install expansive soils for below grade building walls.
- D. Install each layer of material in a not to exceed thickness of 6 inches, unless otherwise required.
- E. Rigidly control the amount of water to be installed to provide optimum moisture content for type of fill material furnished. Do not over-saturate or compact by flooding or jetting.
- F. Install wall backfill before installing railings and fences on walls.

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- G. Impervious backfill materials shall be installed in layers along with and by the same methods specified for structure backfill. Impervious backfill materials shall be at the approximate grade and elevation and where exposed to erosion, shall be covered with at least a 12 inch layer of fill material as reviewed by the geotechnical engineer, retained by the Owner as an Owner Consultant.
- H. Install weep hole drainage at the backside of walls so the backing completely covers the weep holes, is horizontally centered and extends at least 12 inches above the bottom of the weep opening. Provide an 8 inch square section of 1/4 inch galvanized or aluminum screen, with a minimum wire diameter of 0.03 inch, and install at the backside of each weep hole before installing the backfill material.
- I. Where a reviewed drainage matting system is provided instead of permeable backfill for retaining structures, install in accordance with the manufacturer recommendations.

3.7 COMPACTING

- A. Compact each layer of fill material by tamping, sheepsfoot rollers or pneumatic-tired rollers, to such extent as to provide specified relative compaction. At inaccessible locations, compact to specified requirements with hand-held, operated and directed compaction equipment.
- B. Unless otherwise indicated, compact each layer of fill material to a relative compaction of at least 95 percent.
- C. Do not compact by flooding or jetting.
- D. When fill materials, or a combination of fill materials, are encountered or provided which develop densely packed surfaces as a result of installation or compacting operations, scarify each layer of compacted fill before installing the next succeeding layer.

3.8 INSPECTION AND TESTING

- A. The geotechnical engineer, retained by the Owner as an Owner Consultant, will inspect and test excavations, sample material quality as required in Part 2, and observe installation and compaction of fill materials.
- B. The geotechnical engineer, retained by the Owner as an Owner Consultant, will sample imported fill materials from their designated source before delivery to the Project site.
- C. Installation of backfill shall be observed by the geotechnical engineer, retained by the Owner as an Owner Consultant.

SECTION 31 23 17
EXCAVATION, BACKFILLING and COMPACTING for STRUCTURES

- D. The geotechnical engineer, retained by the Owner as an Owner Consultant, will inspect and test excavation Work before the installation of fill and/or other materials.
- E. Compaction: Test compaction in accordance with ASTM D 1557, Method C.
- F. DSA will inspect foundation excavations when completed and ready for forms, after forms are in place and before first placement of concrete.

3.9 PROTECTION

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

3.10 CLEANUP

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

END OF SECTION

SECTION 32 10 00 PAVEMENT REPAIR

PART 1 - GENERAL

1.1 SUMMARY

- A. Provisions of Division 01 apply to this section.
- B. Section Includes:
 - 1. Bituminous Surfacing Repair: Areas removed for utility trenches, heaved by tree roots, cracked areas, protruding areas where pavement meets hard surfaces, depressed areas, holes and areas around new structures, and raveled bituminous pavement.
 - 2. Concrete Pavement Repair: Areas heaved by tree roots, cracked areas, holes and trenches, and areas around new structures.

1.02 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings indicating areas to be repaired.
- B. Product Data: Submit manufacturer's technical data for materials and products.

1.03 QUALITY ASSURANCE

- A. Comply with Standard Specifications for Public Works Construction, current edition.

SECTION 32 10 00 PAVEMENT REPAIR

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials specified in Section 31 11 23: Base Course.
- B. Materials specified in Section 32 12 16: Asphalt Concrete Paving.
- C. Materials specified in Section 32 12 17: Site Concrete Work.

2.02 BITUMINOUS MATERIALS

- A. Provide materials and products of the class, grade or type indicated, conforming to relevant provisions of Section 203 - Bituminous Materials of the latest Standard Specifications for Public Works Construction.

2.03 HEADERS AND STAKES

- A. Headers: Redwood, size 2 x 6, unless otherwise indicated on Drawings.
- B. Stakes: redwood, Construction Grade.
- C. Nails: Common, galvanized, 12d minimum.

2.04 SLURRY

- A. Cement-sand slurry; minimum one sack of cement per cubic yard of mixture.

PART 3 - EXECUTION

3.1 PAVEMENT REMOVAL

- A. Remove bituminous and concrete pavement in accordance with applicable provisions of Section 300 - Earthwork of the Standard Specifications for Public Works Construction.
- B. Pavement Heaved By Roots: Remove pavement to limits of distortion and expose roots. Trim roots to provide at least 12 inches clearance to pavement.
- C. Remove protruding bituminous surfaces flush with the surrounding grade using a suitable tool or equipment so that adjacent finishes are not blackened.
- D. Remove raveled and depressed bituminous pavement to limits indicated or required.
- E. Saw cut existing improvements, trim holes and trenches in bituminous and concrete pavement to permit mechanical hand tampers to compact the fill.

SECTION 32 10 00 PAVEMENT REPAIR

- F. Remove broken concrete by saw cutting. If the required cut line is within 30 inches of a score or joint line or edge, cut and remove to the score, joint line, or edge.

3.02 EXCAVATING, BACKFILLING AND COMPACTING

- A. Conform to requirements in Section 31 23 00: Excavating, Backfilling and Compacting; Section 31 23 16: Excavating, Backfilling and Compacting for Pavement; Section 31 23 17: Excavating, Backfilling and Compacting for Structures.
- B. Where subgrade or base is deemed to be unstable or otherwise unsuitable, excavate such materials to firm earth, and replace with a required material. Install and compact fill materials in accordance with the requirements of related Specification sections.

3.03 HEADERS

- A. Install headers along edge of bituminous surfacing abutting turf, earth, or planting area, unless indicated otherwise.
- B. Install headers so the bottom surface has continuous bearing on solid grade. Where excavation for headers is undercut, thoroughly tamp soil under the header. Compact backfill on both sides of header to the density of the adjacent undisturbed grade.
- C. Fasten headers in place with redwood stakes of length necessary to extend into solid earth a minimum of 12 inches. Stakes shall be of sound material, neatly pointed, driven vertically, and securely nailed to headers. Space stakes, not to exceed 4 feet on centers with top of stakes set one inch below top of header. Stakes are to be installed on the asphalt side of the header. Provide a minimum of 2-12d galvanized common nails through each stake.
- D. Remove existing headers where new surfacing is installed adjacent to existing surfacing.
- E. Install temporary headers at transverse joints of paving where continuous paving operations are not maintained.
- F. Provide additional stakes and devices as required to fasten headers.

3.04 BASE COURSE

- A. Unless otherwise indicated, base course shall be crushed aggregate base, fine grade, 3 inches thick or equal to thickness of the existing base, whichever is greater.
- B. Fill grade and compact as specified in Section 31 22 00: Grading.

SECTION 32 10 00 PAVEMENT REPAIR

3.5 RESURFACING

- A. Holes and Trenches: Remove loose dirt and backfill with cement-sand slurry allowing for surfacing one inch thicker than existing. Unless otherwise indicated on Drawings, resurface flush with existing adjoining pavement installing the same type of materials and section provided in existing improvements.
- B. Other Areas: Other surface improvements damaged or removed shall be cut to a neat even line and excavated one inch below the bottom of the existing pavement. Resurface by following the original grades and installing the same type of materials provided in existing improvements.
- C. Where bituminous surfacing abuts concrete, masonry, walks or paving, tamp joint smooth, if necessary, as described above to obtain a uniformly even joint, true to line and grade. Tamp and smooth materials before asphalt cools.

3.6 REPAIRING AND RESEALING EXISTING SURFACES

- A. Preparation of Surfaces: Prior to filling cracks, clean existing bituminous surfacing of loose and foreign materials and coat with a film of asphalt emulsion.
- B. Repair of Existing Surfacing:
 - 1. Fill cracks 1/2 inch wide and less with RS-1 emulsion and silica sand or other required material. Cracks larger than 1/2 inch wide shall be filled with Type C2 Asphalt Concrete as specified. Cracks shall be filled to the level of adjacent surfacing.
 - 2. Where low areas, holes, or depressions occur in existing surfacing, repair with emulsified asphalt. Install material, strike off the emulsified asphalt with a straightedge flush with adjoining surfacing. Finish with a steel trowel, and after dehydration, compact by rolling or tamping.
- C. Testing: Flood test entire area in presence of the PI. Entire area tested shall be free of standing water or puddles.
- D. Surface Seal: After surface has been repaired and tested, install seal coat over entire area indicated. Surface seal shall be as specified in Section 32 12 16.

**SECTION 32 10 00
PAVEMENT REPAIR**

3.07 CLEANING

- A. Remove all stains on the Project site and adjacent properties caused by or attributed to the Work of this section.
- B. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.08 PROTECTION

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

END OF SECTION

**Section 32 11 23
BASE COURSE**

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 01 apply to this section.
- B. Section Includes:
 - 1. Installation of base material.

1.02 SUBMITTALS

- A. Prior to import, Contractor shall submit written certification to OAR that crushed Miscellaneous Base (CMB) does not contain Polychlorinated biphenyls (PCB) above laboratory detection limits when tested in accordance with EPA Method 8082, and obtain written approval from OAR and FUSD prior to import at the subject site, refer to article 2.02 for sampling frequency.,
- B. Crushed aggregate base (CAB) shall consist of native rock without naturally occurring asbestos or recycled materials. The Contractor shall submit written documentation, which identifies the source, volume, and proposed transport date of the material for review and approval by OAR and FUSD prior to importing the material. A statement on company letterhead from the source, stamped by either a California Professional Geologist or Engineer, which states that the subject materials are native rock, do not contain any recycled materials and that the source does not mine ultramafic materials, a source of natural occurring asbestos shall be included in the submittal to OAR and FUSD. To be considered for a variance, the Contractor shall submit a documentation package, which includes all of the aforementioned information at least 48 hours in advance of planned import.

**Section 32 11 23
BASE COURSE**

1. Frequently used suppliers:
 - a. Hansen Aggregates, Inrwindale, California.
 - b. Vulcan Materials, Reliance Company, Irwindale, California.
 - c. Vulcan Materials Durbin, Irwindale, California.
- C. Product Data: Submit material source, technical information and test data for base materials. Gradation and quality certifications shall be dated within 30 days of the submittal.
- D. Sample: Submit Sample of proposed base course material.

1.03 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement: Standard Specifications for Public Works Construction, current edition.

PART 2 - PRODUCTS

2.01 UNTREATED BASE MATERIALS

- A. The following base materials shall conform to the requirements of the Greenbook: Standard Specifications for Public Works Construction: Section 200 - Rock Materials.
 1. Crushed Aggregate Base.
 2. Crushed Miscellaneous Base.
 - a. CMB meeting requirements of article 1.02, A, may be used on-site for pavement base only.
 - b. CMB may be used off-site when in accordance to the Greenboook.
- B. Materials generated on site shall not be used as a base course material.

2.01 SOURCE QUALITY CONTROL

- A. Sampling and testing of imported and/or exported crushed miscellaneous base (CMB) shall be performed in accordance with the following Table 1 schedule:

**Section 32 11 23
BASE COURSE**

TABLE 1: MINIMUM SAMPLING FREQUENCY	
Volume (CY)	Sampling Frequency
0 - 500	1 per 100 CY
501 - 1,000	1 per 250 CY
1,001 - 5,000	1 per 250 CY for first 1,000 CY 1 per 500 CY thereafter
5,001 - 20,000	12 samples for first 5,000 CY 1 per 1,000 CY thereafter
> 20,000	1 per 2,000 CY for first 20,000 CY 1 per 2,500 CY

2.03 MATERIAL APPROVAL

- A. Base material shall be inspected by the PI for gradation and material content prior to installation. The owner may choose to have additional tests performed by a geotechnical engineer, retained by the Owner, before installation.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install base course material in layers not exceeding 4 inches in thickness, unless required otherwise. Grade and compact to indicated levels or grades, cut and fill, water and roll until the surface is hard and true to line, grade and required section. Provide a relative compaction of at least 95 percent, unless otherwise required.
- B. Grade base course to elevations indicated on Drawings, ready to receive surfacing, in accordance with Section 02310: Grading.

3.02 PROTECTION

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

3.03 CLEANUP

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

END OF SECTION

**SECTION 32 12 17
SITE CONCRETE PAVING**

I. PART 1 - GENERAL

1.1 SUMMARY

- A. Provisions of Division 01 apply to this section.
- B. Section Includes:
 - 1. Portland cement concrete pavement, cement walks, curbs, gutters, trash pick-up area, ramps, mowing strips, fence post footings, sliding gate concrete tracks, catch basins, pipe bedding and encasements, thrust blocks, transition structures, flagpoles and light standard bases and footings, athletic equipment footings and equipment pads.

1.2 SUBMITTALS

- A. Shop Drawings: Submit plans, elevations and details of concrete site Work.
- B. Product Data: Submit mix designs and manufacturer's technical data for materials and products. Submit 3" x 3" concrete Sample of each specified color. Material Sample: Submit one concrete bumper to the PI for destructive testing.

1.3 QUALITY ASSURANCE

- A. Comply with Standard Specifications For Public Works Construction.
- B. Paving along accessible route of travel to be slip resistance.

II. PART 2 - PRODUCTS

2.1 MATERIALS

- A. Concrete, Mortar and Related Materials: Comply with applicable provisions of Standard Specifications for Public Works Construction, Section 201 - Concrete, Mortar and Related Materials:
 - 1. Concrete: 28-day compressive strength 2,500 psi, unless specified otherwise.
 - 2. Reinforcing Mesh: ASTM A 185, 4x4/W1.4 x W1.4 welded wire mesh.
 - 3. Expansion Joint Filler: Preformed expansion joint filler, bituminous type, complying with ASTM D 994.
- B. Form Materials:
 - 1. Side forms: Douglas fir, Construction Grade or Better or metal forms.

SECTION 32 12 17
SITE CONCRETE PAVING

2. Stakes: Douglas fir, Construction Grade or Better or metal stakes.
- C. Concrete Parking Bumpers:
 1. Precast concrete, smooth and free of pits and rock pockets, providing a minimum 28-day compressive strength of 3,500 psi. Size at least 7-1/2 inches wide, 5-1/2 inches high and 6 feet long. Reinforce with 2 #5 reinforcing bars. Provide 2-3/4 inch diameter pre-drilled holes for anchor installation.
 2. Bumper Anchors: Provide 1/2-inch diameter x 18-inch long galvanized steel pipe.
 3. Bumper Adhesive: Provide adhesive recommended by bumper manufacturer/installer for fastening bumpers to concrete pavement.

III. PART 3 - EXECUTION

3.1 CONSTRUCTION OF FORMS FOR CAST-IN-PLACE STRUCTURES

- A. Concrete Pavement: Install Portland cement concrete pavement in compliance with the Standard Specifications for Public Works Construction, Section 302-Roadway Surfacing.
- B. Miscellaneous Exposed Concrete: Install concrete curbs, walks, gutters, cross gutters, access ramps, driveways, catch basins, yard boxes, vaults and similar structures, in compliance with the Standard Specifications for Public Works Construction, Section 303 - Concrete and Masonry Construction.
- C. Exposed Concrete Bases: Install bases, such as for post, flagpole, light standards and similar bases, in compliance with the Standard Specifications for Public Works Construction, Section 303 - Concrete and Masonry Construction.
- D. Post, flagpole, light standard footings below grade, underground conduit bedding, encasements, thrust blocks and similar structures may be placed \directly in excavations conforming to the required sizes.
- E. Reinforcement installation and concrete placement, surface finishes, curing and removal of forms shall be performed in compliance with applicable provisions of Standard Specifications for Public Works Construction, Section 303 - Concrete and Masonry Construction. Provide heavy broom finish at slopes exceeding six (6) percent and medium broom finish at slopes up to six (6) percent.

3.02 INSTALLATION OF PARKING BUMPERS

- A. Install bumpers as indicated on the Drawings. On bituminous paving, install anchors through pavement and into the ground a minimum of 12 inches. On concrete pavement, install bumpers in a continuous bed of adhesive.

3.03 CLEAN UP

**SECTION 32 12 17
SITE CONCRETE PAVING**

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

3.04 PROTECTION

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

END OF SECTION

SITE CONCRETE PAVING REINFORCEMENT
Section 32 12 18

Part 1 GENERAL

1.1 SECTION INCLUDES

- A.** Reinforcing steel bars and accessories for cast-in-place concrete.

1.2 REFERENCES

- A.** ACI 315 - Details and Detailing of Concrete Reinforcing.
- B.** ACI 318 - Building Code Requirements for Reinforced Concrete.
- C.** ASTM A82 – Standard Specification for Steel Wire, Plain, For Concrete Reinforcement.
- D.** ASTM A184 – Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
- E.** ASTM A185 – Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
- F.** ASTM A496 – Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
- G.** ASTM A497 – Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
- H.** ASTM A615 – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
- I.** ASTM A706 - Standard Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement.

SITE CONCRETE PAVING REINFORCEMENT
Section 32 12 18

- J.** AWS D1.4 - Structural Welding Code for Reinforcing Steel.
- K.** CRSI - Concrete Reinforcing Steel Institute Manual of Practice.
- L.** Chapter 19A, California Building Code.

1.3 SUBMITTALS

- A.** Shop Drawings: Submit steel reinforcement Shop Drawings in accordance with ACI 315. Include assembly diagrams, bending charts and slab plans. Indicate lengths and location of splices, size and lengths of reinforcing steel.
- B.** Closeout Submittals: Record exact locations of reinforcing that vary from Shop Drawings.

1.4 QUALITY ASSURANCE

- A.** Provide Testing Laboratory with access to fabrication plant to facilitate inspection of reinforcement. Provide notification of commencement and duration of shop fabrication in sufficient time to allow inspection.
- B.** Comply with the following as a minimum requirement:
 - 1. Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice.
 - 2. American Welding Society (AWS)
 - 3. American Concrete Institute (ACI)
 - 4 CBC, Chapter 19A, Concrete
- C.** Source Quality Control: Refer to Division 01 Sections for general requirements and to the following paragraphs for specific procedures. Testing laboratory retained by the Owner shall select test Samples of Bars, ties, and stirrups from the material at the Project Site or from the place of distribution, with each Sample consisting of not less than two 18 inch long pieces, and perform the following tests according to ASTM A615, or ASTM A706, as applicable:
 - 1. Identified Bars: If Samples are obtained from bundles as delivered from the mill, identified as to heat number, accompanied by mill analyses and mill test reports,

SITE CONCRETE PAVING REINFORCEMENT
Section 32 12 18

and properly tagged with the identification certificate so as to be readily identified, perform one tensile and one bend test for each 10 tons or fraction thereof of each size of bars. Submit mill reports when Samples are selected.

2. Unidentified Bars: When positive identification of reinforcing bars cannot be performed and when random Samples are obtained; perform tests for each 2.5 tons or fraction thereof, one tensile and one bend test from each size of bars.

D. Certification of Welders: Shop and project site welding shall be performed by welding operators certified by AWS.

1.5 DELIVERY, STORAGE AND HANDLING

- A.** Avoid exposure to dirt, moisture or conditions harmful to reinforcing material.
- B.** Reinforcing steel bars, wire, and wire fabric shall be stored on the Project site to permit easy access for examination and identification of each shipment. Material of each shipment shall be separated for size and shape.

1.6 COORDINATION

- C.** Coordinate with placement of formwork, formed openings and other Work.

Part 2 PRODUCTS

2.1 MATERIALS

- A.** Reinforcing Steel: ASTM A 615, or ASTM A706, 60 yield grade deformed low alloy steel for No. 4 bars or larger; 40 yield grade, No. 3 bars for ties and stirrups. Conform to Section 1903A, California Building Code 19A.
- B.** Welding Electrodes: Low Hydrogen grade E70XX for Grade 40, E90XX for Grade 60.

2.2 ACCESSORY MATERIALS

- A.** Tie Wire: Minimum 16 gage black annealed type.
- B.** Chairs, Bolsters, Bar Supports, and Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions.
- C.** Special Chairs, Bolsters, Bar Supports, and Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic coated steel type; size and shape as required.
- D.** Concrete Blocks: Approximately 3 inches dimension each side.

2.3 FABRICATION

SITE CONCRETE PAVING REINFORCEMENT
Section 32 12 18

- A.** Fabricate concrete reinforcing in accordance with CRSI Manual of Practice and ACI 315 and ACI 318. Wherever possible, make bends to shape in fabricator's shop.
 - (1)** Bars reduced in section will not be accepted.
 - (2)** Bars with kinks are unacceptable.
 - (3)** Bars shall not be heated to facilitate bending or for any other purpose.
 - (4)** Bars with bends not indicated on drawings will not be accepted. Perform no forming in a manner which will damage bars.
- B.** Weld reinforcement in accordance with AWS D1.4.
- C.** Locate reinforcing splices not indicated on Drawings at point of minimum stress.

Part 3 EXECUTION

3.1 PLACEMENT

- A.** Place, support and secure reinforcement against displacement. Do not deviate from required position. Install concrete blocks to support reinforcement over grade. Smooth face rocks not permitted.
- B.** Do not displace or damage vapor barrier where vapor barrier is specified or indicated on drawings.
- C.** Accommodate placement of formed openings.
- D.** Prior to placing, thoroughly clean reinforcement of all rust, dirt, dust, oil or any other material deleterious to bonding of concrete.
- E.** Accurately place and securely tie reinforcement at all intersections and splices with black annealed wire and securely hold in position during placing of concrete by means of precast concrete block supports. Point wire tie ends away from the form. Unless otherwise indicated, the number, type, and spacing of supports shall conform to the ACI 315.
- F.** During placing of structural concrete slabs, provide a full-time reinforcing steel placer to repair and replace reinforcing to its proper location. Provide additional chairs of the proper size available to place under bars displaced during the concrete pouring operation.
- G.** Dowels for Walls: Securely tie in place prior to placing of concrete. Do not place dowels in concrete after pour.

SITE CONCRETE PAVING REINFORCEMENT
Section 32 12 18

- H.** Dowels for Slabs: Securely tie in place prior to placing concrete. Per Plans or Drawings. Do not place dowels in concrete after pour.
- I.** Conform to Section 1907A, California Building Code for concrete cover over reinforcement.

3.2 CLEAN UP

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

3.3 PROTECTION

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

END OF SECTION

**SECTION 33 40 00 - 1
STORM DRAINAGE SYSTEM**

PART 1 - GENERAL

1 SUMMARY

- A. Provisions of Division 01 apply to this section.
- B. Section Includes:
 - 1. Catch basins, grates and frames; culverts; curb inlets; drainage pipes; sub-surface drains; manhole covers and frames; surface run-off collection or infiltration.
- C. Definitions:
 - 1. BMP: Stormwater Best Management Practice.
 - 2. Post Construction BMP's: Devices installed by the Contractor for storm water management to be left on site after construction completion.
 - 3. SWPPP: Storm Water Pollution Prevention Plan.

1.2 SUBMITTALS

- A. Shop Drawings: Submit site plan denoting locations of lines, valves, and appurtenances.
- B. Product Data: Manufacturer's catalog data for all required materials. Include technical data for accessories, information concerning gaskets, joints and couplings.
- C. Certificates: Certificates attesting that tests set forth in referenced publication have been performed and the results required by design have been met.
- D. Closeout Documents: Submit the following documents to the OAR at Substantial Completion:
 - 1. Maintenance Log: Maintenance and upkeep records of the installed Post Construction BMP's. Provide in electronic MS Excel Sheet including the following headers as a minimum: "Date of Service", "Location of BMP", "Type of Maintenance or Service", "Notes", "Next Scheduled Preventive Maintenance Due", and "Inspector Signature".
 - 2. Two copies of the latest project SWPPP including Notice of Termination (NOT) from the State Water Board.

**SECTION 33 40 00 - 2
STORM DRAINAGE SYSTEM**

3. Record drawings: As-Built site plan(s) showing the Post Construction BMP's. Provide a copy of marked record set with red pencil identifying any variations from design documents at substantial completion.
4. Two CD's containing electronic MS Excel Sheet including the following headers as a minimum: "BMP Description", "Location of BMP and Map Grid Location" and "Type of Maintenance or Service Needed", i.e.; weekly, monthly, quarterly, etc. "Stock No.", "Manufacturer Contact Information", along with "Frequency" i.e.; weekly, monthly, quarterly, etc. and "Special Instructions".
5. Maintenance Manuals: Provide Maintenance Manual for specific storm drainage BMP components installed along with requirements, replacement or maintenance schedule and plans with the location of each BMP component. This manual shall include product information cut sheet, shop drawings, vendor information for each component and warranty.

1.3 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement: Standard Specifications for Public Works Construction, current edition.

1.4 TRAINING OF OWNER PERSONNEL

- A. At Substantial Completion and when the storm drainage system is fully operational, knowledgeable representatives from the contractor and manufacturer(s) of various components specified and installed at the site shall provide up to 8 hours of training. Date, time and location for the training shall be coordinated through the project OAR.
- B. Training period shall cover but not be limited to the following:
 1. Explain the operation of storm drainage system and its design intent.
 2. Explain the maintenance requirements of every component of the system.
 3. Provide recommendations of practices to minimize or eliminate negative impact on the system.
 4. Provide maintenance schedule as recommended by the manufacturers for every component and review it with M & O staff.
 5. Conduct a site walk, identify every component of the system and demonstrate its operation.

**SECTION 33 40 00 - 3
STORM DRAINAGE SYSTEM**

6. Training shall be conducted with the use of Maintenance log and Maintenance manual.
- C. Provide the following training documentations:
 1. Have all District attendees sign off training sheet and provide a copy to the OAR.
 2. Provide Operations and Maintenance manuals at the time of training to the Districts staff. The manual shall include only the components that are installed at the site.
 3. Upon completion of training, provide a DVD of materials covered in the training and components installed.

1.5 SURPLUS MATERIALS

- A. Provide sufficient additional materials for each component of BMP that requires replacement or service during the first year.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Storm Drain Pipe: Provide in conformance with Section 207 - Pipes and Section 208 - Pipe Joint Types and Materials of the Standard Specifications for Public Works Construction.
- B. Perforated Subsurface Drain Pipe: Provide shop-perforated with perforations symmetrically located within a maximum arc of 160 degrees. Perforations shall provide a total open area of at least 0.3 square inches per linear foot of pipe, with a minimum of one perforation per linear foot, except for joint areas. Perforation shall be either holes or slots. Hole diameters of 1/4 inch minimum to 3/8 inch maximum. Width of slots of 3/16 inch minimum to 5/16 inch maximum with slot length not exceeding 4 inches.
- C. Concrete, Mortar and Related Materials: Conform to Section 02770: Site Concrete Work.
- D. Metal Covers, Grates, Frames and Accessories:
 1. Conform to Section 206 - Miscellaneous Metal Items of the Standard Specifications for Public Works Construction.
 2. Hot-dip galvanize steel parts after fabrication and before installation, in accordance with Section 210 - Paint and Protective Coating of the Standard Specifications for Public Works Construction.

**SECTION 33 40 00 - 4
STORM DRAINAGE SYSTEM**

- 3. Grates and Frames: Vandal-proof design and construction.
- E. Filter Material for Subsurface Drain: Non-woven geotextile filter fabric, Mirafi 140N, or equal.
- F. Aggregate Around Perforated Pipe: 6 inches of gravel containing no particles finer than a 3/8 inch to 1/2 inch sieve opening size.
- G. Manhole Brick Mortar, Grout, and Plaster: Conform to Standard Specifications for Public Works Construction, Section 202 - Masonry Materials.

PART 3 – EXECUTION

3.1 EXCAVATION, BACKFILLING AND COMPACTING

- A. Conform to the requirements of Section 02315: Excavating, Backfilling and Compacting or Section 02318: Excavating, Backfilling and Compacting for Utilities, as required.

3.2 INSTALLATION OF PIPE

- A. Conform to Section 306 - Underground Conduit Construction of the Standard Specifications for Public Works Construction.
- B. Non-ferrous drainpipe installed with less than 12 inches of cover to finish grade shall be provided with a 4 inch thick concrete pipe encasement.

3.3 DRAINAGE APPURTENANCES

- A. Catch basins, junction chambers, manholes, box culverts, outlet chambers and other drainage structures: Construct as indicated on Drawings and as specified in Section 02770: Site Concrete Work.
- B. Ensure that all Post Construction BMP have a visible identifying manufacturer tag with product identification, manufacturer contact information, date of last service and date of next service due.
- C. Provide storm drain stencil per City or County requirements as applicable.

3.4 ABANDONED DRAINAGE LINES AND STRUCTURES

- A. Cap or plug existing drain lines that are cut and abandoned and remove existing drainage structures that are abandoned.

3.5 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.
- B. Maintain Post Construction BMP's after installation and keep a

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maintenance log to be turned over to OAR at Substantial Completion.

3.6 PROTECTION

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

**END OF
SECTION**