

**Chavez High School
Swimming Pool
Stockton Unified School District**



DSA Submittal Specifications

March 13, 2020

PREPARED BY:



VERDE DESIGN

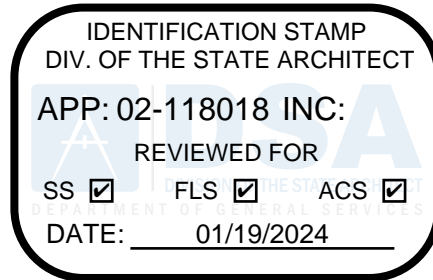
Project No. 1910900
DSA App No. 118018

**Chavez High School Swimming Pool
Stockton Unified School District**

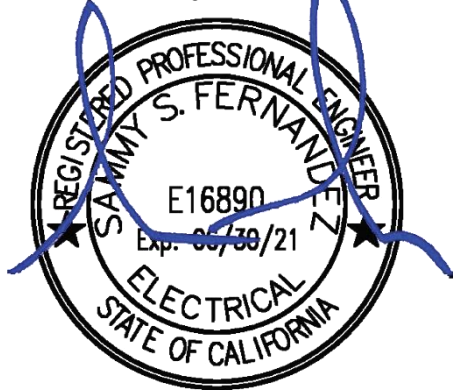
SPECIFICATIONS SIGNATURE PAGE



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DOCUMENT 00 01 10

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SUMMARY OF WORK

1.01 WORK COVERED BY CONTRACT DOCUMENTS

- A. Work of this Contract for the Chavez High School Swimming Pool, shall include, but is not necessarily limited to, the following:
 - 1. Demolition of a portion of the existing asphalt basketball courts
 - 2. Installation of new competition swimming pool with seating, lighting, and scoreboard
 - 3. Installation of pool mechanical building
 - 4. Installation of equipment storage area with shade structure canopies
 - 5. Installation of plaza area improvements with lighting, precast planters, and synthetic turf
 - 6. Improvements to existing locker rooms
 - 7. Perimeter paving, decorative pool area fencing, site furnishing improvements, and utility upgrades
- B. The Work specifically includes all work as represented by the Drawings and Specifications issued for construction and subsequent approved revisions and addenda.
- C. If certain features are not fully shown or called for on the Drawings, their construction shall be of the same character, quality and level of performance as for similar conditions that are shown, called for, or reasonably inferred.

1.02 RELATED REQUIREMENTS

- A. Section 01 42 00 - References.

1.03 PROJECT LOCATION

- A. Chavez High School, 2929 Windflower Lane, Stockton, CA 95212
- B. The general nature and extent of the work and the appurtenant facilities are shown on the Drawings under the title: Chavez High School Swimming Pool.
- C. Perform work within the Limit of Work line indicated on the Drawings and per the discretion of the District.

1.04 SPECIFICATIONS AND DRAWINGS

- A. The General Conditions, Supplementary Conditions, and Division 01 - General Requirements apply to the Work of all Sections.
- B. Drawings, such as irrigation plans, utility plans, and other utility Drawings, are diagrammatic. Actual runs indicated on the Drawings shall be followed as closely as coordination with the work of other trades will permit. The exact routing of such improvements and locations of equipment shall be governed by site conditions, obstructions, and locations of other utilities as acceptable to the District.
- C. In the event that discrepancies arise over dimensions, product references, omissions, or written statements, these conflicts shall be immediately brought to the District's attention by the Contractor. If available, this may be accomplished with the use of a "Request for Information" (RFI) form. While awaiting direction or clarification from the District, the Contractor shall re-direct work as necessary so as not to cause delay to the project.

- D. If discrepancies arise between the Drawings and Specifications, the order of descending precedence shall be:
 - 1. Specifications.
 - 2. Details on the Drawings.
 - 3. Plans on the Drawings.
- E. Products, materials, labor, etc., installed or performed without proper clarification, or prior to District acceptance shall be the Contractor's sole responsibility and shall be removed, repaired, replaced, and/or reinstalled per the District's direction at no additional cost to the District or its agents.

1.05 CONTRACTOR'S DUTIES

- A. Provide and pay for:
 - 1. Labor, materials, equipment, tools, construction equipment machinery, and other facilities and services necessary for proper execution and completion of the Contract.
 - 2. Water and temporary utilities required for construction excluding any metering and connection fees or charges.
 - 3. Subject to the discretion of the Districts Representative as verified by the Contractor, utilities which are in place and/or are in use by the District at the site, excluding telephone, may be utilized by the Contractor, to the extent available, at no cost.
 - 4. Other facilities and services necessary for proper execution and completion of work to provide a facility capable of operation.
 - 5. Legally required sales, consumer, and use taxes.
- B. Permits:
 - 1. The District shall obtain and pay for the building permits, utility cut-offs and hook-ups including, but not limited to: water, gas, and electrical meters, sanitary and storm sewer connection fees.
 - 2. The contractor shall obtain and pay for other permits required by District, County and other agencies, including but not limited to business licenses and hauling and dumping permits as applicable.
 - 3. Provisions of required permits and licenses, whether obtained by the District's Representative or the contractor, shall become a part of the Contract Documents and shall be adhered to by the contractor.
- C. Comply with latest adopted edition of the governing building code and other codes, ordinances, rules, regulations, orders and other legal requirements of public authorities which bear on performance of the work. Nothing in the Drawings or Specifications shall be construed to permit work not conforming to these applicable laws, ordinances, rules, and regulations. In case of conflicts between code requirements, the most restrictive shall apply; except that where the requirements of these Specifications exceed code requirements, the Specifications shall govern.
- D. Attend pre-scheduled on-site job conference meetings and/or any special meetings as may be required by the District's Representative.
- E. Promptly submit written notice to the District's Representative of any observed variance in Contract Documents from legal requirements. Appropriate modifications to Contract Documents will be performed by the District's Representative to incorporate such necessary modifications.
 - 1. Contractor shall assume responsibility for work performed and known to be contrary to such requirements.
- F. Enforce strict discipline and good order among the contractor's or sub-contractor's employees per the discretion of the District's Representative.
- G. The Contractor shall be held to have examined the site and to have compared it with the Drawings and Specifications, to have carefully examined all of the Contract Documents and to have satisfied itself as to the conditions under which the work is to be performed before entering in this Contract.

1. No allowance shall subsequently be made on behalf of the Contractor on account of an error on its part or its negligence or failure to acquaint itself with the conditions of the site.
- H. Examine site and verify that site conditions are acceptable to begin any work. Verify that work specified elsewhere has been completed to an appropriate stage to begin any applicable work. This includes, but is not limited to, lines, grades and surfaces prepared by others. Notify the District's Representative in writing of any irregularities or unacceptable conditions. Start of work by Contractor shall indicate Contractor's acceptance of site conditions.
- I. Throughout the job the Contractor shall be responsible for the general safety of the public and shall take appropriate means at no extra cost to District to provide a safe and secure job site to the satisfaction of the District's Representative.
- J. Verify all measurements, materials and systems taken from the Drawings and Specifications. Contractor shall be responsible for all investigations, field measurements layouts, and coordination necessary to properly fit, install and complete the work required, including integration of new work into, and with existing.
- K. Contractor shall deliver, receive, store, protect, install and apply materials in accordance with manufacturer's and/or industry specifications and instructions unless specifically modified and shown otherwise in the Contract Documents. Installations shall be tight, smooth, level, straight, true to line, and secure.

1.06 PROTECTION OF PROPERTY, MATERIALS AND WORK

- A. Contractor shall be held responsible insofar as its operations are concerned for the care, protection, and preservation of the adjoining premises, buildings, trees, landscaping, utilities, walks, streets, and adjacent properties from damage resulting from or incidental to this Contract.
- B. Protect existing structures, planted areas and improvements not designated for removal. Damage to existing structures including asphalt paving, utilities, and fixtures shall be replaced to an "as was" or better condition, at Contractor's expense, to the satisfaction of the District's Representative.
- C. Materials and equipment, both before and after installation, shall be properly protected by the contractor from the weather and other hazards and kept in a clean and orderly manner.
- D. Utility piping and conduit stub-outs, and parts or equipment left unconnected shall be capped, plugged, or otherwise properly protected by the contractor to prevent damage or the intrusion of dirt or other foreign matter.
- E. Materials and equipment damaged or containing defects developed before acceptance of the work shall be replaced with new at the Contractor's expense.

1.07 WORK SEQUENCE AND SCHEDULE

- A. The sequence and scheduling of the work to be performed by the Contractor shall be subject to review and acceptance by the District's Representative. The Contractor shall submit a Submittal Progress Log and Schedule in accordance with Section 01 33 00 - Submittal Procedures prior to starting work. Project schedules shall conform to Specification Section 01 33 00.

1.08 CONTRACTOR'S USE OF PREMISES

- A. Confine operations to areas immediately within the proposed project sites.
 1. Develop and utilize construction access and haul routes as per the rules and regulations pertaining to the locale in which the work is to be performed and in accordance with the discretion of the District's Representative.

2. Do not encumber site with materials or equipment.
- B. Limit use of premises for work and construction operations to allow for work by other contractors.
 1. Conduct operations so as not to cause unnecessary delay or hindrance to other contractors.
 2. Conduct, adjust, correct, and coordinate work with others to prevent project discrepancies and/or delays.
- C. Assume full responsibility for protection and safekeeping of products stored on premises and work performed until Final Acceptance of the work.
- D. Move stored products under Contractor's control which interfere with operations of the District.
- E. Obtain and pay for use of additional storage or work areas needed for construction operations.

1.09 WORK HOURS AND WORK DURING ONGOING ACTIVITIES

- A. Carry on the work as quietly as possible to prevent possible annoyance to adjacent properties. Avoid unnecessary noise at all times. Comply with local noise regulations or requirements. No work, delivery of equipment or materials shall take place between the hours of 5:00PM and 8:00AM, or during non-working hours and days without written authorization by the District's Representative.
- B. When connecting new utilities to existing, and similar operations, the contractor shall time and coordinate with District's Representative, facility operators, and utility companies such operations to minimize interference with existing activities and operations.

1.10 MATERIALS

- A. Unless otherwise noted or scheduled, materials and equipment specified and used in the work of this Contract shall be new, in first class condition, and suited to the intended use.
- B. Materials shall be delivered to the site and stored in original containers sheltered from the elements, but readily accessible for inspection by the District's Representative until installed.
- C. Materials of the same general type shall be of the same make and quality throughout the work to provide uniform appearance, operation, and maintenance ease.
- D. Equipment specified by manufacturer's number shall include all controls and accessories listed in catalog as standard equipment. Furnish optional or additional accessories as specified.
- E. Where no specified make of material or equipment is specified, any product by a reputable manufacturer which conforms to the requirements of the Contract Documents may be used with the District's Representative's acceptance.
- F. Materials and equipment shall be current products by manufacturers regularly engaged in the production of such products.
- G. Equipment items shall be supported by service organizations, which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the Specified Warranty Period.

1.11 NUISANCE WATER

- A. The Contractor shall protect the work at all times from damage, and shall take measures to prevent delays in the progress of the work caused by nuisance water, such as rainfall, irrigation water and groundwater.

- B. The Contractor shall dispose of nuisance water using appropriate mechanical means at their sole expense and without adverse effects upon the District's, or any other property.
- C. The Contractor shall comply with any and all applicable non-point source pollution regulations required by the District.

1.12 REFERENCE POINTS

- A. The Contractor shall leave existing stakes and reference points in their existing locations unless directed or authorized otherwise by the District's Representative. The Contractor shall set additional stakes and reference points as necessary to properly establish horizontal and vertical controls required for the work.

1.13 COORDINATION

- A. The Contractor shall coordinate all items of its work to assure efficient and orderly sequence of installation of construction elements.
 - 1. The Contractor shall make provisions for accommodating items installed by the District or under separate contracts.
 - 2. The Contractor shall coordinate and cooperate fully with all other agencies, sub-contractors, or utility company personnel furnishing labor, materials, or services, so that the work, as a whole, shall be executed in the most efficient manner and without conflict or delay.
- B. The Contractor shall verify that characteristics of interrelated operating equipment are compatible and coordinate work having interdependent responsibilities for installing of mechanical, irrigation, or electrical work, which may be indicated diagrammatically on Drawings.
- C. The Contractor shall coordinate space requirements and installation of work, which is indicated diagrammatically on Drawings.
 - 1. Follow routing shown for pipes and conduits as closely as possible, run lines parallel with lines of construction edges whenever possible.
 - 2. Utilize spaces efficiently for other installations, for maintenance, and for repairs.
 - 3. Work out all conditions involving work of all trades in advance of installation. If necessary, and before work proceeds in areas with constricted clearances, prepare supplementary drawings for District's Representative review, showing all work in "tight" areas. Provide supplementary drawings and additional work necessary to overcome spatially constricted conditions.
- D. Differences or disputes concerning coordination, interference or extent of work between divisions shall be decided by the District's Representative.
- E. Access Doors and Panels: Coordinate access door and panel requirements with each trade installing work to which access must be available to the District's Representative from time to time.

1.14 CUTTING AND PATCHING

- A. Contractor shall be responsible for all cutting, fitting, or patching of work which may be required to make its several parts come together properly and fix it to receive or be received by work of other trades.
- B. Costs incurred by defective or poorly timed work shall be borne by the responsible party, as determined by the District's Representative. Contractor shall not endanger any work, persons or construction by cutting, digging, or otherwise, and shall not alter the work of any other contractor except as acceptable to the District's Representative.
- C. Patching of openings for new installations and openings resulting from the removal or relocation of an installation shall be done with material of the same type adjoining openings and as acceptable to the District's Representative.

1.15 CLEANING DURING CONSTRUCTION

- A. Execute weekly cleaning operations to keep the work, site, streets, and adjacent properties free from accumulations of waste materials, rubbish, and windblown debris resulting from construction operations.
- B. Provide on-site containers for the collection of waste materials, debris and rubbish.
- C. Remove hazardous waste materials, debris, and rubbish from the site periodically and properly dispose of such materials at legal disposal areas.
 - 1. Location of legal disposal sites and all costs incurred from waste disposal and transportation shall be the responsibility of the contractor.
 - 2. Waste material or debris shall not be buried or burned on the site.
- D. The District's Representative may, at any time during construction, order general clean-up of the site at no additional cost to the District.

1.16 PROJECT COMPLETION

- A. Conform to Section 01 77 00 - Contract Closeout.
- B. The Contractor shall, at completion of the project, leave the installed work properly operating and in a thoroughly clean condition.
- C. Thoroughly instruct the District's Representative and any applicable operation and maintenance personnel in the contents of the "operations and maintenance manual." Refer to Section 01 33 00 – Submittal Procedures.

END OF SECTION

SECTION 01 25 00

SUBSTITUTION PROCEDURES

1.01 SUMMARY

- A. Section Includes: Specific requirements for submission and approval of products other than those specified or noted on the Drawings.
- B. Related Requirements:
 - 1. Section 01 33 00 – Submittal Procedures
 - 2. Other applicable Sections of the Specifications

1.02 DEFINITIONS

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

1.03 INTENT OF SPECIFICATIONS – PRODUCT SELECTION

- A. When a material, article, or process is indicated or specified by trade, patent, proprietary name, or name of manufacturer, the Specification shall be deemed to be followed by the words "or equal, as accepted in writing by the District's Representative" and a request for substitution shall be submitted as specified in this Section. Provide only the named product or products where products are specified followed by the words "no substitution." Substitutions are not allowed.
- B. The naming of more than one manufacturer in a Section does not imply that all products produced by the listed manufacturers are acceptable for use on the project. Where more than one proprietary name, process, and product is specified, the Contractor may provide materials or equipment of any one of the manufacturers specified if it is in full compliance with the Contract Documents and is acceptable to the District's Representative.
- C. Costs incurred due to requests, changes or revisions resulting from substitutions requiring Drawings or services of the District's Representative or Project Consultants to facilitate purchase, installation or erection of any portion of the work shall be borne by the Contractor. A flat hourly rate, as agreed upon, shall be paid by the Contractor whether the change is accepted or not. This fee shall be deducted, and paid, from Contract moneys due to the Contractor as determined by the District's Representative.

1.04 ACTION SUBMITTALS

- A. Procedures: In accordance with Section 01 33 00 – Submittal Procedures.
- B. Substitution Requests:
 - 1. Include sufficient data, drawings, samples, literature and other detailed information which demonstrates to the District's Representative that the proposed substitute is equal in quality, operating efficiency, and durability of the material specified.

2. Substitution Request Form: Facsimile of form provided in Project Manual.
 3. Documentation:
 - a. Submit a detailed side-by-side comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - b. Sufficient data, drawings, samples, literature and other detailed information which demonstrates to the District's Representative that the proposed substitute is equal in quality, operating efficiency, and durability of the material specified.
 - c. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable or requested.
 - d. Samples for review, if applicable.
 - e. Certificates and qualification data.
 - f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and Districts.
 - g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - h. Research reports evidencing compliance with building code in effect for Project.
 - i. Cost information, including a proposal of change, if any, in the Contract Sum.
 - j. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - k. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
- C. Submittal Timing:
1. Substitutions for Cause: Submit requests immediately on discovery of need for change, but not later than 15 working days prior to time required for preparation and review of related submittals.
 2. Substitutions for Convenience: Submit within 20 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.

1.05 CONSIDERATION OF SUBSTITUTIONS

- A. General:
1. Materials and equipment for the work shall be the standard product of a manufacturer regularly engaged in the production of such materials and equipment. Product options or substitutions shall not be the basis for any price increase above the original Contract Sum.
 2. Substitutions which are equal in quality, efficiency, durability and utility to those specified will be permitted, subject to the following conditions.
 3. The District's representative shall review such proposed substitutions and determine if a substitution is acceptable. If the following conditions are not satisfied, District's Representative will return requests without action, except to record noncompliance with these requirements.
 4. Failure of the Contractor to submit proposed substitutions for review in the manner specified shall be sufficient cause for rejection by the District's Representative of any substitutions otherwise proposed.
 5. Failure to place orders for specified equipment or material sufficiently in advance of the scheduled date of installation shall not be considered a valid reason upon which the Contractor may base a request for any substitutions or for any deviations from the Contract Documents.
- B. Substitutions for Cause: District's Representative will consider Contractor's request for substitution for cause when the following conditions are satisfied. If the following conditions are not satisfied, District's Representative will return requests without action, except to record noncompliance with these requirements:
1. Substitution request is fully documented and properly submitted.

2. Requested substitution will not adversely affect the Project Construction Schedule.
 3. Requested substitution has received necessary approvals of authorities having jurisdiction, if applicable.
 4. Requested substitution provides specified warranty.
 5. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- C. Substitutions for Convenience: District's Representative will consider Contractor's request for substitution for convenience when, in addition to the conditions specified for a substitution for cause, under the following conditions.
1. Requested substitution offers District a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities District must assume. District's additional responsibilities may include compensation for redesign and evaluation services, increased cost of other construction by District, and similar considerations.
 2. Requested substitution does not require extensive revisions to the Contract Documents.
 3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
- D. Action by District's Representative:
1. Substitutions shall be favorably reviewed and accepted by the District's representative in writing prior to implementation. Favorable review shall not relieve the Contractor from complying with the requirements of the Contract Documents, and the Contractor shall be responsible for all expenses for any changes resulting from acceptable substitutions which affect other parts of the work.
 2. If necessary, District's Representative will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution.
 3. District's Representative will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
 4. Forms of Acceptance: Change Order, Construction Change Directive, or Supplemental Instructions for minor changes in the Work.
- E. The first or only named manufacturer is the basis for the project design and the use of alternative-names, second-names, or unnamed manufacturer's products may require modifications in the project design and construction.
1. Costs incurred due to requests, changes or revisions resulting from substitutions requiring drawings or services of the District's representative or project consultants to facilitate purchase, installation or erection of any portion of the work, shall be borne by the contractor. A flat hourly rate, as agreed upon, shall be paid by the contractor whether the change is accepted or not. This fee shall be deducted, and paid, from Contract moneys due to the contractor as determined by the District's representative.
- F. Contractor shall furnish full information concerning the material or articles being proposed for substitution.
1. Testing of a proposed substitute material to assure compliance with the Specifications may be required by the District's representative at the contractor's expense.
 2. Samples shall be submitted for review as specified in Section 01 33 00 – Submittal Procedures.
 3. Equipment, material, and articles installed or used by the contractor without required review, shall be at the contractor's risk.
- G. Substitutions shall comply with or exceed all requirements of size, function, structure, durability, and appearance without exception.
1. Use of accepted substitutions shall in no way relieve the contractor from responsibility for compliance with the Contract Documents after installation.
 2. The contractor shall assume all extra costs caused by the use of such substitutions where they affect other work or trades.

1.06 SUBSTITUTION REQUEST FORM

- A. For proposed substitutions, the Contractor shall complete the following Substitution Request Form, attach substantiating back-up literature, and submit to the District's representative within time limit specified.

(Remainder of this Page is Blank)

SUBSTITUTION REQUEST FORM

DATE: _____

TO: DISTRICT'S REPRESENTATIVE

PROJECT NAME: _____

SPECIFIED ITEM: Section _____ Page _____ Item Number _____ Paragraph _____

DESCRIPTION:

S A M P L E

The undersigned requests consideration of the following:

PROPOSED SUBSTITUTION: (put N/A where not appropriate)

Manufacturer: _____ Color: _____

Model Number: _____ Material: _____

Attached data includes product description, specifications, drawings, photographs, performance and test data adequate for evaluation of the requests; applicable portions of the data are clearly identified.

Attached data also includes description of changes to Contract Documents which the proposed substitution requires for proper installation.

The undersigned states that the following paragraphs, unless modified on attachments, are correct:

1. The proposed substitution does not affect dimensions shown on Drawings. If, in fact, it does affect dimensions, the contractor shall provide shop drawings, accurately showing changes to documents.
2. The undersigned shall pay for changes to the design, including engineering design, detailing, and construction costs caused by the requested substitution.
3. The proposed substitution shall not adversely affect other trades, the construction schedule, or specified

- warranty requirements.
- 4. Maintenance and service parts are locally available for the proposed substitution.

The undersigned further states that the function, appearance, and quality of the proposed substitution are equivalent or superior to the specified item.

Submitted by:

Signature: _____ Title: _____

License Category: _____ License Number: _____

Firm: _____ Phone No.: _____

Address: _____ Fax No.: _____

Telephone: _____

DISTRICT'S REPRESENTATIVES REVIEW:

- NO EXCEPTIONS TAKEN EXCEPTIONS TAKEN (SEE ATTACHED COMMENTS)
- FURNISH AS CORRECTED REVISE AND RESUBMIT

By: _____

Date: _____

Comments: **S A M P L E**

Attachments:

END OF SECTION

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Procedures to be followed in preparing and submitting the following supplementing and superseding those included in the General Conditions.
 - a. Photographic documentation.
 - b. Construction Schedule.
 - c. Submittal Schedule.
 - d. Project directory.
 - e. Product list.
 - f. Shop drawings.
 - g. Design-build engineering design and drawings.
 - h. Product data.
 - i. Samples.
 - j. Procedures for:
 - 1) Action Submittals.
 - 2) Informational submittals.
 - 3) Deferred submittals.
 - 4) Delegated design services.
 - k. Colors and patterns submittals.
 - l. Operating and maintenance manuals.
 - m. Field samples and mockups, including on-site review of materials, colors, and textures.
 - n. Environmental plans.
 - o. Requests for Information (RFI's).
 2. Final distribution of submittals.
- B. Related Requirements:
1. Section 01 25 00 - Substitution Procedures.

1.02 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require District's Representative's responsive action. Action submittals are those submittals indicated in individual Specification Sections as action submittals.
- B. Informational Submittals: Written and graphic information and physical samples indicated in individual Specification Sections as informational submittals that do not require District's Representative's responsive action.
- C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.03 GENERAL

- A. Comply with the requirements specified in addition to submittal review procedures and requirements of the General Conditions.

- B. Do not commence any portion of the Work requiring submission of a shop drawing, product datum, or sample until the submittal has been reviewed by District's Representative and appropriate consultant. Such portions of the Work shall be in accordance with reviewed submittals.
- C. Shop drawings, product data, samples and supporting data shall be prepared by Contractor or its suppliers but shall be submitted to District's Representative by Contractor as the instruments of the Contractor.
 - 1. Contractor shall check the drawings of its suppliers as well as its own drawings before submitting them to District's Representative.
 - 2. Contractor shall ascertain that shop drawings, product data, and samples meet all requirements of the Contract Documents and also conform to the structural and space conditions. If shop drawings, product data, and samples show variations from Contract Documents, whether because of standard shop practice or other reasons, Contractor shall make special mention thereof in its letter of transmittal and describe the reasons why there are variations.
 - 3. Contractor shall be fully responsible for observing the need for and making changes in arrangement and manner of installation of piping, connections, wiring, and similar items that may be required by equipment it proposes to supply, both as pertains to its own work and work affected under other parts, headings, or Divisions of the Contract Documents.
 - 4. Prior to submittal to District's Representative, each shop drawing, product datum, and sample submitted for review shall be stamped, dated, and signed by Contractor, verifying that it has been checked by Contractor to be in accordance with the Contract Documents. Submittals not signed by Contractor will be returned without review by the District's Representative.
- D. Miscellaneous systems not specifically specified but installed to meet code requirements or for other reasons are subject to District's Representative's review prior to installation.

1.04 COORDINATION OF SUBMITTALS

- A. Prior to submittal, use all means necessary to fully coordinate all material, including, but not necessarily limited to:
 - 1. Determine and verify all interface conditions, catalog numbers and other data.
 - 2. Coordinate with other trades as required.
 - 3. Clearly indicate all deviations from requirements of the Contract Documents.
 - 4. Verify that each item and the submittal conform in all respects with the requirements of the Contract Documents.
- B. The following products do not require further review except for interface within the Work, unless indicated otherwise:
 - 1. Products specified by reference to standard specifications such as ASTM and similar standards.
 - 2. Products specified by manufacturer's name and catalog model number.
- C. By affixing the Contractor's signature to each submittal, the Contractor certifies that this coordination has been performed.

1.05 GROUPING OF SUBMITTALS

- A. Unless otherwise specified, make submittals in groups containing all associated items to assure that information is available for checking each item when it is received.
 - 1. Partial submittals may be rejected as not complying with the provisions of the Contract.
 - 2. The Contractor may be held liable for delays so occasioned.

1.06 IDENTIFICATION OF SUBMITTALS

- A. Consecutively number all submittals.

1. When material is resubmitted for any reason, transmit under a new letter of transmittal. The resubmittal shall reference the original submittal number but be otherwise identified with a suffix such as "001A" for first revisions, "001B" for second revision, etc.
- B. Accompany each submittal with a letter of transmittal showing all information required for identification and checking.
- C. On at least the first page of each copy of each submittal, and elsewhere as required for positive identification, clearly show the submittal number in which the item was included.
- D. Maintain an accurate submittal log for the duration of the Work, showing current status of all submittals at all times. Make the submittal log available to the District's Representative for review.
- E. Quality Control Set: Maintain returned final set of submittals at project site, in suitable condition and available for quality control comparisons by District's Representative.

1.07 TIMING OF SUBMITTALS

- A. Make submittals far enough in advance of scheduled dates for installation to provide all time required for reviews, necessary approvals, possible revisions, resubmittals, and for placing orders and securing delivery.
- B. In scheduling, allow for review by the District's Representative in a timely manner following receipt of the submittal by the District's Representative.
- C. Delays caused by tardiness in receipt of submittals will not be an acceptable basis for extension of the Contract completion date.

1.08 SUBSTITUTIONS

- A. Substitution requests shall be written, timely and submitted in accordance with the procedures specified in Section 01 25 00 - Substitution Procedures.

PART 2 - SUBMITTALS

2.01 PROJECT DIRECTORY

- A. After execution of the Contract but prior to commencement of Work, Contractor shall submit to District's Representative a Project Directory listing subcontractors and vendors on the Project and giving a brief description of their scope of work, firm name, contact person, address, phone number, and fax number.

2.02 SUBMITTAL SCHEDULE

- A. Contractor shall prepare and submit to District's Representative a "Submittal Schedule" when required by the General Conditions showing scheduled dates of submittals and date required for return of submittals to Contractor.
- B. Contractor shall provide in schedule a minimum of 10 working days for District's Representative to review and check submittals as may be necessary provided it is not a deferred approval item. Based on the number and complexity of submittals at any one time, District's Representative's review period may be longer than 10 days.
- C. Dates on "Submittal Schedule" shall be agreed upon by both District's Representative and Contractor.

2.03 PRECONSTRUCTION PHOTOGRAPHS

- A. Before commencement of work on the site, take digital photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by the District's Representative.
- B. Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as cracking or other damage caused by demolition, site preparation, and building construction operations.
- C. Submit digital file as specified for Construction Photographs.
- D. Submit before Work begins.

2.04 CONSTRUCTION PHOTOGRAPHS

- A. Provide digital photographs taken daily of key site and construction processes, from beginning of mobilization to completion of exterior work. Photographs shall be produced by the contractor in a manner deemed acceptable to District's Representative.
- B. Photographs shall:
 - 1. Provide factual presentation.
 - 2. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.
- C. Views:
 - 1. Provide non-aerial photographs from four cardinal views at each specified time until date of Substantial Completion.
 - 2. Consult with District's Representative for instructions on views required.
 - 3. View and location for each orientation shall be maintained throughout Project.
- D. Digital File:
 - 1. File Format: Joint Photographic Experts Group (JPEG), unless otherwise directed by District's Representative.
 - 2. Minimum Resolution: 2400 x 3000 pixels.
 - 3. Provide digital date/time information in each image file (EXIF metadata).
 - 4. Digital images shall be exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
- E. Submit digital file of photographs on USB flash drive or cloud storage folder with each Application for Payment to District with Project Record Documents.
 - 1. Deliver USB flash drive with Project Record Documents. The USB flash drive shall contain digital files of the Project photographs.
 - 2. Provide with typed table of contents.
 - 3. Prints are not required.

2.05 CONSTRUCTION SCHEDULE

- A. In accordance with the General Conditions, prepare a comprehensive schedule of basic operations of the entire Project in the form of a Critical Path (CPM) network or other appropriate method acceptable to District's Representative.
 - 1. Indicate critical dates for submission of specified shop drawings, product data, samples, and certificates. Provide in Schedule a minimum of 10 working days for District's Representative to review and check submittals as may be necessary. No extension of time will be granted because of Contractor's failure to make submittals to allow for review and processing by District's

- Representative in accordance with the accepted milestones. Specific submittals considered by the Contractor to be on the "critical path" shall be indicated on the Schedule.
2. Include decision dates for products specified by allowance and for selection of colors/finishes.
- B. The schedule shall be the basis for establishing starting and completing dates of Work for the Project.
 - C. Conform to accepted schedule, and arrange work in such a manner that it will be installed in accordance with the schedule.
 - D. Establish a program to reevaluate and update the schedule periodically in accordance with requirements of the Project. Submit first schedule 2 weeks after Notice to Proceed.
 - E. Coordinate letting of subcontracts, material purchases, delivery of materials, sequence of operations, and similar activities to conform to accepted schedule, and furnish proof of conformance as may be required by District.
 - F. In case District determines, after consultation with District's Representative, that Contractor fails or refuses to take appropriate and necessary measures to complete the Work in accordance with the accepted schedule or within time to which such completion may be extended, the Contract, or any part thereof, may be terminated under the provisions of the General Conditions.
 - G. Submit to the District's Representative for review, within 45 calendar days after date of the Contract or as allowed by the Schedule, all submittals for equipment, fabrications, and specialty items as listed in each Section of the Specifications.

2.06 SHOP DRAWINGS

- A. Shop drawings shall be drawn to a scale, be completely dimensioned, and be sufficiently large to show all pertinent aspects of the item and its method of connection to the Work, or as specifically indicated elsewhere in other Sections of these Specifications.
- B. Entitle shop drawings with name of the Project and list applicable divisions, sections, article, or reference on each sheet.
- C. Submit separate items on separate sheets.
- D. The reproduction of any Contract Documents for use in a shop drawing submittal is not permitted.
 1. If the Contractor requires, it may request drawings/backgrounds from the District's Representative to use in its preparation of shop drawings. The District's Representative will send drawings, via e-mail, only after the following is completed:
 - a. Contractor to complete a "CAD Release & Indemnity Agreement," or similarly named document, to be provided by District's Representative. Sign and return to the District's Representative.
 - b. Requests for drawings prepared by consultant of District's Representative shall be directed to the office of the respective consultant and are subject to each consultant's firm policies.
 2. Review comments of the District's Representative or its consultants will be shown on the copy returned to the Contractor. The Contractor shall make and distribute additional copies as are required for its purposes.
 3. The District shall be provided with a copy of shop drawing transmittals only if requested.

2.07 PRODUCT DATA

- A. Manufacturer's standard drawings shall be modified to delete information which is not applicable and shall be supplemented to provide additional information where so required.

- B. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, and other standard descriptive data shall:
 - 1. Have each copy clearly marked to identify pertinent materials, products, models, finishes, etc.
 - 2. Show clearly standard options included.
 - 3. Show dimensions and clearances required.
 - 4. Show performance characteristics and capacities.
 - 5. Show wiring diagrams and controls, and show necessary rough-in requirements for utility services and connections, where applicable.
 - 6. Include manufacturer's installation instructions on 8.5-inch by 11-inch format.
- C. Identify each item of product data by reference to sheet and detail numbers of Contract Drawings and/or specific reference to Articles or paragraphs of a Specification Section.
- D. Where product data, as submitted, contains extraneous information, unmarked options, or is incomplete, it will be returned to Contractor without review.

2.08 SAMPLES

- A. Contractor shall forward to District's Representative, at its own expense, samples designated for use on the Project. Include material, equipment, textures, colors, and fabrics in sizes and quantities as required by the Drawings and Specifications or as requested by District's Representative. Where there is an expected range of color or texture variations for the specified item, submit sufficient number of samples to illustrate range.
- B. Submit and resubmit samples until accepted by District's Representative.
- C. No review of a sample shall be taken in itself to change or modify the Contract requirement.
- D. Finishes, materials, and workmanship in the completed Project shall match accepted samples.
- E. Samples of value will be returned to Contractor, when requested in writing at time of submittal, for its use in the Project after review, analysis, comparison, or testing as may be required by District's Representative.
- F. No samples shall be incorporated into the Work, unless otherwise specified or specific approval is given by District's Representative.

2.09 DELEGATED DESIGN SERVICES

- A. Performance and Design Criteria:
 - 1. Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 2. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to District's Representative.
- B. Delegated-Design Services Certification:
 - 1. In addition to shop drawings, product data, and other required submittals, submit paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 2. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

- C. Delegated Design / Design-Build Engineering Design and Drawings: Furnish in a computer-aided design (CAD) program, AutoCAD, or accepted equal, unless otherwise directed. Drawings shall plot at a minimum 1/8" = 1'-0" scale.

2.10 COLORS

- A. Unless the color and pattern are shown or specified, whenever a choice of color or pattern is available in a specified product, submit accurate color charts and pattern charts to District's Representative for review and selection.
- B. Completely describe the relative costs and capabilities of each color and pattern, unless available colors and patterns have identical costs and wearing capabilities.

2.11 FIELD SAMPLES AND MOCKUPS

- A. Comply with requirements specified in respective Specification Section.

2.12 ENVIRONMENTAL PLANS

- A. Unless otherwise not required by governing authorities or waived by the District, within 21 days of the date of commencement as stated in the Notice to Proceed, prepare and submit the following items:
 - 1. A completed Health and Safety Plan acceptable to the District.
 - 2. A completed Dust and Odor Control Plan.
 - 3. A Transportation Plan.
 - 4. A completed Erosion Control Plan.

2.13 REQUESTS FOR INFORMATION (RFI'S)

- A. RFIs shall be submitted by the Contractor or by subcontractors to the Contractor who shall then assign the request an RFI number and forward the request on to the District's Representative. RFIs from contractors under separate contract with District, and performing work concurrently with work under this Contract, shall submit RFIs through the Contractor for coordination.
- B. Subcontractors shall not submit RFIs directly to the District's Representative.
- C. Each RFI shall be given a discrete, consecutive number such as "001," "002," "003," etc. Revisions or resubmittal of the same RFI shall maintain the original RFI number but be otherwise identified with a suffix such as "001A" for first revisions, "001B" for second revision, etc.
- D. Contractor shall identify in the RFI the specific issue that the Contractor is requesting information on, where the issue is referred to in the Contract Documents, and what is the Contractor's proposed solution to the apparent conflict. RFIs not addressing these three issues will be rejected.
- E. The District's Representative's response to RFIs will confirm a stated interpretation or otherwise interpret the design intent and may include furnishing an alternative conflict resolution.
- F. The District's Representative will review and process RFIs in an average of 10 working days. It is acknowledged and understood that some RFIs will take longer to answer than others.
- G. RFI Log: Contractor shall prepare and maintain a log of RFIs, and at any time requested by the District's Representative, the Contractor shall furnish copies of the log showing all outstanding RFIs.

PART 3 - EXECUTION

3.01 PROCEDURES FOR ACTION SUBMITTALS

- A. General: Submit as specified in the General Conditions and Specification Sections.
1. Submittals shall be made to District's Representative. Submittal of shop drawings via e-mail attachment will be generally accepted, though when requested by District's Representative, Contractor shall provide full size and half size shop drawings.
 2. Subcontractors shall make submittals to Contractor.
 3. Submittals shall not be made directly to the District, unless specifically requested, or consultants of the District's Representative. Even if a submittal is reviewed and returned by a consultant of the District's Representative, such submittal shall be considered as not reviewed if not submitted through the District's Representative.
 4. If more than one resubmittal of the same item or its component is required, the Contractor will be billed for additional review time and materials at current billing rates of the District's Representative.
- B. Unless otherwise agreed or requested, District shall be provided with a copy of transmittals only.
- C. Copies required in each Action Submittal shall be as follows unless otherwise mutually agreed or specified in a respective Specification Section:
1. Shop Drawings and Product Data: Digital PDF (Portable Document Format) files via email, ftp site, or other secure file transfer protocol.
 - a. Digital submittals shall be fully compatible with Adobe Acrobat Reader.
 - b. All parties shall view and print with Adobe Acrobat (fully up-to-date) to ensure compatibility, unless agreed upon otherwise.
 - c. District's Representative reserves the right to request hard copies of submittals as follows:
 - 1) Shop Drawings: Three sets of bond prints.
 - 2) Product Data: Three sets.
 2. Samples:
 - a. Unless otherwise specified, submit samples in the quantity which is required to be returned, plus 2 which will be retained by the District's Representative.
 - b. By prearrangement in specific cases, a single sample may be submitted for review and, when reviewed, be installed in the Work at a location agreed upon by the District's Representative.
- D. Identification:
1. Properly identify each submittal with name of Project, Contractor, subcontractor, and date.
 2. Accompany each submittal by an acceptable transmittal form referring to Project name and Specifications Section number, and paragraph number, when applicable, for identification of each item.
 3. Consecutively number shop drawings for each Section of work; retain numbering system throughout all revisions.
 4. Allow clear space on each drawing, product datum, and sample for stamp of Contractor and District's Representative. Where clear space is not available on samples, submit with tags or stickers attached.
- E. Stamp each shop drawing, product datum, and sample to certify that it has been coordinated and checked for completeness and compliance with requirements of the Work, Project, and Contract Documents.
- F. Review by District's Representative:
1. General:
 - a. Except for finish, color, and other aesthetic matters left to District's Representative's decision by Contract Documents, District's Representative's review of shop drawings, product data, and samples is only for Contractor's convenience in following work and does not relieve Contractor from responsibility for deviations from requirements of Contract Documents.

- b. Do not construe review by District's Representative as a complete check or relief from responsibility for errors or omissions of any sort in shop drawings or schedules or from necessity of furnishing work required by Contract Documents that may not have been shown on shop drawings.
 - c. Review of a separate item by District's Representative does not indicate review of complete assembly in which it functions.
 - d. Review comments of the District's Representative (or its consultants) will be shown when it is returned to the Contractor. The Contractor shall make and distribute such copies as are required for its purposes.
 2. Submittals not stamped by Contractor and submittals which, in opinion of the District's Representative, are incomplete, contain numerous errors, or have not been checked or have only been checked superficially will be returned to Contractor for resubmittal.
 3. Processing:
 - a. District's Representative will review shop drawings, product data, and samples in accordance with agreed upon "Submittal Schedule" and will return them to Contractor imprinted with stamp of the District's Representative.
 - b. Notations by District's Representative which increase Contract cost or time of completion shall be brought to attention of the District's Representative before proceeding with work. Failure to do so will result in the increased costs being borne by the Contractor.
 - c. Each submittal will be stamped indicating appropriate action required of the Contractor.
 - d. If for any reason the Contractor cannot comply with the notations, Contractor shall re-submit submittal. In the transmittal letter accompanying the re-submittal, clearly describe the reason(s) for not being able to comply with the notations.
- G. Consultants' Review:
 1. Submittals requiring review by District's Representative or its consultants shall be sent to the District's Representative. District's Representative will forward submittal to applicable consultant for their review.
 2. Processing shall be in accordance with consultants stamp.
 3. If action required by consultants stamp is not clear, Contractor shall immediately notify the District's Representative for a clarification.
 4. If returned submittal also includes stamp by the District's Representative, processing shall be in accordance with the District's Representative's stamp.
- H. Revisions:
 1. Make revisions pertinent to by comments noted on the submittal.
 2. If the Contractor considers any required revision to be a change, they shall so notify the District's Representative as provided for in the General Conditions.
 3. Show each revision by number, date, and subject in a revision block on the submittal.
 4. If for any reason Contractor cannot comply with the notations, Contractor shall resubmit submittal.
- I. Revisions after Review: When a submittal has been reviewed by the District's Representative, resubmittal for substitution of materials or equipment will not be considered unless accompanied by an acceptable explanation as to why the substitution is necessary, or unless directed by the District.

3.02 PROCEDURES FOR INFORMATIONAL SUBMITTALS

- A. General:
 1. Prepare and submit "Informational Submittals" where required by the Specifications.
 2. Number of Copies: Submit PDF as specified for Action Submittals, unless otherwise indicated. District's Representative will not return copies.
 3. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 4. Test and Inspection Reports: Comply with requirements specified in Section 01 45 00 – Quality Control.

- B. The following items shall be considered "Informational Submittals" whether or not identified as such in the respective Specification Sections.
 - 1. Qualification Data.
 - 2. Certificates for or from the following:
 - a. Installers.
 - b. Manufacturers.
 - c. Products and materials.
 - 3. The following Reports:
 - a. Material and Product Test Reports.
 - b. ICC-ES Reports:
 - c. Preconstruction Test Reports.
 - d. Compatibility Test Reports.
 - e. Field Test Reports.
 - 4. Maintenance Data.
 - 5. Design Data.
 - 6. Manufacturer's Instructions.
 - 7. Manufacturer's Field Reports.
 - 8. Insurance Certificates and Bond.
 - 9. Construction photographs as specified .
 - 10. Material Safety Data Sheets (MSDSs).

3.03 PROCEDURES FOR CLOSEOUT AND MAINTENANCE MATERIAL SUBMITTALS

- A. Number of Copies: Two, unless otherwise directed by District's Representative.
- B. Comply with additional Closeout Procedures specified for the Project.

3.04 FINAL DISTRIBUTION AFTER REVIEW

- A. In addition to copies of submittals required by Contractor, subcontractors, suppliers, and fabricators, Contractor shall make distribution to:
 - 1. Contractor's jobsite file.
 - 2. Project Record Documents file; see additional requirements specified in Section 01 78 39 - Project Record Documents.

END OF SECTION

SECTION 01 41 00

REGULATORY REQUIREMENTS

1.01 SUMMARY

- A. Section Includes:
 - 1. The codes and regulations applicable to the Work.
 - 2. Code and regulatory abbreviations used in the Specifications.
- B. Related Requirements:
 - 1. Section 01 42 00 - References, Abbreviations, and Definitions; requirements relating to industry standard references used in the Specification Sections.

1.02 APPLICABLE CODES AND REGULATIONS

- A. Codes which apply to this Project include, but are not limited to, the following including additions, changes, and interpretations adopted by the enforcing agency in effect as of the date of these Contract Documents.
 - 1. State of California Code of Regulations (CCR):
 - a. Title 8, Industrial Relations.
 - b. Title 19, Public Safety.
 - c. Title 24, Building Standards Code.
 - 1) Part 2, California Building Code.
 - 2) Part 3, California Electric Code.
 - 3) Part 4, California Mechanical Code.
 - 4) Part 5, California Plumbing Code.
 - 5) Part 6, California Energy Code.
 - 6) Part 9, California Fire Code.
 - 2. State of California, Business and Transportation Agency, Department of Transportation (Caltrans) "Standard Specifications."
 - a. Control of Work: Conform to Section 5.
 - b. Control of Materials: Conform to Section 6.
 - 3. The following additional Codes and Standards:
 - a. California Occupational Safety and Health Act Standards (Cal-OSHA).
 - b. Occupational Safety and Health Act (OSHA).
 - c. Air Quality Standards of the San Joaquin Valley Air Pollution Control District including emissions and dust during construction.
 - d. Americans with Disabilities Act (ADA) Standards.
 - e. Environmental Regulations including:
 - 1) 22 CCR, Section 66260 et seq.; California Hazardous Waste Management Regulations.
 - 2) 40 CFR, Part 260 et seq.; Hazardous Waste Management System.
 - 3) 42 USC, Section 6901 et seq.; Resource Conservation and Restoration Act (RCRA).
 - 4) National Pollutant Discharge Elimination System (NDPES).
 - f. National Fire Protection Association (NFPA): Standards 13, 24, 72, and 80.
 - g. National Electrical Code (NEC).
 - 4. Local ordinances and amendments to the above codes
- B. All work shall meet or exceed the requirements of the above codes.
- C. References in the Specifications to "code" or to "building code," not otherwise identified, shall mean the foregoing specified codes, together with the additions, changes, amendments, and interpretations adopted by the enforcing agency and in effect on the date of these Contract Documents. Nothing on the

Drawings or in the Specifications shall be interpreted as requiring or permitting work that is contrary to these rules, regulations, and codes.

- D. Where other regulatory requirements are referenced in these Specifications, the affected work shall meet or exceed the applicable requirements of such references.
- E. Regulatory requirements referred to shall have full force and effect as though printed in these Specifications.
- F. Where the Drawings or Specifications call for or describe materials, workmanship, or construction of a better quality, higher standard, or larger size than is required by said laws, codes, rules, and regulations, the provisions of the Drawings and Specifications shall take precedence over said laws, codes, rules, and regulations.

1.03 OTHER APPLICABLE LAWS AND REGULATIONS

- A. All applicable federal, state, and local laws, regulations of governing utility districts, regulations of the state fire marshal, federal, state and local environmental regulations, and the various other authorities having jurisdiction over the construction of the Project shall apply to the Contract throughout and they shall be deemed to be included in the Contract the same as though printed in these Specifications.
- B. Discrepancies between these codes, rules, and regulations and the Contract Documents shall be brought to the attention of the District's Representative for resolution.

END OF SECTION

SECTION 01 42 00

REFERENCES, ABBREVIATIONS, AND DEFINITIONS

1.01 SUMMARY

- A. Section Includes:
 - 1. Requirements for standard references used in the various Specification Sections.
 - 2. Standard reference abbreviations used in the Project Manual.
 - 3. Definitions of terms used in the Project Manual.
- B. Related Requirements:
 - 1. Section 01 41 00 - Regulatory Requirements

1.02 STANDARD SPECIFICATIONS

- A. The Contract Documents contain references to various standard specifications, codes, practices, and requirements for materials, work quality, installation, inspections, and tests published and issued by the organizations, societies, and associations. Such references are hereby made part of the Contract Documents to the extent required.
- B. When standard specifications are included by abbreviation and number only, it is assumed that the Contractor is familiar with and has ready access to the specified standards.
- C. When the effective date of a reference standard is not given, it shall be understood that the current edition or latest revision thereof and any amendments or supplements thereto in effect on the date of original issue of these Contract Documents, as indicated on the cover, shall govern the Work.
- D. Reference standards are not furnished with the Contract Documents, because the Contractor, subcontractors, manufacturers, suppliers, and the trades involved are assumed to be familiar with their requirements.
- E. Contractor shall obtain its own copies of required specified referenced publications.
- F. The specification or standard referred to shall have full force and effect as though printed in these Specifications.
- G. In addition to those standards specifically referenced in the Specifications, comply with the accepted industry standards and trade association recommendations for the respective portions of Work.
- H. In the case of difference between referenced standards and the Contract Documents, the most stringent requirements prevail.

1.03 STANDARD SPECIFICATION ABBREVIATIONS

- A. In addition to abbreviations indicated on the Drawings, references in the Project Manual to trade associations, technical societies, recognized authorities, and other institutions may include the following organizations, which are sometimes referred to by only the corresponding abbreviations. Not all abbreviations are listed, and not all listed abbreviations are used.
- B. Abbreviations:
 - 1. AA Aluminum Association
 - 2. AAADM American Association of Automatic Door Manufacturers
 - 3. AAMA American Architectural Manufacturer's Association.
 - 4. AASHTO American Association of State Highway and Transportation Officials

5. ACI American Concrete Institute
6. AEIC Association of Edison Illuminating Companies
7. AIA American Institute of Architects
8. AIEEE American Institute of Electrical and Electronic Engineers
9. AISC American Institute of Steel Construction, Inc.
10. AFI Air Filter Institute
11. AJCHN American Joint Committee on Horticultural Nomenclature
12. AMCA Air Moving and Conditioning Association
13. ANSI American National Standards Institute
14. APA APA - The Engineered Wood Association
15. ARI American Refrigeration Institute
16. ASHRAE American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc.
17. ASLA American Society of Landscape Architects
18. ASME American Society of Mechanical Engineers
19. ASSE American Society of Sanitary Engineering
20. ASTM American Society for Testing and Materials
21. AWMAC Architectural Woodwork Manufacturers Association of Canada
22. AWPA American Wood Protection Association
23. AWI Architectural Woodwork Institute
24. AWS American Welding Society, Inc.
25. AWWA American Water Works Association
26. BHMA Builder's Hardware Manufacturers Association
27. CBC California Building Code
28. CRA California Redwood Association
29. CSI Construction Specifications Institute
30. CLFMI Chain Link Fence Manufacturers Institute
31. CRSI Concrete Reinforcing Steel Institute
32. CS Commercial Standard of National Bureau of Standards, U.S. Department of Commerce
33. DHI Door and Hardware Institute
34. FGMA Flat Glass Marketing Association
35. FM Factory Mutual
36. FS Federal Specification of General Services Administration
37. GA Gypsum Association
38. ICC-ES International Code Council Evaluation Service, Inc.
39. MIL Military Specification of U.S. Department of Defense
40. NAAMM National Association of Architectural Metal Manufacturers
41. NAAWS North American Architectural Woodwork Standards
42. NAFM National Association of Fan Manufacturers
43. NBS National Bureau of Standards
44. NEC National Electric Code
45. NEMA National Electrical Manufacturers' Association
46. NFC National Fire Code
47. NFPA National Fire Protection Association
48. NIST National Institute of Standards and Technology
49. NLMA National Lumber Manufacturers Association
50. NSF National Sanitation Foundations
51. PCI Precast Concrete Institute
52. PDI Plumbing and Drainage Institute
53. RIS Redwood Inspection Service [Grading Rules]
54. SDI Steel Deck Institute
55. SDI Steel Door Institute
56. SFPA Southern Forest Products Association
57. SMACNA Sheet Metal and Air Conditioning Contractors' National Association, Inc.
58. State of California:
 - a. CalTrans Business and Transportation Agency, Department of Transportation

b.	SFM	Office of State Fire Marshal
c.	DSA	Division of State Architect.
59.	SSPC	SSPC: The Society for Protective Coatings
60.	TCNA	Tile Council of North America
61.	UL	Underwriters' Laboratories, Inc.
62.	WCLIB	West Coast Lumber Inspection Bureau
63.	WDMA	Window and Door Manufacturers Association
64.	WI	Woodwork Institute
65.	WMMP	Wood Moulding & Millwork Producers Association
66.	WRCLA	Western Red Cedar Lumber Association
67.	WWPA	Western Wood Products Association.

1.04 DEFINITIONS

- A. Reference to Drawings: Where the words "shown", "indicated", "detailed", "noted", "scheduled". or words of similar import are used, it shall be understood that reference is made to the Drawings accompanying these Specifications, unless otherwise noted.
- B. Addendum: The word "Addendum" shall mean written and/or graphic modifications to the Contract documents provided to holders of the Contract Documents prior to the opening of bids. Addenda shall be issued by the Districts Representative.
- C. Alternates: The word "Alternates" shall be understood to mean alternate products, materials, equipment, systems, methods, units of work or elements of the construction, which may, at the Districts option and under the terms established by the Contract Documents, be added to, or deleted from the work.
- D. Approvals: The words "approved", "approval", "acceptable", "acceptance", shall mean acceptance by the Districts Representative is required.
- E. Contract Change Order: The words "Contract Change Order" shall mean a change order authorization to the Contractor, covering changes to the Contract found by the District Representative to be necessary for the proper completion or construction for the whole work required by the Contract, and establishing the basis of payment and/or time adjustments for the work affected by the changes, also sometimes referred to as a "Change Order."
- F. Contract Documents: The words "Contract Documents" shall mean the documents contained within the General Conditions, Special Provisions of the Contract, the Drawings, the Specifications, Change Orders, and other modifications issued by the Districts Representative prior to and after execution of the Contract and identified as a Contract Document.
- G. Directions: The words "directed," "designated," and "selected" shall mean the directions, designations, selection, of the Districts Representative, unless otherwise noted.
- H. Drawings: The word "Drawings" shall mean the official Project bid or construction plans, plan details, profiles, typical cross sections, working drawings, shop drawings, supplemental drawings, and/or reproductions thereof, accepted or issued by the Districts Representative, which show the locations, character, dimensions, and details of work to be performed. All such documents are to be considered as a part of the Drawings.
- I. Equals: The words "or equal," "equal to," "approved equal," "or approved equal," "accepted equal," and "equivalent," shall mean "equal to or acceptable in the opinion of the Districts Representative," unless stated otherwise.

- J. Language: Words and phrases requiring an action or performance, such as "perform," "provide," "install," "furnish," "connect," "test," "coordinate," and words and phrases of similar import, shall be understood to be preceded by the phrase "The Contractor shall" unless otherwise stated.
- K. Modifications: The word "modifications" shall mean a written amendment to the Contract signed by both parties to the Construction Contract, a Change Order, a written interpretation issued by the Districts Representative or a written order for a minor change in the work issued by the Districts Representative.
- L. Notice To Proceed: The words "Notice to Proceed" shall mean the written notice issued by the Districts Representative to the contractor fixing the date on which or within which dates the contractor shall start to perform the contractor's obligations under the Contract Documents.
- M. Perform: The word "perform" shall mean that the contractor, at his expense, shall perform all operations including necessary labor, tools, and equipment and further including the furnishing and installation of materials that are indicated, specified, and required to complete such the conditions of the Contract and Contract Documents.
- N. Project: The word "project" shall mean the total construction of the work performed under the Contract Documents.
- O. Provide: The word "provide" shall mean that the Contractor, at its expense, shall furnish and install the work, complete in place and ready for use, including furnishing of necessary labor, materials, tools, equipment and transportation.
- P. Required: The word "required" shall mean "as required to properly complete the work and as required and acceptable to the District's Representative" unless otherwise noted.
- Q. Shop Drawings: The words "shop drawings" shall mean drawings, diagrams, schedules, and other data specifically prepared for the work by the contractor or his sub-contractor, manufacturer, supplier, or distributor to illustrate some portion of the work.
- R. Site: The words "Site" or "Sites" shall be understood to mean the property or properties described within the Contract Documents and indicated on the Drawings where the work shall commence.
- S. Substantial Completion: The words "substantial completion" shall mean the time and date when the work, or designated portion thereof, is sufficiently complete in accordance with the Contract Documents so that the District can occupy or utilize the work, or designated portion thereof, for the use for which it was intended, as evidenced by the District's Certificate of Substantial Completion. The Certificate of Substantial Completion shall set forth the date on which Substantial Completion is deemed by the Districts Representative in its sole discretion to have occurred. This shall occur only when the site improvements are 100 percent complete and shall exclude correction of final punch list items(s) and the execution of the Landscape Maintenance Period. The issuance of a Certificate of Substantial Completion shall signify the date on which the accounting of Contract "Working Days" or "Calendar Days" is terminated insofar as they may relate to Liquidated Damages.
- T. Work: The word "work" whether capitalized or in lower case, shall be understood to mean labor, materials, or both, and the entire construction encompassed by the Contract Documents.

END OF SECTION

SECTION 01 45 00

QUALITY CONTROL

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Testing and inspection requirements.
 - 2. Testing Agency qualifications.
 - 3. Manufacturer's field services.
- B. Related Requirements:
 - 1. Inspections and Testing Required by Laws, Ordinances, Rules, Regulations, Orders, or Approvals of Public Authorities: Conditions of the Contract.
 - 2. Additional requirements for inspections and testing are included in the General Conditions.

1.02 TESTING LABORATORY SERVICES

- A. General:
 - 1. Requirements for testing are included in governing codes and described in various Sections of the Specifications.
 - 2. The District will employ and pay for the services of an Independent Testing Agency to perform testing and inspection requirements required by code and other tests and inspections when specified to be performed and paid for by the District. Employment by the District of the Testing Agency shall in no way relieve Contractor's obligations to perform the Work of the Contract.
 - 3. Tests required by the Specifications and not specified or required by Code to be performed and paid for by the District shall be performed by a testing laboratory employed and paid for by the Contractor and meeting the qualification requirements specified in this Section.
 - 4. Where no testing requirements are described, but the District decides that testing is required, the District may require such testing be performed under current pertinent standards for testing. Payment for such testing will be by the District.
 - 5. Inspections, tests, and related actions specified are not intended to limit the Contractor's quality control procedures that facilitate compliance with the Contract Documents.
- B. Qualification of Testing Agency:
 - 1. Meet "Recommended Requirements for Independent Laboratory Qualification," published by American Council of Independent Laboratories.
 - 2. Meet basic requirements of ASTM E329, "Use in the Evaluation of Testing and Inspection Agencies as Used in Construction."
 - 3. Authorized to operate in the State of California.
- C. Limitations of Authority of Testing Agency: Testing Agencies are not authorized to:
 - 1. Release, revoke, alter, or enlarge on requirements of Contract Documents.
 - 2. Approve or accept any portion of the Work.
 - 3. Perform any duties of the Contractor.
- D. Testing Agency Duties:
 - 1. Cooperate, together with Contractor, in notifications, information, scheduling, storage, and access as necessary to meet requirements for service without causing delays on Project.
 - 2. Perform specified inspections, sampling, and testing of materials and methods of construction.
 - 3. Comply with specified standards.
 - 4. Ascertain compliance of materials with requirements of Contract Documents.

5. Notify District's Representative and Contractor when test or inspection reveals undesirable conditions, nonconformance, or failure to meet requirements.
6. Promptly submit written report of each test and inspection, with copies to District's Representative, Contractor, and governing agencies as required.
 - a. Include all samples taken and tests made, regardless of results.
 - b. Include reports to show specified requirements, and state whether or not test results comply with requirements.
7. Perform additional tests as required by the District's Representative.

1.03 CONTRACTOR'S RESPONSIBILITIES

- A. It is the Contractor's responsibility to coordinate the services of all testing and inspection required by the separate Specification Sections whether or not to be performed by the District's or Contractor's Testing Agency.
- B. Contractor shall furnish promptly, without additional charge, all reasonable facilities; labor and materials necessary for safe, thorough, and convenient inspection; and tests that may be required by the Contract Documents.
- C. Prepare and submit to District's Representative a schedule of tests required of the Testing Agencies at least 15 working days in advance of first test. In addition, Contractor shall give minimum 48 hours' notice to the Testing Agency prior to required tests and inspections.
- D. Furnish, prepare, and deliver test samples and specimens as required by the Testing Agency except where such preparation and handling is to be performed by Testing Agency. Contractor shall be solely responsible for delays due to such samples' not being submitted and resubmitted, if necessary, in the time required for tests or inspections before material is incorporated into the Work.
- E. Cooperate with Testing Agency personnel in providing access to materials being tested or inspected.
- F. Make necessary repairs to in-place work caused by removal of required test samples.
- G. Materials furnished and installed on the Project shall be equal to approved test samples in every respect.
- H. Samples which are of value after testing will remain the property of the Contractor, but no such samples shall be incorporated in the Work without written approval of the District's Representative.
- I. Costs associated with testing, inspections and observations due to the following shall be the responsibility of the Contractor:
 1. Re-testing due to failure of initial samples.
 2. Unacceptable changes in sources, lots, or suppliers of materials after original testing established compliance.
 3. Changes in methods or materials of construction by contractor that require testing, inspection or other related services in excess of that require by original design.
 4. Failure to properly notify the District's Representative at critical stages of construction.
 5. Requesting testing, inspection, and/or observation of work not ready.

1.04 QUALITY ASSURANCE

- A. Materials furnished and work performed under the Contract shall be subject to review by the District's Representative. The Contractor shall be held strictly to the requirements of the Contract Documents with regard to quality of materials, workmanship, and diligent execution of the Contract. Review by the District's Representative may include mill, plant, shop, or field review as deemed necessary.

- B. Work performed in the absence of any prescribed inspection or observation may be subject to removal and replacement. In such a case, the entire cost of removal and replacement shall be borne by the Contractor, regardless of whether the work removed is found to be defective or not.

1.05 CONFLICTING REQUIREMENTS

- A. If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to District's Representative for a decision before proceeding.
- B. The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to District's Representative for a decision before proceeding.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 EXAMINATION OF CONDITIONS

- A. Prior to installing any portion of the work, the Contractor shall examine the site and verify that site conditions are acceptable to begin work of each section.
- B. Verify that work specified elsewhere has been completed to an appropriate stage to begin work of each section.
- C. Materials or products requiring installation under the supervision or inspection of a specific materials manufacturer or manufacturer's representative shall be examined and/or tested, and accepted in writing, by such representative(s) prior to installation of work.
- D. Notify the District's Representative immediately in writing of any irregularities or unacceptable conditions and re-direct work to avoid delay.
- E. Start of work by Contractor shall indicate Contractor's acceptance of site conditions.

3.02 TOLERANCES

- A. Tolerances not specifically identified shall meet the written standards and/or recognized commercial tolerances established for the specific materials or product. Refer to Section 01 42 00 - References.

3.03 REQUIRED TESTS AND INSPECTIONS

- A. "Special Inspections" as required by DSA 103, List of Required Structural Tests & Special Inspections.
- B. Additional Tests and Inspections: See the various technical Sections of the Specifications.

3.04 FAILURE TO PASS TESTS

- A. Failure of any material or article to pass specified tests will be sufficient cause for refusal to consider any further samples of the same brand or make of that material or article.

- B. Where an individual material is to be part of an assembly with other materials for incorporation in the Work, failure of the material to pass specified tests or to conform to indicated standards will be sufficient cause for its rejection and removal and replacement, regardless of whether tests or inspections have been made or not in an assembled or in an unassembled condition.
- C. When tests indicate non-compliance, the Contractor shall pay all direct and indirect costs of subsequent re-testing until compliance is established.

3.05 MANUFACTURER'S FIELD SERVICES

- A. When specified in respective Specification Sections, Contractor shall require supplier or manufacturer to provide qualified personnel to observe field conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, testing, adjusting and balancing of equipment as applicable, and to make appropriate recommendations. Contractor is responsible for proper notification of manufacturer's representative before installation of applicable work and for obtaining necessary inspection certificate stating that installation was observed and approved.
- B. Product Performance Verification: The supplier of products specified based on performance criteria shall, at the request of the Agency, inspect the installed product and certify conformance of the product to specified criteria under the installed conditions.
- C. Manufacturer's representative shall submit written report to the District's Representative listing observations and recommendations.

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Temporary facilities and controls needed for the Work during construction including, but not necessarily limited to:
 - 1. Temporary utilities.
 - 2. Sanitary facilities.
 - 3. Enclosures such as coverings, barricades, and fences.
 - 4. Site security.
- B. Related Requirements:
 - 1. Equipment normally furnished by individual trades in execution of their portions of the Work shall comply with requirements of pertinent safety regulations.
 - 2. Permanent installation and hookup of utility lines are included under other Sections.

1.02 SELECTED REFERENCE AND REGULATORY REQUIREMENTS

- A. National Fire Protection Association (NFPA):
 - 1. 10 - Portable Fire Extinguishers.
 - 2. 241 - Safeguarding Building Construction and Demolition Operations.
- B. State of California, Business and Transportation Agency, Department of Transportation (Caltrans) "Standard Specifications."

1.03 GENERAL

- A. Furnish, install, and pay for meters, equipment, wiring, and piping necessary to provide such utilities.
- B. Additional requirements for construction facilities and temporary controls are included in the General Conditions.
- C. Provide written notification to the District to request use of new building equipment for temporary facilities. New building equipment shall not be used for temporary facilities without prior written approval from District.

1.04 REQUIREMENTS FOR REGULATORY AGENCIES

- A. Comply with applicable standards referenced in Section 01 42 00 - References, Abbreviations, and Definitions.
- B. All facilities shall be provided and maintained by the contractor in accordance with Cal-OSHA and applicable laws and ordinances.
- C. Contractor shall:
 - 1. Take suitable steps to ensure that public utilities encountered in connection with the Work will not be damaged.
 - 2. Send notices, make necessary arrangements and provide services required for the care of gas mains, water pipes, sewer pipes, conduits, cables, and other equipment or property.

3. Arrange with utility companies for fees required to move or remove their meters, poles, cables, guy wires, or equipment in or set under the property which will interfere with the construction work or which will not be required in the new construction.

PART 2 - TEMPORARY FACILITIES AND CONTROLS

2.01 MATERIALS

- A. General: Materials may be new or used but shall be adequate in capacity for the required usage, shall not create unsafe conditions, and shall not violate requirements of applicable codes and standards.
- B. Tools, extension cords, and electrical equipment shall conform to Underwriters' Laboratory standards and OSHA requirements and shall be in proper working order to preclude hazard to occupants and premises.

2.02 UTILITY SERVICES

- A. Power and Lighting: Furnish, install, and maintain temporary wiring, poles, meter board, service entrance switch, lamps, and equipment as necessary to provide temporary lighting and power for the construction site.
 1. Pay all costs for temporary electrical systems required for construction.
 2. Source of power shall be at location on site acceptable to the District's representative. Required temporary transmission lines shall be arranged by contractor in conjunction with the appropriate utility company.
- B. Water:
 1. Install temporary piping and valves downstream from permanent (new) meter locations as acceptable to the District's representative. No temporary water services shall be installed prior to meter installation without prior District review and acceptance.
 2. Temporary water facilities shall be installed with an acceptable reduced pressure backflow prevention unit furnished and installed by the contractor.
 3. Locate temporary sources of water route, and construct pipelines so that they do not create a hazard or interfere with public access, traffic, or construction operations.
 4. Design and construct such pipelines.
- C. Utility Costs for Contractors: Distribution of temporary utility services to sub-contractors shall be Contractor's responsibility and cost.

2.03 CONTRACTOR'S FIELD OFFICE

- A. The Contractor shall provide and maintain the following minimum facilities and equipment in the field office:
 1. Door top type jobsite desk or equivalent horizontal desk surface for drawings.
 2. Adequate storage facilities.
 3. A laptop or other portable device for internet access and to transmit and receive information to and from the Architect.
 4. Digital camera, with downloading interface, for purposes of communicating field conditions.
 5. Additional facilities and equipment as required by the Architect.

2.04 TEMPORARY TELEPHONE AND INTERNET SERVICE

- A. Contractor shall arrange, provide, and pay for the following temporary service at the site.
 1. A cell phone line and phone for the Contractor's Superintendent.
 2. Internet access for laptop or other acceptable internet access device.

2.05 TEMPORARY PHOTOGRAPHY

- A. Live Webcam: Provide a single video camera, connected directly to a computer, whose current or latest image can be requestable from a Web site developed by the District.
 - 1. The live cam shall continually provide new images transmitted in rapid succession.
 - 2. Camera shall be located on construction trailer, temporary pole, or other location as directed by District.
 - 3. Webcam shall be used by District for marketing purposes.

2.06 TEMPORARY SANITARY FACILITIES

- A. Provide, pay for, install, and maintain for duration of the Work, necessary enclosed toilet and sanitary facilities for construction personnel.
 - 1. Sanitary facilities shall be provided, maintained with supplies as required for the number of construction personnel in compliance to local regulations.
 - 2. Locate such facilities a reasonable distance from all working areas.
- B. New or existing restroom facilities, if available, shall not be used by construction personnel except with written permission from the District.

2.07 FIRST AID

- A. Provide and maintain first aid supplies as required Cal-OSHA and applicable local ordinances.
- B. Make arrangements with local emergency center and nearest hospital to receive personnel requiring medical attention, including emergencies. Information for emergency center shall be conspicuously displayed at the construction office when an office is required on the Project.

2.08 STORAGE ENCLOSURES

- A. Provide sheds and enclosures necessary for storing applicable materials and equipment.
- B. Enclosures shall be conveniently located, substantially and neatly constructed, and weather tight.
- C. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible.
- D. For exterior storage of fabricated products, place on sloped supports, above ground.
- E. Provide off-site storage and protection when site does not permit on-site storage or protection.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation or potential degradation of product.
- G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent contamination by foreign matter.
- H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.
- J. Hazardous or Flammable Materials:

1. Use and store hazardous or flammable chemicals, liquids, or gases brought into the Project site in approved containers, conforming to local, state, and national fire codes.
2. Use hazardous materials in a manner that will prevent their accidental release into other areas.
3. Do not discard hazardous materials into the jobsite waste-disposal facilities.
4. Remove empty containers from the premises immediately, and disposed of in a legal manner.

2.09 STAGING AND HOISTS

- A. Furnish and maintain hoists, staging, rigging, and runways required in the execution of the Work.
- B. Erect, equip, and maintain temporary work in accordance with the statutes, laws, ordinances, rules, or regulations of the state or other authorities and state-approved insurance companies having jurisdiction.

2.10 SAFETY AND PROTECTION

- A. General:
 1. Follow construction procedures necessary to provide a safe working condition through all phases of the Project. Procedures shall conform to the Safety Orders, Division of Industrial Safety, Title 8, California Code of Regulations.
- B. Contractor is solely responsible for outlining safety procedures to be followed by its workers, subcontractors, and related trades working on its Project. Provide for safety of the public both day and night where they are exposed to construction operations.
- C. Contractor shall also take whatever care is necessary to avoid damage to existing facilities or utilities to remain, whether on the Project or adjacent to it, and shall be liable for any damage thereto or interruption of service as a result of its operations.
- D. Provide fences, barricades, railings, warning lights, lights and other protection required by law, Contract Documents, and common sense to ensure public safety.
- E. Give adequate warning to the public at all times whenever a dangerous condition exists as the result of construction work. Furnish District's Representative with name, address, pager number and local telephone number of the superintendent responsible and at least one other person for the maintenance of barriers, signs, lights and other accident prevention devices for evenings and weekends.
- F. Protection of Work and Facilities:
 1. Protect adjacent property, roads, streets, curbs, planting areas, erosion control materials and other improvements during construction operations. All damaged materials shall be replaced and/or repaired at the expense of the contractor and to the satisfaction of the District's Representative.
 2. Protect installed work and provide special protection where applicable.
 3. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
 4. New turf areas shall be fenced off during turf establishment and specified Landscape Maintenance Period subject to the discretion of the District's Representative.
 5. Contractor shall install temporary construction fencing per contract documents and place signage on the fence stating "Construction Area – Keep Out" and "No Trespassing". Signs shall be located along fence every 75 feet.
- G. Vehicular Safety: Motorized and/or self-propelled construction equipment shall be equipped with a hub-cap type reverse signal alarm.

2.11 WATER CONTROL

- A. Furnish and maintain pumps or other devices that may be required by Contractor's work under this Contract.

- B. The Work shall be kept free of standing water during construction.

2.12 MAINTENANCE OF TRAFFIC, ACCESS, AND PARKING

- A. Throughout progress of work, do not interfere with use of or access to adjacent buildings or property.
- B. Construct, designate and maintain specific vehicular access as required for the orderly progress of the work.
 - 1. Engineer construction access roads and parking areas as necessary to provide suitable support during all weather conditions for anticipated loads, including municipal fire apparatus.
 - 2. Provide adequate surface drainage without interrupting natural flow of existing drainage.
- C. Parking:
 - 1. Provide temporary on-site parking to accommodate construction personnel and District's Representative to the greatest extent possible. Coordinate location with the District's Construction Coordinator.
 - 2. Contractor shall make arrangements for offsite parking, if required, with adjacent public parking facilities to accommodate vehicles of construction personnel. Cost of parking is the responsibility of the Contactor and/or its subcontractor.
- D. Restore temporary vehicular access and parking areas to original or specified conditions prior to Project Final Acceptance.
- E. Move and relocate traffic signs and signals, controls, power and light poles, and similar utility and public service items obstructed by Project barricades and operations.
- F. Maintain accessibility from street at all times to fire hydrants within construction area.
- G. Construction traffic shall be routed, whenever possible, to avoid noise impacts on the surrounding neighborhood.
- H. Construction period for trucks hauling fill and piling materials shall be restricted to nonpeak hours to minimize impact to rush hour traffic and to avoid noise impacts on the surrounding existing residential areas.
- I. Vehicles (wheels in particular) shall be cleaned before leaving site so as to minimize impact on City streets.
- J. Clean and sweep all streets muddied or littered from construction activity to the satisfaction of the City.

2.13 HAUL ROUTES

- A. Comply with any and all local governing ordinances and guidelines.

2.14 FIRE PROTECTION

- A. Take precautions to prevent and eliminate fire hazards. The Contractor shall be responsible for providing, maintaining, and enforcing any necessary or required fire prevention safeguards until project final acceptance.
- B. Provide fire extinguishers on the premises during the course of construction of the type and sizes recommended by the NFPA 10 and NFPA 241 to control fires resulting from the particular work being performed. Instruct employees in their use. Place extinguishers in the immediate vicinity of the work being performed, ready for use.

- C. Fire Inspection: The Contractor's Superintendent shall inspect the entire project as necessary to make certain the required precautions are being maintained.
- D. Combustible and/or flammable Building Materials: Only an appropriate working supply of flammable fuel or building materials shall be located inside storage facilities.
- E. During the use of hazardous equipment, such as acetylene torches, welding equipment, bitumen kettles, and similar devices, no work shall start or equipment used unless fire extinguishers of specified type and capacity are placed in the working area and available for use by workmen using such hazardous equipment. Extinguishers shall meet standards established by Underwriter's Laboratory, and shall be inspected at regular intervals and recharged by the contractor as necessary.
- F. Combustible and/or flammable Waste Materials. Oil-soaked rags, papers, and other highly combustible materials must be stored in closed metal containers with tightly-hinged lids at all times, and shall be removed from the site at the close of each day's work and more often when necessary.

2.15 TOOL AND ELECTRICAL EQUIPMENT

- A. Tools, extension cords, and electrical equipment shall conform to Underwriters' Laboratory standards and OSHA requirements and shall be in proper working order.

2.16 TEMPORARY SIGNS AND NOTICES

- A. Contractor shall post and maintain all signs and notices required by law or ordinance. No advertisements will be permitted on the premises without approval of the District.
- B. Project Sign:
 - 1. Contractor shall provide a project sign as directed by the District.
 - 2. Sign graphics shall include, as a minimum, the following:
 - a. Project name.
 - b. District's name.
 - c. Landscape Architect's name and address.
 - d. Contractor's name and address.
 - 3. Full-scale artwork for logos, if required, will be provided.
 - 4. Location of sign shall be as directed by the District.

2.17 TRASH REMOVAL

- A. Store trash or rubbish resulting from construction within the Contract work area.
- B. Provide the necessary on-site containers for the collection of recycling materials, waste materials, and debris.
- C. Remove waste materials and debris from the site periodically and dispose of at recycling centers or legal disposal sites in accordance with governing construction and demolition debris regulations.
- D. Keep the work area clean at all times. Increase frequency of trash removal, when requested by the District, to conform to this requirement.
- E. Waste material and debris shall not be buried at the site.
- F. Burning of trash and debris on the site will not be permitted.

2.18 SECURITY

- A. All site security shall be the responsibility of the Contractor at its expense and no additional cost to District.
- B. Employment of security personnel for non-construction hours shall be left to the discretion of the Contractor, who shall be fully responsible for any theft or damage to any material, equipment or to portion of the work until Project Final Acceptance.
- C. Security provisions shall be provided 24 hours a day, 7 days a week, including holidays, until acceptance of the Project by District.
- D. If security personnel are used, provide District's Representative with the name and pager number or 24-hour telephone number of a contact person who shall have primary responsibility for security.

2.19 DUST CONTROL

- A. Blowing dust shall be reduced by timing construction activities so that paving begin as soon as possible after completion of grading and by landscaping disturbed soils as soon as possible.
- B. All portions of the site shall be watered as many times a day as required to ensure proper dust control seven (7) days a week for the duration of the Project.
 - 1. Sprinkle unpaved construction areas with water at least twice per day or as necessary to eliminate dust.
 - 2. Cover stockpiles of soil, sand, and other similar materials.
 - 3. Cover trucks hauling debris, soil, sand, and other similar materials.
- C. The Contractor shall obtain reclaimed water from the City, if available, for compliance with the above requirements.
- D. The Contractor shall maintain and operate construction equipment so as to minimize exhaust emissions of PM10 and other pollutants by means of the following:
 - 1. Prohibition on idling of motors of equipment that is not in use and by waiting trucks.
 - 2. Implementation of specific maintenance programs to reduce emissions for equipment in frequent use during construction.

PART 3 - EXECUTION

3.01 SYSTEMS

- A. Maintain and operate systems to assure continuous service.
- B. Modify and extend systems as work progress requires.

3.02 STORM WATER POLLUTION PREVENTION

- A. Contractor shall be required to adhere to the project's Storm Water Pollution Prevention Plan (SWPPP) prepared and approved for this Project.

3.03 MAINTENANCE AND REMOVAL

- A. Maintain temporary facilities and controls as long as needed for safe and proper completion of the work.

- B. Completely remove temporary materials and equipment when their use is no longer required.
- C. Clean and repair damage caused by temporary installations or use of temporary facilities.
- D. After removal of temporary facilities, restore existing facilities used for temporary services back to an “as was” or better condition subject to the discretion of the District’s Representative
- E. Full compensation for cleanup shall be included in other items of work. No separate compensation will be allowed for work pertaining to cleanup or disposal of material.

END OF SECTION

SECTION 01 57 23

STORM WATER POLLUTION PREVENTION PLAN

FACILITY:

**CESAR CHAVEZ HIGH SCHOOL
2929 WINDFLOWER LANE
STOCKTON, CA 95212
REPORT DATE: [_____]**

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1.01 GENERAL FACILITY INFORMATION

Name of Facility: Cesar Chavez High School _____

Facility Address: 2929 Windflower Lane, Stockton, CA 95212 _____

Facility Contact _____

Name: _____

Title: _____

Telephone: _____

Mailing Address _____

District: _____

Operator: _____

(if different from District)

Permit Information:

Initial Date of Coverage: _____

Number of Storm Water Outfalls _____

Receiving Water: _____

Emergency Contact (preferably on-site):

Name: _____

Telephone: _____

STORM WATER POLLUTION PREVENTION PLAN

1.02 OVERVIEW

A. INTRODUCTION

This storm water pollution prevention plan (SWPPP) covers the operations at Cesar Chavez High School in Stockton, CA. This plan was designed to meet the requirements of the California State Water Resource Control Board, Environmental Protection Agency, National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Industrial Activities (General Permit). This SWPPP describes these facilities and its operations, identifies potential sources of storm water pollution at the facility, recommends appropriate best management practices (BMPs) or pollution control measures to reduce the discharge of pollutants in storm water runoff, and provides for periodic review of this SWPPP.

B. OBJECTIVES

1. The primary goal of the storm water permit program is to improve the quality of surface waters by reducing the amount of pollutants potentially contained in the storm water runoff.

This SWPPP will:

- a. Identify sources of storm water and non-storm water contamination to the storm water drainage system;
- b. Identify and prescribe appropriate "source area control" type best management practices designed to prevent storm water contamination from occurring;
- c. Prescribe an implementation schedule so as to ensure that the storm water management actions prescribed in the Storm Water Pollution Prevention Plan are carried out and evaluated on a regular basis.

1.03 STORM WATER POLLUTION PREVENTION TEAM

- A. The storm water pollution prevention team is responsible for developing, implementing, maintaining, and revising this SWPPP. The members of the team are familiar with the management and operations of Cesar Chavez High School.
- B. The member(s) of the team and their responsibilities (i.e. implementing, maintaining, record keeping, submitting reports, conducting inspections, employee training, conducting the annual compliance evaluation, testing for non-storm water discharges, signing the required certifications) are as follows:

Name & Title	Responsibility

1.04 POTENTIAL SOURCES OF POLLUTANTS

A. SITE MAP

1. Figure 1 (attached) presents a site map of Cesar Chavez High School showing the following features as required by the permit:

- a. the facility property boundaries;
- b. a depiction of the storm drainage collection and disposal system, including all known surface and subsurface conveyances, with the conveyances named;
- c. any secondary or other containment structures;
- d. the location of all outfalls;
- e. the drainage area boundary for each storm water outfall;
- f. the surface area in acres draining to each outfall, including the percentage that is impervious such as paved, roofed, or highly compacted soil and the percentage that is pervious such as grassy areas and woods; existing structural storm water controls;
- g. the name and location of receiving waters, if any;
- h. and the location of activities and materials that have the potential to contaminate storm water shall also be depicted on the drainage base map.

B. INVENTORY OF POTENTIAL SOURCES OF CONTAMINATION

1. The following have been identified as potential sources of storm water contamination:
 - a. Immediate access roads and rail lines;
 - b. material handling sites (storage loading, unloading, transportation, or, conveyance of any raw material, finished product, intermediate product, by-product or waste;
 - c. refuge sites;
 - d. vehicle maintenance and cleaning areas;
 - e. any other areas capable of contaminating storm water runoff.

1.05 BEST MANAGEMENT PRACTICES

Storm water management controls, or best management practices (BMPs), will be implemented to reduce the amount of pollutants in storm water discharged from Cesar Chavez High School

A. GENERAL REQUIREMENTS

1. The following general requirements shall be met on all projects within the District.
 - a. Non-hazardous Material/Waste Management
 - 1) Designated Area: The Contractor shall propose designated areas of the project site, for approval by the District Representative, suitable for material delivery, storage, and waste collection that, to the maximum extent practicable, are near construction entrances and away from catch basins, gutters, drainage courses, and creeks.
 - b. Granular Material
 - 1) The Contractor shall store granular material at least ten feet away from catch basin and curb returns.
 - 2) The Contractor shall not allow granular material to enter the storm drains or creeks.
 - 3) When rain is forecast within 24 hours or during wet weather, the District Representative may require the Contractor to cover granular material with a tarpaulin and to surround the material with sandbags.
 - c. Dust Control: The Contractor shall use reclaimed water to control dust on a daily basis or as directed by the District Representative.
 - d. Cleaning Paved Storage Areas: The Contractor shall thoroughly clean all on-site paved areas used for storage of materials or otherwise utilized or involved during the work immediately after the materials are removed from storage. Cleaning shall be accomplished by sweeping and not with use of water.
 - e. Recycling
 - 1) The Contractor, to the extent practicable, shall recycle aggregate base material, asphalt concrete, and Portland cement concrete as described in these Specifications.

- 2) In addition, to the maximum extent practicable, the Contractor shall reuse or recycle any useful construction materials generated during the project.
- f. Disposal
- 1) The Contractor shall maintain the project site in a clean and orderly manner at all times. To the extent practicable, the Contractor shall collect all scrap, debris, and waste material, and dispose of such materials properly. The District Representative may require the Contractor to clean and dispose of such materials at any time should the situation, in his opinion, constitute a danger.
 - 2) The Contractor shall inspect dumpsters for leaks and contact trash hauling contractors to replace or repair dumpsters that leak.
 - 3) The Contractor shall not discharge water on-site from cleaning dumpsters.
 - 4) The Contractor shall arrange for regular waste collection before dumpsters overflow.
- g. Hazardous Material / Waste Management
- 1) The Contractor shall label and store all hazardous materials, such as pesticides, paints, thinners, solvents, and fuels; and all hazardous wastes, such as waste oil and antifreeze; in accordance with the San Joaquin County Hazardous Materials Storage Ordinance and all applicable State and Federal regulations. If a hazardous waste spill should occur call:
- Butch Schmidt**
Asbestos/Hazardous Waste Materials Technician
Stockton Unified School District
1944 N. El Pinal Drive
Stockton, CA 95205
(209) 933-7045 ext. 2348
- h. Usage
- 1) When rain is forecast within 24 hours or during wet weather, the District Representative may prevent the Contractor from applying chemicals in outside areas.
 - 2) The Contractor shall not over-apply pesticides or fertilizers and shall follow material manufacturers instructions regarding uses, protective equipment ventilation, flammability, and mixing of chemicals. Over-application of a pesticide constitutes a “label violation” subject to an enforcement action by the San Joaquin County Agriculture Department.
- i. Disposal
- 1) The Contractor shall arrange for regular hazardous waste collection to comply with time limits on storage of hazardous wastes.
 - 2) The Contractor shall dispose of hazardous waste only at authorized and permitted Treatment, Storage, and Disposal Facilities, and use only licensed hazardous waste haulers to remove the waste off-site, unless quantities to be transported are below applicable threshold limits for transportation specified in State and Federal regulations.
 - 3) If the Contractor qualifies as a “Conditionally Exempt Small Quantity Generator” as defined under State and Federal regulation and if the Contractor’s business offices is located [_____], then the Contractor may dispose of this waste through a city-sponsored program.
- j. Spill Prevention and Control
- 1) The Contractor shall keep a stockpile of spill cleanup materials, such as rags, or absorbents, readily accessible on-site.
 - 2) The Contractor shall immediately contain and prevent leaks and spills from entering storm drains, and properly clean up and dispose of the waste and cleanup materials. If the

- waste is hazardous, the Contractor shall handle the waste as described in section A.1.i above.
- 3) The Contractor shall not wash any spilled material into streets, gutters, storm drains, or creeks and shall not bury spilled hazardous materials.
 - 4) The Contractor shall report any hazardous materials to the San Joaquin County Environmental Health Department (209) 468-3420, and to the District's Representative.
- k. Vehicle/Equipment Cleaning
- 1) The Contractor shall not perform vehicle or equipment cleaning on-site or in the street using soaps, solvents, degreasers, steam cleaning equipment, or equivalent methods.
 - 2) The Contractor shall perform vehicle or equipment cleaning, with water only, in a designated, bermed area that will not allow rinse water to run off-site or into streets, gutters, storm drains, or creeks.
- l. Vehicle/Equipment Maintenance and Fueling
- 1) The Contractor shall perform maintenance and fueling of vehicles or equipment in a designated, bermed area or over a drip pan that will not allow run-on of storm water or runoff of spills.
 - 2) The Contractor shall use secondary containment such as a drip pan, to catch leaks or spills any time that vehicle or equipment fluids are dispensed, changed, or poured.
 - 3) The Contractor shall keep a stockpile of spill cleanup materials, such as rags or absorbents, readily accessible on-site.
 - 4) The Contractor shall clean up leaks and spills of vehicle or equipment fluids immediately and dispose of the waste and cleanup materials as hazardous waste, as described in section A.1.i above.
 - 5) The Contractor shall not wash any spilled material into streets, gutters, storm drains, or creeks and shall not bury spilled hazardous materials.
 - 6) The Contractor shall report any hazardous material spills to the San Joaquin County Environmental Health Department (209) 468-3420, and to the District's Representative..
 - 7) The Contractor shall inspect vehicles and equipment arriving on-site for leaking fluids and shall promptly repair leaking vehicles and equipment. Drip pans shall be used to catch leaks until repairs are made.
 - 8) The Contractor shall recycle waste oil and antifreeze, to the maximum extent practicable.
 - 9) The Contractor shall comply with Federal, State, and City requirements for above ground storage tanks.
- m. Contractors Training and Awareness
- 1) The Contractor shall train all employees/subcontractors on the storm water pollution prevention requirements contained in these Specifications.
 - 2) The Contractor shall inform subcontractors of the storm water pollution prevention contract requirements and include appropriate subcontract provisions to ensure that these requirements are met.
 - 3) The Contractor shall post warning signs in areas treated with chemicals.
 - 4) The Contractor shall paint new catch basins, constricted as part of the project with a "No Dumping" stencil.
- B. ACTIVITY-SPECIFIC REQUIREMENTS
1. The following activity-specific requirements shall be met on all projects within the District that include the listed activities.
 - a. Paving Operations
 - 1) Project Site Management
 - a) When rain is forecast within 24 hours during wet weather, the District Representative may prevent the Contractor from paving.

- b) The District Representative may direct the Contractor to protect drainage courses by using control measures, such as earth dike, straw bale, and sand bags to divert runoff or trap and filter sediment.
 - c) The Contractor shall cover drip pans or absorbent material under paving equipment when not in use.
 - d) The Contractor shall cover catch basins and manholes when paving or applying seat coat, tack coat, slurry seal, or fog seal.
 - e) If the paving operation includes an on-site mixing plant, the Contractor shall comply with City of Stockton and/or San Joaquin County Storm Water Permit requirements whichever is stricter.
- 2) Paving Waste Management: The Contractor shall not sweep or wash down excess sand (placed as part of a sand seal or to absorb excess oil) into gutters, storm drains, or creeks. Instead, the Contractor shall either collect the sand or return it to the stockpile, or dispose of it in a trash container. The Contractor shall not use water to wash down fresh asphalt concrete pavement.
- b. Saw Cutting
- 1) During saw cutting, the Contractor shall cover or barricade catch basins using control measures, such as filter fabric, straw bales, sand bag, and fine gravel dams, to keep slurry out of both the sanitary and storm drain systems. When protecting a catch basin, the Contractor shall ensure that the entire opening is covered.
 - 2) The Contractor shall shovel, absorb, or vacuum saw cut slurry and pick up the waste before moving to the next location or at the end of each working day, whichever is sooner.
 - 3) If saw cut slurry enters catch basins, the Contractor shall remove the slurry from the storm drain system immediately.
- c. Contaminated Soil Management
- 1) On all projects involving grading or excavation, the Contractor shall look for contaminated soil as evidenced by site history, discoloration, odor, differences in soil properties, abandoned underground tanks or pipes, or buried debris. If the project is not within an area of known soil contamination and no evidence of soil contamination is found, then testing of the soil shall only be required if directed by the District Representative. The Contractor shall follow section c.2 below, if contamination is found.
 - 2) If the project is within an area of known soil contamination or evidence of soil contamination is found, then soil from grading or excavation operations shall be tested. The soil shall be managed as required by Regional Water Quality Control Board.
 - 3) If the project is found to be within an area of soil contamination not identified by the District in the project specifications, a change order shall be negotiated to cover additional work performed by the Contractor.
- d. Concrete, Grout, and Mortar Waste Management
- 1) Material Management: The Contractor shall store and keep covered concrete, grout, and mortar away from drainage areas and ensure that these materials do not enter the storm drain system.
 - 2) Concrete Truck/Equipment Wash Out:
 - a) The Contractor shall not wash out concrete trucks or equipment into streets, gutters, storm drains, or creeks.
 - b) The Contractor shall perform washout of concrete trucks or equipment off-site or in a designated area on-site where the water will flow onto dirt or into a temporary pit in a dirt area. The Contractor shall let the water percolate into the soil and dispose of the hardened concrete in a trash container. If a suitable dirt area is not available, then the Contractor shall collect tie wash water and remove it off-site.
 - 3) Exposed Aggregate Concrete Wash Water
 - a) The Contractor shall avoid creating runoff by draining water from washing of exposed aggregate concrete to a dirt area. If a suitable dirt area is not available,

- then the Contractor shall filter the wash water through straw bales or equivalent material before discharging to the storm drain.
- b) The Contractor shall collect and return sweepings from exposed aggregate concrete to a stockpile or dispose of the waste in a trash container.
 - e. Painting
 - 1) Painting Cleanup
 - a) Designated Area
 - (1) The Contractor shall conduct cleaning of painting equipment and tools in a designated area that will not allow run-on of storm water or runoff of spills.
 - (2) The Contractor shall not allow wash water from cleaning of painting equipment and tools into streets, gutters, storm drains, or creeks.
 - b) Water-based Paint
 - (1) The Contractor shall remove as much excess paint as possible from brushes, rollers, and equipment before starting cleanup.
 - (2) To the maximum extent practicable, the Contractor shall dispose of wash water from aqueous cleaning of equipment and tools to the sanitary sewer.
 - (3) Otherwise, the Contractor shall direct wash water onto dirt area and spade in.
 - c) Oil-based Paint
 - (1) The Contractor shall remove as much excess paint as possible from brushes, rollers, and equipment before starting cleanup.
 - (2) To the maximum extent practicable, the Contractor shall filter paint thinner and solvents for reuse.
 - (3) The Contractor shall dispose of waste thinner and solvent, and sludge from cleaning of equipment and tools as hazardous waste, as described in Section A.1.i above.
 - d) Material/Waste Management
 - (1) The Contractor shall store paint, solvents, chemicals, and waste materials in compliance with the San Joaquin County Hazardous Materials Storage Ordinances and all applicable State and Federal regulations. The Contractor shall store these materials in a designated area that will not allow run-on of storm water runoff of spills.
 - (2) The Contractor shall dispose of excess thinners, solvents, oil, and water-based paint as hazardous waste.
 - (3) The Contractor shall dispose of dry, empty paint cans, buckets, old brushes, rollers, rags, and drop cloths in the trash.
 - f. Earthwork: The Contractor shall maximize control of erosion and sediment by using the BMPs for erosion and sedimentation in the California Storm Water Best Management Practice Handbook – Construction Activity.

*See California Storm Water Best Management Practice Handbook – Construction Activity

1.06 CERTIFICATION OF THE SWPPP

- A. "I certify under penalty of law that this document and attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information contained in the plan. Based on my inquiry of the person, or persons, who manage the system, or those persons directly responsible for gathering the information; the information contained in this document is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for providing false information, including the possibility of fine and imprisonment. In addition, I certify under penalty of law that, based upon inquiry of persons directly under my supervision, to the best of my knowledge and belief, the provisions of this document adhere to the provisions of the storm water permit for the development and implementation of a Storm Water Pollution Prevention Plan and that the plan will be compiled with."

Signature of Plan Preparer

Date

(Printed Name)

Title

Signature of District

Date

Printed Name

Title

END OF SECTION

SECTION 01 71 23

FIELD ENGINEERING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Field engineering services for proper completion of the Work including, but not necessarily limited to:
 - 1. Establishing and maintaining lines and levels.
 - 2. Structural design of shoring, forms, and similar items provided by the Contractor as part of its means and methods of construction.
 - 3. Excavations and elevations, footings and piers required for installation of work items.
 - 4. Establishing horizontal and vertical control for site construction items.
- B. Related Requirements:
 - 1. Section 01 78 29 - Conformance Survey

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Submittal Procedures: Informational submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.

1.03 INFORMATIONAL SUBMITTALS

- A. Name and address of surveyor or professional engineer to the District's Representative.
- B. Upon request of the District's Representative, submit:
 - 1. Data demonstrating qualifications of persons proposed to be engaged for field engineering services.
 - 2. Documentation verifying accuracy of field engineering work.
 - 3. Certification, signed by the Contractor's retained field engineer, certifying that elevations and locations of improvements are in conformance or nonconformance with requirements of the Contract Documents.

1.04 QUALITY ASSURANCE

- A. Contractor shall employ a California Registered Civil Engineer or Licensed Land Surveyor, hereafter referred to as Surveyor, to lay out the entire work and set grades, lines, levels, and positions throughout the site.

1.05 SURVEY REFERENCE POINTS

- A. Existing horizontal and vertical control points for the Project are those designated on the Drawings, see Existing Conditions Plans. Locate and protect these control points prior to starting site work, and preserve permanent reference points during construction.
- B. Do not change or relocate reference points or items of the work without specific review and acceptance by the District's Representative.
- C. Promptly advise the District's Representative when a reference point is lost or destroyed, or requires relocation because of other changes in the work. Upon direction of the District's Representative, replace reference stakes or markers according to the original or appropriate survey control.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 LAYING OUT THE WORK

- A. Prior to beginning work, locate or set all general reference points, bench marks, establish monuments and take action as necessary to prevent their destruction, then layout all lines, elevations and measurements for entire work.
- B. Verify figures and dimensions shown on the Drawings and son surveys furnished by the District before starting work. Notify the District's Representative immediately of any discrepancies and re-direct work to avoid delay.
 - 1. Contractor shall accept responsibility for errors resulting from failure to notify District's Representative of known discrepancies.
 - 2. Offsets will be as agreed upon, in writing, by the Contractor and the District's Representative.
- C. Establish monuments on curbs, manholes or pavements with concrete embedded steel pipe with lead plug and/or brass nail with washer, as acceptable to the District's Representative.
- D. Verify layout from time to time as work progresses.

3.02 RECORDS

- A. Maintain a complete and accurate log of all control and survey work as it progresses in accordance with the requirements of Section 01 78 39 - Project Record Documents. Show exact locations of the monuments if any are disrupted or destroyed.

END OF SECTION

SECTION 01 77 00
CONTRACT CLOSE-OUT

PART 1 - GENERAL

1.01 SUMMARY

- A. Scope of work: This section specifies administrative and procedural requirements for project close-out, that may include but are not necessarily limited to:
 - 1. Inspection and/or observation procedures
 - 2. Project record document submittal
 - 3. Operating and maintenance manual submittal
 - 4. Warranty submittal
 - 5. Final cleaning
- B. Related sections can include, but may not be limited to the following:
 - 1. All pertinent Sections of the Specifications

1.02 SUBSTANTIAL COMPLETION

- A. Refer to the General Provisions as applicable, and section 01 42 00 for procedures required to establish Substantial Completion.
 - 1. Final, regular Certificate for Payment (progress payment) shall be issued when all pertinent requirements of the achieving Substantial Completion are met. Final retention payment shall be made after project Final Acceptance and conclusion of any specified Landscape Maintenance Periods subject to the discretion of the District's representative.
- B. Inspection Procedures: Upon receipt of a request for inspection or observation, the District's representative shall either proceed or advise the Contractor of unfilled requirements. The District's representative shall prepare the Certificate of Substantial Completion following review, or advise the contractor of what must be completed or corrected by "punch-list" before the Certificate is issued. Upon receipt of "punch-list", contractor shall complete all work described in a timely manner subject to the discretion of the District's Representative.
 - 1. The District's representative shall repeat inspection and/or observation when requested provided the contractor has made the request within the specified lead time and given written assurance that the "punch-list" work has been completed.
 - 2. Results of the completed inspection and/or observation shall help form the basis of requirements for Final Acceptance and if acceptable, may signal the beginning of the specified Landscape Maintenance Period.

1.03 UNCORRECTABLE WORK

- A. Should the District's representative determine it is not practical or possible for the contractor to correct work that is damaged or improperly executed, an equitable deduction from the Contract sum may be made at the sole discretion of the District's representative.

1.04 CLOSE-OUT SUBMITTALS

- A. Submit two (2) copies of the following, where applicable, in accordance with applicable Contract Documents:
 - 1. Project record documents (as-constructed)
 - 2. Operation and maintenance manuals

3. Warranties, guaranties, and bonds
 4. Keys and keying schedule
 5. Spare parts and extra materials
 6. Other items required by the Specifications
 7. Binder of all manufactured items final submittal information that were installed or provided for the project.
- B. Specified number of copies of above close-out submittals shall be received and accepted by the District's representative before Final Acceptance shall be given.
- C. In addition to those items previously mentioned in this section, the contractor shall submit to the District's representative the following items before a Notice of Completion will be filed:
1. Up-to-date sub-contractor list with names, addresses and telephone numbers.
- D. Final Adjustment of Account:
1. Submit a final statement of accounting to the District's representative showing all adjustments to the Contract sum.

1.05 MAINTENANCE MANUALS

- A. Submit two (2) copies of proposed manual(s) to the District's representative for review and acceptance. All maintenance manuals shall be received and accepted by the District's representative before Final Acceptance shall be given.
- B. Organize operating and maintenance data into properly indexed heavy duty 2-inch, 3-ring vinyl covered binders. Mark appropriate identification on front and spine of each binder. Manuals can include but are not limited to the following types of information:
1. Emergency instructions
 2. Spare parts list
 3. Copies of warranties or actual warranty cards
 4. Wiring diagrams
 5. Recommended "turn around" cycles
 6. Inspection procedures
 7. Shop drawings and product data
 8. Fixture lamping schedule
- C. Product submittal items (1.04-A-7) can be provided with warranty information binders.

1.06 DEMONSTRATION

- A. Prior to Final Acceptance, the contractor shall fully instruct District's representative's designated operating and maintenance personnel in the operation, adjustment and maintenance of all products, equipment, and systems installed.
1. Provide services of factory trained instructors from the manufacturers of each major item of equipment or system, if necessary or requested by the District's representative.
- B. Operation and maintenance manual(s) shall be fully described at this instruction meeting.
1. Review contents of manual(s) with personnel in full detail to explain all aspects of operations and maintenance such as:
 - a. Maintenance manuals
 - b. Record documents
 - c. Spare parts and materials
 - d. Tools
 - e. Fuels

- f. Identification systems
 - g. Control sequences
 - h. Hazards
 - i. Cleaning
 - j. Warranties and bonds
 - k. Maintenance agreements and similar continuing commitments.
2. As part of instruction for operating equipment, demonstrate the following procedures:
- a. Start-up
 - b. Shutdown
 - c. Emergency operations
 - d. Noise and vibration adjustment
 - e. Safety procedures
 - f. Economy and efficiency adjustments
 - g. Effective energy utilization

1.07 WARRANTY/GUARANTY FORMAT

- A. Provide written warranties, guaranties (except manufacturers' standard printed warranties and/or guaranties), addressed to the District's representative, in the format shown within the General Provisions. Manufacturers' standard printed warranties and/or guaranties shall be submitted as-is.
- B. Warranties and guaranties shall be submitted in duplicate, in the format shown within the General Provisions, signed by all pertinent parties and by the contractor in every case, with modifications as accepted by the District's representative to suit the conditions pertaining to the warranty or guaranty. Collect and assemble written warranties and guaranties into bound booklet form, and deliver bound books to the District's representative for review.

1.08 REMOVAL OF TEMPORARY FACILITIES

- A. Prior to final inspection, the contractor shall remove tools, materials, sheds, temporary power poles, temporary tree protection, and other articles from the project site. Should the contractor fail to take prompt action, the District's representative may, given 30 days written notice, treat them as abandoned property.

1.09 FINAL SITE CLEANING

- A. Broom clean and power wash exterior paved surfaces and adjacent public streets. Utilize appropriate cleaning methods to remove spills, stains, tire tracks, etc. from all paved surfaces. Rake clean other surfaces of the site.
- B. Hose down and scrub walls and paving surfaces dirtied or stained as a result of the construction work, as directed by the District's representative.
- C. Remove from the site construction waste, unused materials, excess earth, and debris resulting from the work.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 01 78 29

CONFORMANCE SURVEY

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Conformance surveying required for proper completion of the work including, but not necessarily limited to, the following:
 - 1. Synthetic turf construction, including subgrade and base preparation.
 - 2. Other applicable Project components.

- B. Related Requirements:
 - 1. Section 01 33 00 - Submittal Procedures
 - 2. Section 01 71 23 - Field Engineering
 - 3. Section 01 78 39 - Project Record Drawings
 - 4. Section 31 20 00 - Earth Moving
 - 5. Section 32 11 00 - Base Courses
 - 6. Section 32 12 16 - Asphalt Paving
 - 7. Section 32 18 13 - Synthetic Turf
 - 8. Section 32 18 14 - Synthetic Turf Base
 - 9. Section 32 90 00 - Planting

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Submittal Procedures: Action and Informational Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.

1.03 ACTION SUBMITTALS

- A. Conformance Survey: In addition to required prints, submit 1 electronic copy in AutoCAD or scaled PDF image of all conformance surveys for the Project. Review response by the District Representative shall identify any areas out of tolerance.

1.04 INFORMATIONAL SUBMITTALS

- A. Name and address of Contractor's licensed surveyor to the District's Representative.

1.05 QUALITY CONTROL AND REWORK

- A. Contractor shall retain a California Licensed Land Surveyor to obtain survey data and supervise preparation of the Conformance Surveys as specified.

- B. Portions of a survey that does not conform to the grading tolerance requirements identified in this Section will be corrected by the Contractor at its expense. Areas out of conformance shall be resurveyed at the Contractor's expense by its Surveyor. Revised points shall be added to the original digital file for resubmittal, review, and acceptance by the District Representative.

- C. Delays and costs incurred due to grades out of conformance are the sole responsibility of the Contractor. At any time during construction and following acceptance of a portion of the survey by the District, the District reserves the right to recheck the surface grades at its expense to verify it is still in conformance.

- D. It is the Contractor's responsibility to protect the grading and compaction tolerances of surveyed surfaces after Conformance Surveying operations are complete and accepted, and prior to installation of subsequent materials.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 LAYING OUT THE WORK

- A. Prior to beginning work, Contractor shall secure the electronic grading plan from the District for use by the Surveyor.
- B. The Contractor's Surveyor shall provide all conformance survey drawings. The drawings shall provide both the design elevations and the as-constructed spot elevations. These elevations shall be for comparison to those on the Contract Documents for the same location. Contractor shall also show the difference in these two numbers. Unique reference numbers shall be assigned to each point for reference purposes. For spacing requirements, refer to specific type of improvement identified in this Section.
- C. Accuracy of the Contractor's surveys provided under this Section shall be to 0.01 feet.
- D. The Contractor's Licensed Surveyor shall provide all conformance survey drawings and all 25 foot grid or other grid conformance grades based on the designed grades shown on the Drawings.

3.02 SYNTHETIC TURF SUBGRADE AND BASE CONFORMANCE SURVEYING

- A. General: The stone grades shall not vary from the specified grades more than 1/4 inch (0.02) feet at any location when measured in any direction. In addition, no two adjacent points within the grid shall cumulatively deviate more than 1/2-inch (0.04 feet) from point to point of the design grades.
- B. Subgrade:
 - 1. Contractor shall verify that subgrade has been prepared according to the Specifications with regard to compaction and grade tolerances and is free of debris, non-compactable material, topsoil, or organics prior to beginning work.
 - 2. Prior to acceptance of the subgrade, a Conformance Survey shall be prepared by the Contractor and a digital file submitted to the District Representative as specified. The survey shall be based on a 20 foot grid showing, including the center of the subgrade elevation of the subdrain trench edges, perimeter of the field at edge finish grade and curb finish surface. The plan shall show the comparison of the design grades versus the as-constructed grades.
 - 3. Top of subgrade elevations shall be verified using laser-operation survey instruments. Grades at each point shall be within plus or minus 1/2-inch (0.04 feet) from the elevations shown on the Drawings. In addition, no two adjacent points within the grid shall cumulatively deviate more than 3/4-inch (0.06 feet) from the respective points' design grades.
- C. Completed Stone Base:
 - 1. Prior to acceptance of the stone base, a Conformance Survey will be prepared by the Contractor's Surveyor and submitted by the Contractor to the District's Representative as specified.
 - 2. The survey shall be based on a 25 foot grid showing the interior and perimeter of the field and adjacent curb edge.
 - 3. The survey plan shall show the comparison of the design grades versus the as-constructed grades.
 - 4. A portion of the survey that does not conform to the requirements identified above shall be corrected by the Contractor.

- a. Areas out of conformance shall be resurveyed following the identical procedure stated above by the Surveyor, and these revised points shall be added to the original digital file for review and acceptance by the District's Representative.
 - b. Delays and costs incurred due to grades out of conformance are the sole responsibility of the Contractor.
5. It is the Contractor's responsibility to protect the grading and compaction tolerances of the base after conformance survey is complete and prior to installation of the synthetic turf.
- D. Finish surface planarity shall be verified, and if necessary adjusted, by the Contractor using the string line method.
1. A mason's line held taught between two workers separated by a distance of approximately 40 feet shall be placed directly on the finished surface parallel to the direction of greatest slope.
 2. A third worker shall check for separations between the mason's line and the finished surface that are equal to or greater than the specified tolerances.
 3. Entire finished surface shall be "walked" with mason's line in increments of approximately 3 feet.
 4. Areas of separation shall be outlined with marking paint and the depth of separation indicated.

END OF SECTION

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

1.01 SUMMARY

- A. Section Includes: Requirements for preparing, maintaining, and submitting the Project Record documents.
- B. Related Requirements:
 - 1. Section 32 80 00 - Irrigation
 - 2. Section 33 11 00 – Domestic Water Utilities
 - 3. Section 33 30 00 – Sanitary Sewerage Utilities
 - 4. Section 33 40 00 - Storm Drainage Utilities
 - 5. All other applicable sections

1.02 DOCUMENT MAINTENANCE

- A. Maintain one record copy of each of the following at the site for the District:
 - 1. Contract Drawings, Specifications, Addenda, Change Orders, RFIs and other modifications marked currently to record changes made during construction.
 - 2. Reviewed submittals.
 - 3. RFI log.
 - 4. Addenda log.
 - 5. Submittal log.
 - 6. Inspection reports and log.
- B. Documents shall be kept at the site and maintained in a clean, dry, legible condition.
- C. The Contractor shall advise the District's Representative of changes and deviations made during construction.
- D. Make documents available at all times for review by District's Representative.
- E. Comply with related requirements of the individual Specification Sections.
- F. Maintenance of Record Drawings shall be delegated to one person on Contractor's staff who will be present at all meetings.

1.03 RECORDING

- A. Label each document "PROJECT RECORD."
- B. Do not permanently conceal any work until required information has been recorded.
- C. Drawings:
 - 1. Make day-to-day changes and notations on a specially designated complete "Job Set" of prints or digital files as the work proceeds.
 - 2. Markings and notations shall be neatly and accurately made, using nonfading, clear, permanent markings. Use contrasting colors for different disciplines of work and where required for clarity.
 - 3. Clearly identify deviations by drawing a "cloud" around affected area and make sufficient notations to describe the change.
 - 4. Convert schematic layouts to portray precise physical layout (including depths) of exposed and concealed work.
 - 5. Drawings shall be marked to indicate:

- a. Measured depths of various elements of foundation in relation to survey or other approved datum.
 - b. Measured horizontal and vertical locations of underground utilities and appurtenances referenced to permanent surface improvements.
 - c. Measured locations of utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure.
 - d. Variations in layout of site improvements.
 - e. Field changes of dimensions and detail.
 - f. Changes made by Change Order or Construction Change Directive.
 - g. Significant details not shown on the original Contract Drawings.
 6. Contractor shall solely bear any cost of uncovering, recording and re-covering work not recorded on Job Set.
 7. Upon completion of the Work and unless otherwise mutually agreed between District and Contractor, all changes and notations shall be neatly and accurately transferred by the Contractor to a complete set of Drawings, as originally issued for construction, obtained from the District.
 - a. Where the Contract Drawings are not of sufficient size and detail, the Contractor shall furnish its own drawings for incorporation of details and dimensions.
 - b. Each sheet of record drawing shall be signed and certified by the Contractor as to their correctness and turned over to the District's Representative.
 8. Record Drawings are specifically required for the following work:
 - a. Electrical including exterior lighting and all other related work.
 - b. Water distribution.
 - c. Storm, sanitary, and site drainage.
 - d. Irrigation.
- D. Specifications:
1. On a complete and designated copy or digital file of the Project Manual, legibly mark each Specification Section to record:
 - a. Manufacturer, trade name, catalog number, color designation (if applicable), and supplier of each product and item of equipment actually installed.
 - b. Changes made by Addendum, Change Order, or Construction Change Directive.
 - c. Other matters not originally specified.
 - d. Where selection of manufacturers is offered, indicate which manufacturer's product was installed.
- E. Product Data: Maintain one copy or digital file of each product data submittal. Note related Change Orders and markup of Contract Drawings and Specifications.
1. Mark these documents to show significant variations in actual work performed in comparison with information submitted. Include variations in products delivered to the site and from the manufacturer's installation instructions and recommendations.
 2. Give particular attention to concealed products and portions of the Work that cannot be readily reviewed by direct observation.
- F. Samples: Immediately prior to Substantial Completion, meet with District's Representative and District's personnel at the Project site to determine which samples are to be transmitted to the District for record purposes. Comply with the District's instructions regarding delivery to the District's storage area.
- G. Miscellaneous Record Submittals: As specified in other Specification Sections.
1. Immediately prior to Substantial Completion, complete these miscellaneous records and place in good order.
 2. Identify miscellaneous records properly and bind or file, ready for continued use and reference. Digital files are acceptable.
 3. Submit for the District's records as directed.

1.04 INTERIM REVIEW

- A. Project Record Documents are subject to review at time of review of payment request.

- B. If Record Documents are not properly maintained, District may withhold all or a portion of payment to Contractor.

1.05 SUBMITTALS

- A. At completion of work under the Contract, deliver Record Documents as directed.
- B. Partial submittals are not acceptable, unless specifically acceptable to District.
- C. Submit documents specified and required prior to claim for final Application and Certificate for Payment.
- D. Accompany submittal with transmittal letter, in duplicate, containing:
 - 1. Date.
 - 2. Title of Work.
 - 3. Contractor's name and address.
 - 4. Title of each Record Document.
 - 5. Certification that each document, as submitted, is complete and accurate.
 - 6. Signature for Contractor or its authorized representative.

END OF SECTION

SECTION 02 41 13

SITE CLEARING AND DEMOLITION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Site clearing and demolition work and related activities as shown on the Drawings and specified herein. The general extent of the site clearing and demolition work includes, but is not necessarily limited to, the following:
 - 1. Demolition, removal and disposal of designated items.
 - 2. Careful removal, protection and re-installation of designated items.
 - 3. Careful removal and salvage of designated items.
 - 4. Disconnection and capping of existing utility and irrigation lines.
 - 5. Incidental demolition of abandoned utility and irrigation lines.
 - 6. Spraying until dead, clearing, grubbing vegetated areas in existing turf areas.
 - 7. Protection of existing plant material.
 - 8. Removal of designated trees and planting areas.
- B. Related Requirements:
 - 1. Section 32 01 90 – Existing Tree Protection and Maintenance
 - 2. Section 31 20 00 - Earth Moving

1.02 REFERENCES AND REGULATORY REQUIREMENTS

- A. State of California, Business and Transportation Agency, Department of Transportation (Caltrans) "Standard Specifications."

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Submittal Procedures: Action Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.

1.04 ACTION SUBMITTALS

- A. Product Data: Manufacturer's product information on herbicides to be used for approval prior to use.

1.05 INFORMATIONAL SUBMITTALS

- A. Schedule: Indicate the proposed time line for site clearing and demolition work including shut off times and capping of utility services on the project schedule.

1.06 QUALITY ASSURANCE

- A. The District will obtain and pay for all permits required in connection with this work. Fees for the dumping of debris shall be paid for by the Contractor.

1.07 FIELD CONDITIONS

- A. Dust Control:
 - 1. The Contractor shall prevent the formation of airborne dust on and around the project site with the use of sprinkled water or other means acceptable to the District's Representative. Non-compliance

with proper dust control measures may be grounds for issuance of a "stop work" order by the District until satisfactory measures are implemented.

- B. Utility Services:
 - 1. Issue written notices of planned demolition operations to utility companies and coordinate site clearing and demolition improvements as requested by the utility companies.
 - 2. Existing power poles and lines serving existing occupied buildings shall remain. Arrange work in order to maintain utilities not designated for removal.
 - 3. Coordinate work in order to maintain utilities to temporary on-site facilities.

PART 2 - PRODUCTS

2.01 HERBICIDES

- A. Herbicides shall conform to District's approved chemicals list.
- B. Herbicide shall be non-selective broad spectrum systemic herbicide for perennial vegetation and straight contact herbicide for annual vegetation in accordance with a licensed pest control advisor or herbicide manufacturers' recommendations.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Conform to applicable requirements of Section 01 45 00 - Quality Control.
- B. Carefully identify limits of demolition and site clearing.
- C. Mark project areas in coordination with the District's Representative and as necessary to clearly identify the interface of items to be removed and items remain.

3.02 PREPARATION

- A. Protection:
 - 1. Make provisions and take necessary precautions to protect all existing items not designated for removal. An existing item or area damaged during construction operations shall be replaced or repaired to an "as-was" or better condition at no additional cost to the District and subject to the acceptance of the District's Representative.
 - 2. Erect barriers, fences, guard rails, enclosures, chutes, and shoring as necessary to protect personnel, structures, and utilities to remain.
 - 3. Provide warning signs and lighting as necessary for vehicular and personnel protection. Maintain warning signs during construction as required by applicable safety ordinances and as reasonably prudent.
 - 4. Coordinate arrangements for items to be salvaged and turned over to the District.
 - 5. Notify Underground Service Alert (USA), 800-642-2444, and local utility companies to verify locations of existing utilities a minimum of 48 hours prior to beginning work.
 - 6. Provide tree protection fencing prior to commencing demolition and site clearing work.
- B. Traffic Access:
 - 1. Ensure minimum interference with roads, streets, driveways, sidewalk and adjacent facilities.
 - 2. Do not close or obstruct streets, sidewalk, alleys or passageways without acceptance from the District's Representative or governing authorities as applicable.
 - 3. Provide approved alternate routes around closed or obstructed traffic ways as required by the District's Representative.

4. Maintain access to adjacent existing buildings to ensure uninterrupted operations during demolition work.

3.03 DEMOLITION

- A. General: Refer to the Drawings for extent of demolition and site clearing work.
- B. Paving: Demolish paving in accordance with local noise ordinance regulations and as acceptable to the District's Representative.
- C. Filling:
 1. Completely fill below-grade areas and voids resulting from demolition work.
 2. Install appropriate, acceptable fill material consisting of soil, gravel or sand, free of trash and debris, stones over 3 inch diameter, roots or other organic matter. Meet fill and compaction requirements specified and recommended by the Geotechnical Engineer.
- D. If unanticipated mechanical, electrical or structural elements which conflict with intended function or design are encountered, investigate and measure both the nature and extent of the conflict. Submit report to District's Representative in written, accurate detail. Pending receipt of response from District's Representative, rearrange selective demolition and site clearing schedule as necessary to continue overall job progress without delay.

3.04 CLEARING AND GRUBBING

- A. Remove trees as shown on Drawings. Removal shall include trunks and roots over 1/2 inch in diameter to a depth of 18 inches below subgrade elevations.
- B. Mow all existing turf areas to a height of 1 inch and remove cuttings.
- C. Prior to site clearing, existing vegetation below 12 inches in height and turf areas to be removed shall be sprayed with a non-selective broad spectrum systemic herbicide for perennial vegetation and straight contact herbicide for annual vegetation in accordance with a licensed pest control advisor or herbicide manufacturers. recommendations.
- D. Allow a sufficient period of time to ensure that all sprayed vegetation is dead. Refer to manufacturer's recommendations.
- E. Irrigation heads, valves, and controllers shall be salvaged and provided to District.
- F. Clear and strip vegetative material from soil surface and remove unless noted otherwise. Existing turf areas to be removed shall be stripped per recommendations in Geotechnical Engineering Report.
- G. Contractor is responsible for stockpiling and protecting all topsoil needed for landscaping improvements. Refer to respective earthwork and landscape Specifications.
- H. Utilities and Related Equipment:
 1. The locations of existing utilities, as may be shown on the Drawings, are approximate. Should existing utilities not shown on the Drawings be encountered during construction operations, notify the District's Representative immediately, and re-direct work to avoid delay. The District's Representative will then determine what action, if any, is required.
 2. Remove abandoned utilities as indicated and as uncovered by the work, and terminate in a manner conforming to code.
 3. Remove and salvage designated items and related equipment and deliver to a location acceptable to the District's Representative.
- I. Underground Piping:

1. Existing storm drain and irrigation systems, as may be shown on the Drawings, shall be modified to allow for construction of new items and systems as a part of this project. Caution shall be exercised so as not to damage underground piping not scheduled for removal.
2. Remove underground piping as indicated or necessary, and backfill to specified compaction density.
3. Existing piping abandoned but not removed shall be backfilled with slurry fill (grout), and ends shall be capped with concrete.
4. Manholes and lines scheduled for removal which connect to active systems shall have their active remaining portions capped, plugged, or blind-flanged as appropriate.
5. Materials used for pipe terminations and temporary connections shall be the same as the existing lines. Fittings and flanges shall be of weight and class suitable for the service in which used.

3.05 SALVAGE

- A. Demolition:
 1. Materials or equipment to be demolished shall become the property of the Contractor except for items specified or noted on the Drawings to be salvaged for the District.
 2. Carefully remove items to be salvaged to avoid damage.
 3. Irrigation heads, valves and existing controller shall be salvaged and provided to District. Contractor shall clean and box items. Items shall be returned to District in accordance with instructions provided by the District.
- B. Replacement: In the event items not scheduled to be demolished are damaged, promptly replace or repair such items to an as-was or better condition per the discretion of the District's Representative at no additional cost to District.
- C. Materials scheduled for removal shall not be placed on view to prospective purchasers or sold on site.

3.06 CLEANING

- A. Debris and Rubbish:
 1. Remove and transport debris and rubbish as it accumulates and dispose in a legal manner via recognized haul routes in accordance with Section 01 50 00 - Temporary Facilities and Controls in a manner that will prevent spillage on streets or adjacent areas.
 2. Remove tools, equipment and appliances used for demolition from the site upon completion of the work.
 3. Clean entire project area, adjacent streets, and pavements to a broom-clean, "stain-free" condition per the discretion of the District's Representative.

END OF SECTION

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes hollow-metal work.
- B. Related Requirements:
 - 1. Section 01 33 00 – Submittal Procedures
 - 2. Section 08 71 00 - Finish Hardware

1.03 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM- HMMA 803 or SDI A250.8.

1.04 COORDINATION

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.05 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, core descriptions, and finishes.
- B. Installation Instructions: Manufacturer's written installation instructions for each type of product.
- C. Shop Drawings: Include the following:
 - 1. Elevations of each door type.
 - 2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
 - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 4. Locations of reinforcement and preparations for hardware.
 - 5. Details of each different wall opening condition.
 - 6. Details of anchorages, joints, field splices, and connections.
 - 7. Details of accessories.
 - 8. Details of moldings, removable stops, and glazing.
 - 9. Details of conduit and preparations for power, signal, and control systems.

- D. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.
- E. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch- high wood blocking. Provide minimum 1/4-inch space between each stacked door & frame to permit air circulation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Ceco Door Products; an Assa Abloy Group company.
 - 2. Door Components, Inc.
 - 3. Curries Company; an Assa Abloy Group company.
 - 4. Mesker Door Inc.
 - 5. Pioneer Industries, Inc.; an Assa Abloy Group company
 - 6. Security Metal Products Corp.; an Assa Abloy Group company
 - 7. Steelcraft; an Ingersoll-Rand company.
- B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.02 INTERIOR DOORS AND FRAMES

- A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3.
 - 1. Physical Performance: Level A according to SDI A250.4.
 - 2. Doors:
 - a. Type: As indicated in the Door Schedule on drawings.
 - b. Thickness: 1-3/4 inches.
 - c. Face: Metallic-coated, cold-rolled steel sheet, minimum thickness of 0.053 inch (16 gauge).
 - d. Edge Construction: Model 2, Seamless.
 - e. Core: Polyurethane.
 - 3. Frames:
 - a. Materials: Metallic-coated, steel sheet, minimum thickness of 0.067 inch (14 gauge).
 - b. Construction: Full profile welded.
 - 4. Exposed Finish: Prime.

2.03 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

- A. Construct exterior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3.
 - 1. Physical Performance: Level A according to SDI A250.4.
 - 2. Doors:
 - a. Type: As indicated in the Door Schedule on drawings.
 - b. Thickness: 1-3/4 inches
 - c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch (16 gauge), with minimum A60 coating.
 - d. Edge Construction: Model 2, Seamless.
 - e. Core: Polyurethane.
 - 1) Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (R-value) of not less than R-11 when tested according to ASTM C 518.
 - 3. Frames:
 - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.067 inch (14 gauge), with minimum A60 coating.
 - b. Construction: Full profile welded. (Custom shape, see drawings for profile.)
 - 4. Exposed Finish: Prime.

2.04 HOLLOW-METAL PANELS

- A. Provide hollow-metal panels of same materials, construction, and finish as adjacent door assemblies.

2.05 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
- B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:
 - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.06 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653, Commercial Steel (CS), Type B.
- D. Frame Anchors: ASTM A 879, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008 or ASTM A 1011, hot-dip galvanized according to ASTM A 153, Class B.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153.

- F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- G. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
- H. Glazing: Comply with requirements in Section 08 80 00 "Glazing."

2.07 FABRICATION

- A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Hollow-Metal Doors:
 - 1. Vertical Edges for Single-Acting Doors: Bevel edges 1/8 inch in 2 inches.
 - 2. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets.
 - 3. Bottom Edge Closures: Close bottom edges of doors with end closures or channels of same material as face sheets.
 - 4. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
- C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 - 1. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 - 2. Provide flat -head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 - 3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 - 4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor.
 - 5. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - a) Three anchors per jamb up to 60 inches high.
 - b) Four anchors per jamb from 60 to 90 inches high.
 - c) Five anchors per jamb from 90 to 96 inches high.
 - d) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - 6. Head Anchors: Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
 - 7. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.
- E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
 - 1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
 - 2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

- F. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with mitered hairline joints.
1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow- metal work.
 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
 3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 4. Provide loose stops and moldings on inside of hollow-metal work.
 5. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.08 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.09 ACCESSORIES

- A. Metal Security Louvers: Provide louvers for door, where indicated, which comply with SDI 111C.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Anemostat; a Mestek company; PLSL.
 - b. Air Louvers Inc.; 1500-ASG.
 2. Blade Type: Vision-proof, inverted Y.
 3. Metal and Finish: Hot-dip galvanized steel, Frame & Grille: minimum 0.096 inch thick (12 gauge), Louver Blades: minimum 0.040 inch thick (18 gauge), factory primed for paint finish.
- B. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.03 INSTALLATION

- A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.
- B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.
 - a. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install frames with removable stops located on secure side of opening.
 - d. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - e. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
- C. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
 - 1. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated.
 - 2. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
 - 3. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- D. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
 - 1. Non-Fire-Rated Steel Doors:
 - a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
 - c. At Bottom of Door: 5/8 inch plus or minus 1/32 inch.
 - d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.
- E. Glazing: Comply with installation requirements in Section 08 80 00 "Glazing" and with hollow-metal manufacturer's written instructions.
 - 1. Secure stops with countersunk tamperproof flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.04 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.
- B. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

- C. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 08 11 13

SECTION 08 71 00

FINISH HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: "Finish Hardware" includes items known commercially as builders hardware which are required for swing, sliding and folding doors, except special types of unique and non- matching hardware specified in the same section as the door and door frame. Types of items in this section include (but are not necessarily limited to):
1. Hinges
 2. Lock Cylinders and Keys
 3. Lock and latch sets
 4. Bolts
 5. Exit devices (panic hardware)
 6. Push/pull units
 7. Closers
 8. Overhead holders
 9. Miscellaneous door control devices
 10. Door trim units
 11. Protection plates
 12. Thresholds
 13. Weather-stripping
- B. "Hardware groups" have been assigned to the various doors required for this Work, as described in the Door Schedule on the Drawings; the hardware groups are described in detail on the drawings.
- C. Related Requirements:
1. Section 01 33 00 – Submittal Procedures
 2. Section 08 11 13 – Hollow Metal Doors and Frames
 3. Section 32 36 00 – Landscape Decorative Metal

1.02 QUALITY ASSURANCE:

- A. Manufacturer: Obtain each kind of hardware (latch and locksets, hinges, closers, etc) from only one manufacturer.
- B. Supplier: A recognized builders hardware supplier who has been furnishing hardware in the project's vicinity for a period of not less than 2 years, and who is, or employs an experienced hardware consultant who is available, at reasonable times during the course of the work, for consultation about project's hardware requirements, to owner, Architect and Contractor.
- C. Fire-rated Openings: Provide hardware for fire-rated openings in compliance with UL10B. Provide only hardware which has been tested and listed by UL for types and sizes of doors required and complies with requirements for door and door frame labels. In addition manual locks shall comply with California State Standards (CSS) 12-33-2 and panic hardware shall comply with CSS 12-33-3.
- D. Where emergency exit devices are required on fire-rated doors, provide supplementary marking on doors UL labels indicating "Fire Exit Hardware."

- E. Group E lockable doors from the inside: Doors to classrooms and rooms with an occupancy of five or more persons shall be equipped with locks that are lockable from inside the space per 2019 CBC Section 1010.1.11. In addition, the locks shall conform to the specifications and requirements found in 2019 CBC Section 1010.1.9.
- F. Accessibility Requirements: For door hardware on doors required to be accessible, comply with applicable provisions in CCR Title 24, Part 2, California Building Code – Accessibility Standards as enforced by DSA.
 - 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 pounds.
 - 2. Hand-activated hardware such as lever locksets, panic bars, and pull handles shall be mounted between 34” to 44” above finish floor or ground.
 - 3. Comply with the following maximum opening-force requirements:
 - a. Interior, Non-Fire-Rated Hinged Doors: 5 pounds applied perpendicular to door.
 - b. Exterior, Non-Fire-Rated Hinged Doors: 5 pounds applied perpendicular to door.
 - 4. Thresholds: The floor or landing shall not be more than ½ inch lower than the threshold of the doorway. Change in level between ¼ inch and ½ inch shall be beveled with a slope no greater than one unit vertical in two units horizontal (50 percent slope).
 - 5. Adjust door closers sweep periods (Delayed Action Feature) so that, from an open position of 90 degrees, the time required to move the door to a position of 12 degrees from the latch is 5 seconds minimum, measured to the leading edge of the door.
- G. Hardware Coordination Meeting: During the course of the work but prior to ordering; contractor shall hold a meeting to review specific door hardware. This meeting shall review the hardware and key schedule along with specific information concerning location and function of each lockset. The meeting shall include the Architect, District Representative, District Locksmiths, General Contractor, Hardware Sub-contractor, and the manufacturer’s representative.

1.03 SUBMITTALS:

- A. Product Data: Submit manufacturer’s technical information for each item of hardware. Include whatever information may be necessary to show compliance with requirements, and include instructions for installation and for maintenance of operating parts and finish.
- B. Hardware Schedule: Submit final hardware schedule confirming compliance as indicated herein. Hardware schedules are intended for coordination of work. Include the following:
 - 1. Name and manufacturer of each item.
 - 2. Fastenings and other pertinent information
 - 3. Location of hardware set cross-referenced to indications on Drawings both on floor plans and in door and frame schedule.
 - 4. Explanation of all abbreviations, symbols, codes, etc. contained in schedule.
 - 5. Mounting locations for hardware.
 - 6. Door and frame sizes and materials.
 - 7. Keying information.

1.04 PRODUCT HANDLING:

- A. Packaging:
 - 1. Furnish all finish hardware with each unit clearly marked or numbered in accordance with the Hardware Schedule.
 - 2. Pack each item complete with all necessary pieces and fastener.
 - 3. Properly wrap and cushion each item to prevent scratches during delivery and storage.
- B. Delivery:
 - 1. Deliver all finish hardware to the installers in a timely manner to ensure orderly progress of the total work.

PART 2 - PRODUCTS

2.01 FASTENINGS:

- A. General:
 - 1. Furnish all finish hardware with all necessary screws, bolts, and other fasteners of suitable size and type to anchor the hardware in position for long life under hard use.
 - 2. Furnish fastenings where necessary with expansion shields, toggle bolts, sex bolts, and other anchors approved by the Architect, according to the material to which the hardware is to be applied and the recommendations of the hardware manufacturer.
 - 3. Provide the products of the manufacturers listed, without substitutions, unless approved in advance, in writing, by Architect.
- B. Design:
 - 1. All fastenings shall harmonize with the hardware as to material and finish.

2.02 KEYING:

- A. Construction Keying: Provide a method independent of the final keying system for securing the building during construction. Contractor must supply Schlage construction cylinders.
- B. Final Keying System:
 - 1. Schlage "Primus" System, Security Level Three, Type EP keyways using 20-700 controlled access cylinders as determined by District. Provide Interchangeable Cores (IC) at all panic devices and where called for in the Hardware Schedule. All cylinders/IC cores shall be provided to District by Hardware Supplier at the time of delivery of the locks. Cylinders/IC Cores shall be Master Keyed by District's Hardware Department, using Schlage Primus System. After Keying all Cylinders/IC Cores shall be issued back to the General Contractor for Installation. This requires a coordination meeting with the GC, Hardware Supplier, Schlage Representative, District Locksmith, and Architect, to be scheduled by the GC within 3 weeks of the Notice to Proceed.
 - 2. Key Blanks: Standard 6 pin bow key blank; tag to identify
 - a. Supply 20 Emergency Keys
 - b. Supply 500 EP Primus Blanks; one side embossed.

2.03 FINISH:

- A. All finishes to be satin chromium plated, US 26 D, ANSI 626 unless otherwise indicated.

2.04 HARDWARE:

- A. Locks/Locksets (All knobs are lever-type: Rhodes (Schlage), Newport (Corbin Russwin.)
 - 1. Pool Gates: Panic, Corbin Russwin, ED8200 x P857 (Nightlatch function, Wing Pull P8) x M54 (sex nuts & bolts) with Schlage 20-757(IC) Rim Cylinder. Panic Device and Trims to receive BHMA 689 Silver Painted Finish.
 - 2. Mechanical Building/ Storeroom Lock, ND96PD, Rhodes. Provide Schlage 20-765 Primus Cylinder.
 - 3. Student/Public Toilets, ND95PD, Rhodes. Provide Schlage 20-765 Primus Cylinder.
- B. Hinges
 - 1. Heavy duty hinges:
 - a. HAGER, BB1199 Stainless, 4 ½ x 4 ½, Heavy Weight, High Frequency, Five- knuckle, four bearing, NRP, full-mortise butts, 1 ½ pair.
 - b. HAGER, BB1199 Stainless, 4 ½ x 4 ½, Heavy Weight, High Frequency, Five- knuckle, NRP, four bearing, full-mortise butts, 2 pair.
 - 2. Self-closing Hinges:
 - a. For gates up to 330 lbs and 5-feet wide: Heavy-duty self-closing hinge with hydraulic damping, ADA compliant (requiring maximum 5 lbs of operating force per CBC 11B-309.4); Locinox Mammoth Heavy Duty "Mammoth180" or accepted equal.
 - b. For gates up to 440 lbs and 6 and ½ -feet wide: Heavy-duty self-closing hinge with hydraulic damping, ADA compliant (requiring maximum 5 lbs of operating force per CBC 11B-309.4); Locinox Mammoth Ultra Heavy Duty "Mammoth-HD" or accepted equal.
- C. Closers
 - 1. NORTON, PR7500DA (Barrier Free, 90 degree opening with delayed closing, Painted Aluminum)
 - 2. NORTON, PR7500DA (Barrier Free, 180 degree opening with delayed closing, Painted Aluminum)
- D. Stops
 - 1. Trimco, #1270CVSV – Stop, Wall
 - 2. Trimco, #1209 – Stop, Floor (Interior)
 - 3. Trimco, #1209HA – Stop, Walk (Exterior)
 - 4. Trimco, #1260W – Wall Stop & Holder, Strike (Not for Fire Rated Applications)
- E. Thresholds
 - 1. Threshold, Pemko; 158 A (1/2" offset)
 - 2. Threshold, Pemko; 272 A (6")
 - 3. Threshold, Pemko; 2005-T (1/2" latching panic saddle)
- F. Miscellaneous
 - 1. Lock Guard, BLP 107-630 3-1/4"x7" Latch Protection
 - 2. Kick Plate, Quality, 10", .050", Aluminum
 - 3. Weather-strip, Pemko, 319 CR
 - 4. Smoke Seal, Pemko, HSS2000xS88
 - 5. Shoe, Pemko; 217AV (sweep)
 - 6. Astragal, Pemko 305CN

PART 3 - EXECUTION:

3.01 DELIVERIES:

- A. Stockpile all items sufficiently in advance to ensure their availability and make all necessary deliveries in a timely manner to ensure orderly progress of the total work.

3.02 INSTALLATION:

- A. Mount hardware units at heights indicated in "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute, except as specifically indicated or required to comply with governing regulations, and except as may be otherwise directed by Architect. Hand-activated hardware such as lever locksets, panic bars, and push-pull handles shall be 34" minimum and 44" maximum above finish floor or ground.
- B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Wherever cutting and fittings required to install hardware onto or into surfaces which are later to be painted or finished in another way, coordinate removal, storage and reinstallation or application of surface protections with finishing work specified in the division 9 sections. Do not install surface-mounted items until finishes have been completed on the substrate.
- C. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation. **Provide steel stud backing in walls as necessary to provide proper anchorage for wall mounted hardware.**
- D. Drill and countersink units, which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

3.03 ADJUST AND CLEAN:

- A. Adjust and check each operating item of hardware and each door, to ensure proper operation of function of every unit. Replace units, which cannot be adjusted to operate freely and smoothly as intended for the application made.
- B. Instruct Owner's Personnel in proper adjustment and maintenance of hardware and hardware finishes, during the final adjustment of hardware.
- C. Continued Maintenance Service: Approximately six months after the acceptance of hardware in each area, the Installer, accompanied by the representative of the latch and lock manufacturer, shall return to the project and re-adjust every item of hardware to restore proper function of doors and hardware. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures. Replace hardware items which have deteriorated or failed due to faulty design, materials or installation of hardware units. Prepare a written

report of current and predictable problems (of substantial nature) in the performance of the hardware, and deliver report to owner with a copy to the Architect.

END OF SECTION

SECTION 09 91 15

EXTERIOR SITE PAINTING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Painting and painter's finish on site and landscape improvements, except prefinished items and unless otherwise noted, as required to complete finishing of the Work. The Work includes the following specific items:
 - a. Pavement markings in parking lot.
 - b. Painting of exterior mechanical building walls.
 - c. Painting of pool area retaining walls and lettering.
 - d. Painting of CMU columns.
 - e. Field painting of exposed bare and shop-primed mechanical items.
- B. Items Not Included in This Section:
 - 1. Factory-prefinished items as specified in various Sections.
 - 2. Painting specified elsewhere and included in respective Sections, including but not necessarily limited to shop priming.
- C. Related Requirements:
 - 1. Section 09 96 23 - Graffiti-Resistant Coatings
 - 2. Section 32 36 00 - Landscape Decorative Metal; site finishing of landscape metal fabrications.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Submittal Procedures: Action and Informational Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.
- B. Coordination: Perform painting work in proper sequence with work of other trades so as to avoid damage to finished work.

1.03 ACTION SUBMITTALS

- A. Product Data: A complete list of materials proposed for use, together with manufacturer's technical information, including paint label analysis and application instructions.
- B. Color Samples:
 - 1. Appropriately label and identify each sample, including location and application. Include manufacturer's name, color number, and gloss units.
 - 2. Wood: Prepare on type and quality of wood specified, 12 inches square or long, as applicable.
 - 3. Other Surfaces: Prepare on hardboard, 8 inches square.
 - 4. Each sample shall have stepped finish, clearly showing each coat and build-up of specified finish. Submit separate samples for each required gloss level.
 - 5. Resubmit samples as requested until required sheen, color, and texture are achieved.
 - 6. See also requirements for field samples below.

1.04 INFORMATIONAL SUBMITTALS

- A. Statement of applicator qualifications.

1.05 CLOSEOUT SUBMITTALS

- A. Extra stock as specified.
- B. Specified warranty.

1.06 QUALITY ASSURANCE

- A. Coatings used on interior shall meet LEED Sustainable Design program requirements and shall be Green Seal Standard GS-11 compliant.
- B. Unsuitability of Specified Products: Claims concerning unsuitability of any material specified (or inability satisfactorily to produce the Work) will not be entertained, unless such claim is made, in writing, to District's Representative before beginning of application.
- C. Single-Source Responsibility:
 - 1. To the maximum extent practicable, select a single manufacturer to provide all materials required by this Section, using additional manufacturers to provide systems not offered by the selected principal manufacturer.
 - 2. For each individual system:
 - a. Provide primer and other undercoat paint produced by same manufacturer as finish coat.
 - b. Use thinner within manufacturer's recommended limits.
- D. Applicator Qualifications:
 - 1. Not less than 5 years of documented experience in painting work similar in scope to work of this Project.
 - 2. Maintain a crew of painters who are fully qualified to satisfy requirements of this Section.
- E. Field Samples:
 - 1. Request review, by the District's Representative, of first finished item of each finish type or color scheme required for color, texture, and workmanship.
 - 2. For walls, finish a panel 8 feet square.
 - 3. Modify selected colors, if requested by District's Representative, to achieve desired effect.
 - 4. Use first acceptable surface or item as the Project standard for each color scheme.
- F. Primers:
 - 1. Provide finish coats that are compatible with prime paints used.
 - 2. Review other Sections of these Specifications in which prime paints are to be provided in order to ensure compatibility of total coatings system for various substrates.
 - 3. Upon request, furnish information to other Sections regarding characteristics of finish materials proposed for use.
 - 4. Provide barrier coats over incompatible primers, or remove and re-prime as required.
 - 5. Notify District's Representative, in writing, of any anticipated problems arising from using specified coating systems with substrates primed by other Sections.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original, new, unopened packages and containers bearing the manufacturer's name and label describing contents including the following information:
 - 1. Name or title of material.
 - 2. Manufacturer's stock number and date of manufacture.
 - 3. Contents by volume for major pigment and vehicle constituents.
 - 4. Thinning instructions.
 - 5. Application instructions.
 - 6. Color name and number.

- B. Store materials in tightly covered containers. Maintain containers in a clean condition, free of foreign materials and residue.
- C. Store materials at ambient temperature of between 45 degrees F minimum and 90 degrees F maximum, in a well-ventilated area.
- D. Ensure that storage area is neat and orderly.
- E. Take precautionary measures to prevent fire and health hazards.

1.08 FIELD CONDITIONS

- A. Ambient Conditions:
 - 1. Comply with manufacturer's recommendations as to environmental conditions under which coatings and coating systems can be stored and applied.
 - 2. Do not apply finish in areas where dust is being generated.
- B. Cover or otherwise protect in progress and finished work of other trades, and surfaces not being painted concurrently or not to be painted.

1.09 WARRANTY

- A. Color and Life of Film:
 - 1. At the end of 1 year, colors of surfaces shall have remained free from serious fading. Variations (if any) shall be uniform.
 - 2. Materials shall have their original adherence at end of 1 year. There shall be no evidence of blisters, running, peeling, scaling, chalking, streaks, or stains at end of this period.

1.10 EXTRA MATERIALS

- A. At completion of the Work, deliver to District extra stock of paint of each color used in each coating material used.
- B. Containers shall be full, tightly sealed, and clearly marked.
- C. Provide the following quantities:
 - 1. Field Colors: One 5-gallon container.
 - 2. Accent Colors: One 1-gallon container.

PART 2 - PRODUCTS

2.01 MANUFACTURERS AND PRODUCTS

- A. Products are specified under "Paint Systems" in Part 3 below and are manufactured by Kelly-Moore Paints, unless otherwise indicated. Equivalent products manufactured by PPG, Benjamin Moore, Sherwin-Williams, or Dunn-Edwards are acceptable.
- B. Materials selected for coating systems for each type surface shall be the product of a single manufacturer or shall be acceptable to manufacturer of finish coating for system.
- C. If more than one quality level of product type is marketed, use material of highest quality.

2.02 COLORS

- A. District's Representative will prepare a color schedule with samples for guidance of painter and reserves right to select, allocate, and vary colors on different surfaces throughout the project. Colors selected by District's Representative may be from manufacturer's standard palette or be custom mixed.
- B. Submit samples of selected colors as specified in Part 1 above.
- C. Colors of paints, including shades of stain, shall match color chips on schedule.

2.03 MIXING AND TINTING

- A. Deliver paints and stains ready mixed to jobsite.
- B. Accomplish job mixing and job tinting only if required for adjustment to finish applied to field test areas to achieve color acceptable to District's Representative.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine surfaces scheduled to receive paint and finishes for conditions that will adversely affect execution, permanence, or quality of work and that cannot be put into acceptable condition through preparatory work as included in Article 3.02, "Preparation."
- B. Do not proceed with surface preparation or coating application until conditions are suitable.

3.02 PREPARATION

- A. General:
 - 1. Verify that surfaces to be painted are dry, clean, smooth, and free from deleterious materials.
 - 2. Protect hardware, exposed metals, and other surfaces that are not to be painted by masking, removal, or other means to ensure a neat job.
- B. Wood - General:
 - 1. Cleaning and Sanding:
 - a. Remove handling marks and effects of exposure to moisture with a thorough, final sanding over all exposed surfaces, using 150-grit or finer sandpaper.
 - b. Clean and vacuum before applying sealer or finish.
 - 2. Do not sandpaper resawn surfaces.
 - 3. Wood to Receive Opaque Finish: Fill nail holes, cracks, open joints, and other defects with filler after priming coat has dried. Color shall match finish color.
 - 4. Wood to Receive Transparent Finish:
 - a. Remove any material that would adversely affect penetration or appearance of finish.
 - b. Do not seal wood surfaces to receive transparent finish.
- C. Wood – New Exterior, Opaque Finish:
 - 1. Surfaces shall be dry and free of grease and splatters.
 - 2. Rough surfaces shall be sanded smooth.
 - 3. Fill nail holes, cracks, open joints, and other defects with filler after priming coat has dried. Exposed nail heads shall be spot primed.
 - 4. Avoid painting surfaces while exposed directly to hot sun.
 - 5. Smooth surfaces shall be sanded thoroughly to allow proper penetration and adhesion. Areas exhibiting tannic acid staining shall receive two coats of primer waiting 24 hours between coats.

- Sand and prime as soon as possible after installation to avoid UV degradation of unpainted wood surface.
6. Mildew, if present, shall be removed by scrubbing with a commercial mildew wash in accordance with manufacturer's directions.
- D. Wood - Existing Exterior, Opaque Finish:
1. Remove all blistered, peeling and scaling paint to a sound substrate by scraping, sanding, and wire brushing. Spot prime bare wood and exposed nail heads before applying overall coat of primer.
 2. Surfaces that exhibit moderate to heavy chalk deposits shall be thoroughly cleaned to sound substrate by wire brushing, sanding, or power washing.
 3. Loose and split sealants shall be removed and replaced.
 4. Glossy surfaces shall be dulled by sanding. Crystalline deposits shall be removed by flushing with water from a hose.
 5. Mildew, if present, shall be removed by scrubbing with a commercial mildew wash in accordance with manufacturer's directions.
- E. Wood – New and Existing Exterior, Transparent Finish:
1. Surfaces shall be dry and free of grease and splatters.
 2. Avoid coating surfaces while exposed directly to hot sun.
 3. Mildew, if present, shall be removed by scrubbing with a commercial mildew wash in accordance with manufacturer's directions.
 4. Comply with additional requirements of the coating manufacturer.
- F. Metals:
1. Remove mill scale, rust, and corrosion.
 2. Clean oils, grease, and dust from surfaces.
 3. Touch up chipped or abraded areas in shop coatings, using appropriate primer.
 4. Soluble Salts: Removal of soluble salts from bare metal and galvanized metal surfaces, both interior and exterior, is required prior to application of primer coats to preclude pre-mature coating failure and accelerated corrosion.
 - a. Removal shall be in accordance with SSPC-Guide 15, "Field Methods for Retrieval and Analysis of Soluble Salts on Steel and Other Nonporous Substrates."
 - b. Abrasive blasting, where specified as a required surface preparation procedure, shall be performed after removal of soluble salts. Abrasive blasting is not an acceptable procedure for removal of soluble salts.
 5. Previously Painted Metal: Prepare in accordance with recommendations of coating manufacturer based on condition of surfaces and the following:
 - a. Remove loose paint, dirt, and chalk with scraper and strong detergent solution.
 - b. Abrade shiny surfaces, such as baked enamel.
 - c. Clean surfaces of dust from sanding and other foreign matter that could adversely affect adhesion or performance of coating system. Remove sanding dust with a clean, wet rag.
 - d. Surfaces shall be clean, dry, smooth, and even.
- G. Concrete:
1. Fill cracks and irregularities with Portland cement grout or patching mortar in order to provide uniform surface texture.
 2. Surfaces shall not be painted until they have completely cured and have a stabilized moisture content but in no case less than 60 days from completion of surface.
- H. Cement Plaster:
1. Fill cracks and irregularities with Portland cement grout or patching mortar in order to provide uniform surface texture.
 2. Surfaces shall not be painted until they have completely cured and have a stabilized moisture content but in no case less than 60 days from completion of surface.
- I. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions

- J. Surfaces that cannot be prepared or painted as specified shall be immediately brought to the attention of the District's Representative, in writing.
 - 1. Starting of work without such notification will be considered acceptance by the Contractor of surfaces involved.
 - 2. Replace unsatisfactory work caused by improper or defective surfaces, as directed by District's Representative.

3.03 FACTORY FINISHING AND PRIMING

- A. Pertinent Work and Requirements Specified Elsewhere: Review all Sections for products that are to be factory finished or factory (shop) primed.
- B. Touch-up: Touch up abrasions in prime coat immediately after products arrive on jobsite and as required prior to application of finish coats.

3.04 APPLICATION

- A. Do not apply initial coating until moisture content of surface is within limitations recommended by paint manufacturer.
- B. Application:
 - 1. Apply paint with suitable brushes, rollers, or spraying equipment.
 - 2. Guardrails and other exposed metal requiring field finish painting shall be sprayed to the fullest extent conditions will permit. If brush or roller application is used, surface finish shall be subject to review by the District's Representative for complying with the appearance requirements specified herein.
 - 3. Apply coatings in accordance with manufacturer's recommendations.
 - 4. Rate of application shall be within limits recommended by paint manufacturer for surface involved.
- C. Spray-Gun Application - Standard Coatings:
 - 1. Spray-apply standard paints only with airless sprayer.
 - 2. Apply in fine, even spray, without addition of thinner, using nozzle pattern suitable to surface being painted.
 - 3. When necessary, follow by brushing to ensure uniform coverage and to eliminate wrinkling, blistering, and air holes.
 - 4. If spraying becomes detrimental to equipment or objectionable to personnel, brush painting will be required.
- D. Comply with recommendation of product manufacturer for drying time between succeeding coats.
- E. Finish coats shall be smooth and free from brush marks, streaks, laps or pileup of paints, and skipped or missed areas.
- F. Leave all parts of moldings and trim clean and true to details with no undue amount of paint in corners and depressions.
- G. Make edges of paint adjoining other materials or colors clean and sharp, with no overlapping.
- H. Refinish whole area where portion of finish is not acceptable.

3.05 CLEANING

- A. Touch up and restore finish where damaged.
- B. Remove spilled, splashed, or spattered paint from all surfaces. Do not mar surface finish of item being cleaned.

- C. Leave storage space clean and in condition required for equivalent spaces in Project.

3.06 PAINT SYSTEMS

A. General:

1. This Specification shall serve as guide and is meant to establish procedure and quality. Confer with the District's Representative to determine exact finish desired.
2. Number of coats scheduled is minimum. Additional coats shall be applied at no additional cost as required to hide base material completely, produce uniform color, and provide required and satisfactory finish.

- B. Acceptance of Final Colors: Final coat of paint shall not be applied until colors have been accepted by the District's Representative.

- C. Gloss and Sheen Ratings: It is recognized that manufacturer's use various identifiers for the sheen of their paints. The sheen rating of applied paint, therefore, shall be identified as a Gloss Level and generally fall within the following limits established by the Master Painters Institute, Inc. (MPI) Standards and ASTM D523. Not all of the Gloss Levels are necessarily scheduled or used on this Project.

1. Gloss Level 1: Matte or Flat; not more than 5 units at 60 degrees and 10 units at 85 degrees.
2. Gloss Level 2: Velvet or Low Sheen; not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees.
3. Gloss Level 3: Eggshell; 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees.
4. Gloss Level 4: Satin; 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees.
5. Gloss Level 5: Semi-gloss; 35 to 70 units at 60 degrees.
6. Gloss Level 6: Gloss; 70 to 85 units at 60 degrees.

D. Clarification of System Terminology:

1. Exterior paint Systems are specified and identified herein by initial letters "EXT."
2. Initial numbers for each System identify the substrate to be coated.
3. Letter following substrate numbers identify the general finish coat chemistry summarized as follows:

CODE	DESCRIPTION
A	Standard acrylic
B	Standard alkyd
C	Semi-transparent stain
D	Semi-solid stain
H	High performance polyurethane
M	Premium performance acrylic polymer
T	Fluoropolymer

4. Hyphenated suffix identifies the topcoat gloss levels.

E. Exterior Painting Systems:

EXT 3.1A-1

Acrylic on Concrete and Cement Plaster - Gloss Level 1

1 coat	6001-XXXX	Acrylic Bonding Primer
2 coats	2200-XXXXV	100% Acrylic Flat

EXT 4.2A-1

Latex on Concrete Unit Masonry - Gloss Level 1

1 coat	"Bloxfil" 4000	Heavy-duty Block Filler
2 coats	2200-XXXX	100% Acrylic Flat

EXT 5.1A-5

Acrylic over Waterborne Primer on Ferrous Metal - Gloss Level 5

1 coat	4020-1000	Metal Primer (If Not Shop Primed)
2 coats	4206-XXXX	Acrylic Semi-gloss

EXT 5.1M-6

Acrylic over Waterborne Primer on Ferrous Metal - Gloss Level 6

1 coat	4020-1000	Metal Primer (If Not Shop Primed)
2 coats	4208-XXXX	Acrylic Gloss

EXT 5.3-5

Acrylic over Waterborne Primer on Galvanized Metal – Gloss Level 5

Pretreatment (SSPC SP-1)	Devprep 88	Heavy-duty cleaner
1 coat	4020-1000	Primer
2 coats	2406-XXXX	100% Acrylic Semi-gloss

EXT 5.4G-5

Acrylic on Factory-Primed Aluminum - Gloss Level 5

2 coats	2406-XXXX	100% Acrylic Semi-gloss
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EXT 5.1M-5

Premium-Performance Acrylic Polymer over Epoxy on Shop Primed Decorative Metal- Gloss Level 5

Pretreatment		As specified in Section 05 7000, "Decorative Metal"
1 coat	Tnemec 27WP	Two-component, water-based epoxy tinted to match color of topcoat (if primer not shop applied)
1 coat	Tnemec Series 1029	High dispersion acrylic polymer

Note: Provide additional topcoat if required to achieve manufacturer's recommended total DFT (primer plus finish coats), or to achieve complete hiding for selected color.

EXT 5.1H-5

High Performance Polyurethane over Galvanized Metal, Gloss Level 5

Pretreatment		As specified in Section 32 3600 – Landscape Decorative Metal
1 coat	Tnemec 27WB	Two-component, water-based epoxy tinted to match color of topcoat (if primer not shop applied)
1 coat	Tnemec UVX Series 750	Polyurethane

Note: Provide additional topcoat if required to achieve manufacturer's recommended total DFT (primer plus finish coats), or to achieve complete hiding for selected color. Comply with manufacturer's maximum recoat time.

EXT 5.3T-5

High Performance Fluoropolymer Finish on Galvanized Steel - Gloss Level 5: Tnemec coatings as specified, or equal.

Pretreatments

	Cleaner	SSPC SP-1	Heavy-duty cleaner
	Additional Surface Preparation	ASTM D6386	Brush Blast
1	coat	Tnemec "Chembuild" Series 135"	Modified polyamidoamine epoxy applied at 102 microns to 127 microns (4.0 to 5.0 mils) in one or more coats
1	coat	Tnemec "Endura Shield" Series 740	Low VOC hybrid aliphatic polyurethane applied at 102 microns to 127 microns (4.0 to 5.0 mils) in one or more coats
1	coat	Tnemec "Fluoronar" Series 1071	High-solids thermoset fluoropolymer applied at 51 microns to 76 microns (2.0 to 3.0 mils) in one or more coats

Note: Provide additional topcoat if required to achieve manufacturer's recommended total DFT (primer plus finish coats), or to achieve complete hiding for selected color.

EXT 6.3A-4

Acrylic on Dressed Lumber - Gloss Level 3

1	coat	2000-1000	100% Acrylic Primer
2	coats	2402 XXXXV	100% Acrylic Satin Enamel

EXT 6.3A-5

Acrylic on Dressed Lumber - Gloss Level 5

1	coat	2000-1000	100% Acrylic Primer
2	coats	2406-XXXXV	100% Acrylic Semi-gloss Enamel

EXT 6.3D

Semi-Transparent Stain on Dressed Lumber

1	coat	2610-XXXX	"Woodpride" Waterborne
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EXT 6.3V-5

Clear Alkyd Varnish on Dressed Lumber - Gloss Level 6

3	coats	Cabot 18040	Spar Varnish
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EXT 6.3V-3

Clear Alkyd Finish over Clear Base Coat on Dressed Lumber – Gloss Level 3

	Surface Preparation	Gemini "Wood Prep"	Mill glaze remover
1	coat	Sikkens "Cetol 1"	Translucent Alkyd Primer
2	coats	Sikkens "Cetail 23 Plus"	Translucent Alkyd Topcoat

END OF SECTION

SECTION 09 96 23

GRAFFITI-RESISTANT COATINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Liquid-applied sacrificial surface sealer for all exterior masonry and concrete wall surfaces that will prevent penetration of staining mediums and allow easy removal and reapplication.
 - 2. Items included in the scope include, but are not limited to, the following:
 - a. Pool mechanical building exterior Painted Surfaces
 - b. Exterior painted surfaces
- B. Related Requirements:
 - 1. Section 32 32 15 – Landscape Concrete.
 - 2. Section 32 32 00 – Landscape Concrete Masonry.
 - 3. Section 32 36 00 – Landscape Decorative Metal.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Submittal Procedures: Action and Informational Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.

1.03 ACTION SUBMITTALS

- A. Product Data: Manufacturer's specifications, installation instructions, and general recommendations for specified coating materials. Include instructions and recommendations for cleaning and preparation of concrete surfaces, coating and recoating application techniques, equipment to be used, coverage rates, accessory materials, and special removal procedures.
- B. Samples: 12-inch-square of each substrate to receive graffiti-resistant coating, with coating applied to half of each sample.

1.04 INFORMATIONAL SUBMITTALS

- A. Statement of applicator qualifications.
- B. Letter documenting work has been applied in compliance with specifications and manufacturer's written instructions and that specified field testing has been satisfactory.

1.05 CLOSEOUT SUBMITTALS

- A. Extended warranty.
- B. Maintenance materials.

1.06 QUALITY ASSURANCE

- A. Applicator Qualifications: Approved in writing by the manufacturer with documented experience in application of similar graffiti-resistant coatings.
- B. Mockup:

1. Treat and evaluate a minimum eight square foot area of completed wall at the Project site for product adhesion, compatibility and appearance.
 2. Apply and remove graffiti to a portion of the mock-up to the satisfaction of the District's Representative.
 3. Application shall not continue unless mockup is acceptable to District's Representative.
- C. Do not apply specified coatings when surfaces or ambient air temperature is below 45 degree F or over 90 degrees F, or expected to drop below freezing during the 24-hour period following application.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store materials at site in protected location, and away from flame, excessive heat, at temperatures above 40 degrees F.

1.08 MAINTENANCE

- A. At completion of the Work, deliver to District specified cleaning and application solution sufficient to clean and recoat a minimum of 500 square feet of coated wall surface.
- B. Stock shall be in factory sealed and clearly labeled containers.
- C. Stock shall be delivered and stored as directed by the District.

1.09 WARRANTY

- A. Manufacturer: Provide District with a written 10-year warranty, signed by the manufacturer, agreeing to repair or replace work that exhibits defects in materials or workmanship. Defects are defined to include failure to withstand complete graffiti removal, ghosting, shadowing, chemical stain, yellowing, and normal environmental effects.

PART 2 - PRODUCTS

2.01 PERFORMANCE CRITERIA

- A. The coating shall not darken, stain, or discolor substrate surfaces.
- B. The coating shall be non-yellowing.

2.02 MATERIALS

- A. Graffiti-Resistant Coating System: "Defacer Eraser" SC-1 by Prosoco, or equal meeting governing VOC requirements.
- B. Application Equipment: Medium-to-large-capacity airless sprayer and hoses or other equipment as recommended by the coating manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are dry, clean, and free of dust, dirt, grime, oils, alkali or acid residues, and other contaminants or compounds unacceptable to the graffiti-resistant coating manufacturer.

3.02 PREPARATION

- A. Clean and prepare substrates in accordance with graffiti-resistant coating manufacturer's instructions.
- B. Test for moisture content in accordance with manufacturer's instructions to ensure that surface is sufficiently dry.
- C. Protect adjacent surfaces not to receive coating from spillage or blow-over.
- D. Cover adjoining and nearby surfaces of metal and glass as required.

3.03 APPLICATION

- A. Apply graffiti-resistant coating following manufacturer's recommendations for number of coats and their application.
- B. Avoid runs or applying coating too heavily as this will impair transparency of cured material. Excessive coating will turn milky when it gets wet after curing.
- C. Runs or sags on masonry surface shall be immediately brushed out using a clean soft brush.
- D. Clean spillage from horizontal surfaces immediately after spillage.

END OF SECTION

SECTION 13 11 00

SWIMMING POOL GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. The scope of the work included under this Section of the Specifications shall include swimming pool(s) as illustrated on the Drawings and specified herein. The General and Supplementary Conditions of the Specifications shall form a part and be included under this Section of the Specifications. The Swimming Pool Subcontractor shall provide all supervision, labor, material, equipment, machinery, plant and any and all other items necessary to complete the work. ALL OF THE WORK IN SECTIONS 13 11 00 – 13 11 08 IS TO BE THE RESPONSIBILITY OF ONE EXPERIENCED SWIMMING POOL SUBCONTRACTOR PRIMARILY ENGAGED IN THE CONSTRUCTION OF COMMERCIAL PUBLIC-USE SWIMMING POOLS. A SWIMMING POOL SUBCONTRACTOR SHALL BE CONSIDERED PRIMARILY ENGAGED AS REQUIRED HEREIN IF THE SUBCONTRACTOR DERIVED 50% OF ITS ANNUAL REVENUE FROM PUBLIC-USE SWIMMING POOL CONSTRUCTION FOR EACH OF THE LAST FIVE YEARS. THE SUBCONTRACTOR MUST HAVE ALSO, IN THE LAST FIVE YEARS CONSTRUCTED AT LEAST FIVE (5) COMMERCIALY DESIGNED MUNICIPAL AND PUBLIC-USE SWIMMING POOLS, EACH OF WHICH SHALL HAVE INCORPORATED A MINIMUM SIZE OF 6,000 SQUARE FEET OF WATER SURFACE AREA WITH A CONCRETE AND CERAMIC TILE PERIMETER OVERFLOW GUTTER AND SELF-MODULATING BALANCE TANK. The Swimming Pool Subcontractor shall furnish and install the swimming pool structures, finishes, cantilever forming, swimming pool mechanical and electrical systems, and all accessories necessary for a complete, functional swimming pool system, as herein described. Work shall include start-up, instruction of District's personnel, as-built drawings and warranties as required.

1.02 CODES, RULES, PERMITS, FEES

- A. The swimming pools shall be constructed in strict accordance with the applicable provisions set forth by authorities having jurisdiction over swimming pool construction and operation in the State of California.
- B. The Swimming Pool Subcontractor shall give all necessary notices, obtain all permits, and pay all government sales taxes, fees, and other costs in connection with their work; file all necessary plans, prepare all documents and obtain all necessary approvals of governmental departments having jurisdiction; obtain all required certificates of inspection for their work and deliver same to the District Representative before request for acceptance and final payment for the work.
- C. The Swimming Pool Subcontractor shall include in the work any labor, materials, services, apparatus, or drawings in order to comply with all applicable laws, ordinances, rules and regulations, whether or not shown on Drawings and/or specified.
- D. The Contractor shall submit all required documents and materials to all Governmental Departments having jurisdiction for any deferred approval items or substituted materials or products to obtain final approval to installation.

1.03 DESCRIPTION OF WORK

- A. Furnish and perform supervision, coordination, all layout, formwork, excavation, hand trim, disposing off-site of all unused material or debris to complete the swimming pool excavation to the dimensions shown on the plans.
- B. Furnish and install complete swimming pool structures, including reinforcing steel and cast-in-place or pneumatically placed concrete walls and floors.

- C. Furnish and install swimming pool finishes, including ceramic tile and marble plaster or other waterproof finishes.
- D. Furnish and install complete swimming pool mechanical system(s), including, but not limited to, circulation systems, filtration systems, pool water heating systems, water chemistry control systems, domestic water fill line systems, booster pump and special effects systems, and all pumps, piping, valves, and connections between system(s) and swimming pool(s).
- E. Furnish and install complete swimming pool electrical system(s) from P.O.C. in Mechanical Room, including, but not limited to, underwater lighting systems, water level control systems, timing systems, scoreboards, special effects systems, control circuitry, motor starters, time clocks, bonding, and all conduits, conductors, contactors, and switches between the system(s) and swimming pool(s).
- F. Furnish and install all swimming pool cantilever forming, deck equipment and required anchors and inserts for the specified equipment as required by code, shown on the Drawings and specified herein.
- G. After the initial filling of the swimming pool system(s), should any repairs, continuing work, or other Subcontractor responsibility require drainage or partial drainage of the swimming pool systems, the Swimming Pool Subcontractor shall be responsible for any subsequent refilling and shall complete the project with the swimming pool system(s) full of water, water in chemical balance, complete in every way, and in full operation.

1.04 ASSIGNED RESPONSIBILITIES AND RELATED WORK

- A. It is the intent of this section of the Specifications to clarify Work responsibilities of the trades directly and indirectly involved in construction of the pool systems. All labor, equipment, materials and supplies furnished by the Swimming Pool Subcontractor and other Subcontractors shall be as directed by the District through the District Representative.
- B. THE SWIMMING POOL SUBCONTRACTOR SHALL NOT SUBCONTRACT ANY PORTION OF THE SWIMMING POOL CONSTRUCTION OR SWIMMING POOL EQUIPMENT INSTALLATION TO ANYONE OTHER THAN A SUBCONTRACTOR THAT SATISFIES THE REQUIREMENTS OF SECTION 13 11 00
- C. References to "swimming pool systems" shall include the swimming pools, equipment, and accessories.
- D. The District will provide one complete water filling of the swimming pool(s), but will not assume any responsibility for the swimming pool system(s) until they have been proved fully operational, complete in every way and accepted by the District Representative.

1.05 RESPONSIBILITIES OF THE CONTRACTOR

- A. The Contractor shall grade the swimming pool site(s), establish benchmarks, cut and fill as necessary to provide as level an area as possible at swimming pool deck elevation before swimming pool layout.
- B. The Contractor shall be responsible for horizontal dimensions and grade elevations accurately from established lines and benchmarks (as indicated on the Drawings) and be responsible for those grades.
- C. The Contractor shall provide adequate temporary light, electric power, heat and ventilation per Federal and State OSHA requirements to construct the swimming pool system(s).

- D. The Contractor shall not permit any heavy equipment activity over any area or within five (5) feet of any area under which swimming pool piping is buried. There shall be no exceptions to this requirement.
- E. The Contractor shall keep the swimming pool excavation(s) and swimming pool structure(s) free of construction residue and waste materials of their workmen or Subcontractors, removing said material from the swimming pools as required.
- F. The Contractor shall protect the swimming pool(s) from damage caused by their construction equipment and /or workmen and Subcontractors.
- G. The Contractor shall provide a representative at time of swimming pool start-up to coordinate all trades related to swimming pool system(s).

1.06 RESPONSIBILITIES OF THE MECHANICAL SUBCONTRACTOR

- A. The Mechanical Subcontractor shall be licensed in the State of California and provide written notifications to Swimming Pool Subcontractor and contractor when necessary to excavate and backfill within the swimming pool construction site.
- B. The Mechanical Subcontractor shall not utilize any swimming pool piping trench for installation of any sanitary sewer, storm sewer, domestic water, hot water, chilled water or natural gas line.
- C. The Mechanical Subcontractor shall furnish and install all sanitary sewer piping, including vent stacks (if necessary), for backwash pits, floor drains and floor sinks as required by code, shown on Drawings, and herein specified.
- D. The Mechanical Subcontractor shall furnish and install all storm sewer piping and site drainage systems as required by code, shown on the Drawings, and herein specified.
- E. The Mechanical Subcontractor shall provide a minimum 75 psi water supply for swimming pool construction work within fifty (50) feet of the swimming pool construction site(s).
- F. The Mechanical Subcontractor shall furnish and install reduced pressure backflow protected domestic water lines to P.O.C. within swimming pool Mechanical Room as required by code, shown on the Drawings, and herein specified.
- G. The Mechanical Subcontractor shall furnish and install natural gas piping, pressure regulation and valving to P.O.C. within swimming pool Mechanical Room as required by code, shown on the drawings, and herein specified.
- H. The Mechanical Subcontractor shall furnish and install all ductwork, louvers, and all HVAC equipment within swimming pool Mechanical Room as required by code, shown on the Drawings, and herein specified.
- I. The Mechanical Subcontractor shall provide a representative at time of swimming pool start-up to coordinate work related to swimming pool system(s).

1.07 RESPONSIBILITIES OF THE ELECTRICAL SUBCONTRACTOR

- A. The Electrical Subcontractor shall be licensed in the State of California and shall furnish and install electrical service to swimming pool Mechanical Room sized to accommodate all necessary swimming pool equipment as shown on the Drawings and herein specified.
- B. The Electrical Subcontractor shall furnish any temporary power needed by the Swimming Pool Subcontractor within fifty (50) feet of the swimming pool construction site(s).

- C. The Electrical Subcontractor shall furnish and install all conduits, conductors, starters/disconnects, panels, circuits, switches and equipment as required for lighting, ventilation and HVAC equipment within swimming pool Mechanical Room as required by code, shown on the Drawings, and herein specified.
- D. The Electrical Subcontractor shall furnish and install all conduits, conductors, panels, circuits, switches and equipment for area lighting as required by code, shown on the Drawings, and herein specified.
- E. All equipment, material and installation shall be as required under Division 16 of the Specifications and shall conform to NEC Article 680 (latest revision), State and Local Codes, and as may be required by all authorities having jurisdiction over swimming pool construction within the State of California.
- F. The Electrical Subcontractor shall provide a representative at time of swimming pool start-up to coordinate work related to swimming pool system(s).

1.08 INTENT

- A. It is the intention of these specifications and Drawings to call for finished work, tested and ready for operation. Wherever the work “provide” is used, it shall mean “furnish and install complete and ready for use.”
- B. Minor details not usually shown or specified, but necessary for proper installation and operation, shall be included in the work, the same as if herein specified or shown.

1.09 SCHEDULE OF VALUES

- A. Provide a Schedule of Values for all work specified in each of the technical specifications listed in the table below, regardless of whether the work is performed by the swimming pool contractor or others. Values listed shall be fully burdened, with contractor general conditions, overhead, profit and bonds included. Payments for swimming pool work completed shall not be approved until Schedule of Values has been submitted to and approved by Architect.

SWIMMING POOL SCHEDULE OF VALUES			
No.	Section #	Description	Value
1.	13 11 01	Swimming Pool Excavation	
2.	13 11 02	Swimming Pool Concrete	
3.	13 11 03	Swimming Pool Shotcrete	
4.	13 11 04	Swimming Pool Ceramic Tile	
5.	13 11 05	Swimming Pool Plaster	
6.	13 11 06	Swimming Pool Equipment	
7.	13 11 07	Swimming Pool Mechanical	
8.	13 11 08	Swimming Pool Electrical	
Total			

1.10 SUBMITTAL PROCEDURES

- A. General: Electronic copies of CAD Drawings of the Contract Drawings will not be provided by Architect for Subcontractor’s use in preparing submittals.
- B. Coordination: Coordinate preparation and processing submittals with performance construction

activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

- C. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for list of submittals and time requirements for schedules performance of related construction activities.

- D. Processing Time: Allow enough time for submittal review, including time for re-submittals as follows. Time for review shall commence on Architect's receipt of submittal.
 1. Initial Review: Allow fifteen (15) days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Architect will advise Contract when a submittal being processed must be delayed for coordination.
 2. Concurrent Review: Where concurrent review of submittals by Architect's consultants, District, or other parties is required, allow twenty-one (21) days for initial review of each submittal.
 3. Direct Transmittal to Consultant: Where the Contract Documents indicate that submittals may be transmitted directly to Architect's consultants, provide duplicate copy of transmittal to Architect. Submittal will be returned to Architect before being returned to Subcontractor.
 4. If intermediate submittal is necessary, process it in same manner as initial submittal.
 5. Allow fifteen (15) days for processing each submittal.
 6. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.

- E. Identification: Place a title block on each submittal for identification.
 1. Indicate name of firm or entity that prepared each submittal on title block.
 2. Provide a space on title block to record Subcontractor's review and approval markings and action take by Architect.
 3. Include the following information on title block for processing and recording action taken: (See Attached Sample)
 - a. Project name.
 - b. Date.
 - c. Name and address of Subcontractor.
 - d. Name of Subcontractor.
 - e. Name of Supplier.
 - f. Name of Manufacturer.
 - g. Unique identifier, including revision number.
 - h. Number and title of appropriate Specification Section.
 - i. Drawing number and detail references, as appropriate.
 - j. Other necessary identification.

- F. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract documents on submittal.
- G. On all catalogue or cut sheets identify which model or type is being submitted.
- H. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Product data and shop drawings shall be packaged within a three-ring binder and colored samples shall be packaged on a heavy cardboard. Transmit each submittal using a transmittal form.
 - 1. On an attached separate sheet, prepared on Subcontractor's letterhead, record relevant information, request for data, revisions other than those requested by Architect on previous submittals and deviations from requirements of the Contract documents, including minor variations and limitations. Include the same label information as the related submittal.
 - 2. Include Subcontractor's certification stating that information submitted complies with requires of the Contract Documents.
 - 3. Transmittal Form: Provide locations on form for the following information:
 - a. Project name.
 - b. Date.
 - c. Destination (To:).
 - d. Source (From:).
 - e. Names of Subcontractor, manufacturer, and supplier.
 - f. Category and type of submittal.
 - g. Submittal purpose and description.
 - h. Remarks.
- I. Distribution: Furnish copies of final submittals to manufacturers, Subcontractors, suppliers, fabricators, installers, authorities having jurisdiction and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Use for Construction: Use only final submittals with mark indicating action taken by Architect in connection with construction.

1.11 SUBSTITUTIONS

- A. To obtain approval to use unspecified products, bidders shall submit requests for substitution at least ten (10) days prior to bid date. Requests shall only be considered if they clearly describe the product for which approval is asked, including all data necessary to demonstrate acceptability. All unspecified products and equipment will be considered on an "or equal" basis at the discretion of the District Representative. Requests for substitution received after the specified deadline will not be considered. Where a conflict exists between the requirements of the General Conditions / Special Conditions / Division 1 concerning substitutions and the requirements of this Article, this Article (Section 13 11 00, Article 1.10) shall govern.
- B. Where the Swimming Pool Subcontractor proposes to use an item of equipment other than that specified or detailed on the Drawings which requires any redesign of the structure, partitions, foundations, piping, wiring, or any other part of the architectural, mechanical, or electrical layout, all such redesign and all new drawings (stamped by California Licensed Engineer) and detailing required shall be prepared by the Swimming Pool Subcontractor, at his own expense, submitted for review and approval by the District Representative prior to bid.
- C. Where such approved deviation requires a different quantity and arrangement of piping, supports and anchors, wiring, conduit, and equipment from that specified or indicated on the Drawings, the Swimming Pool Subcontractor shall furnish and install any such piping, structural supports,

controllers, motors, starters, electrical wiring and conduit, and any other additional equipment required by the system, at no additional cost to the District.

1.12 SURVEYS AND MEASUREMENTS

- A. The Swimming Pool Subcontractor shall base all measurements, both horizontal and vertical, from benchmarks established by the Contractor. All work shall agree with these established lines and levels. The mechanical Drawings do not give exact details as to elevations of piping, exact locations, etc. and do not show all offsets, control lines, pilot lines and other installation details. Verify all measurements at site and check the correctness of same as related to the work.

1.13 DRAWINGS

- A. Drawings are diagrammatic and indicate the general arrangement of the systems and work included in the Subcontractor. Drawings are not to be scaled. The architectural drawings and details shall be examined for exact dimensions. Where they are not definitely shown, this information shall be obtained from the District Representative.

1.14 SWIMMING POOL SUBSUBCONTRACTOR

- A. The swimming pool construction work as herein described and specified in Division 13 of the Project Manual shall be the complete responsibility of a qualified and specifically licensed (C-53 license classification within the State of California) Swimming Pool Subcontractor with extensive experience in commercial public use swimming pool installations.
- B. The Contractor shall require the Swimming Pool Subcontractor to furnish to the Contractor performance and payment bonds in the amount of 100% of the Swimming Pool Subcontractor's bid written by a surety Company properly registered in the State of California and listed by the U.S. Treasury. The expense of the bond(s) is to be borne by the Subcontractor. The Contractor shall clearly specify the amount and requirements of the bond(s) in the Contractor's written or published request for subbids. The Contractor's written or published request for subbids shall also specify that the bond(s) expense is to be borne by the Subcontractor.
- C. Subcontractor certifies that it meets the qualifications and experience requirements established in Swimming Pool General Requirements, Section 13 11 00, as follows:
 - 1. Subcontractor has derived 50% of its annual revenue from public-use swimming pool construction for each of the last five (5) years.
 - 2. Subcontractor has, in the last five (5) years, constructed at least five (5) commercially designed municipal and public-use swimming pools, each of which have incorporated a minimum size of 6,000 square feet of water surface area with a concrete and ceramic tile perimeter overflow gutter and self-modulating balance tank.
 - 3. The following list of projects meet the requirements of section (b) above and the contact as reference by the Contractor, the Awarding Authority of their agent or designee.
 - a. District: _____
Scope of Project: _____
Contact Person: _____
Phone Number: _____
Architect for Project: _____
 - b. District: _____
Scope of Project: _____
Contact Person: _____
Phone Number: _____
Architect for Project: _____

- c. District: _____
Scope of Project: _____
Contact Person: _____
Phone Number: _____
Architect for Project: _____

- d. District: _____
Scope of Project: _____
Contact Person: _____
Phone Number: _____
Architect for Project: _____

- e. District: _____
Scope of Project: _____
Contact Person: _____
Phone Number: _____
Architect for Project: _____

- D. Swimming Pool Deck Subcontractor other than the swimming pool Subcontractor certifies that it meets the qualifications and experience requirements established in Swimming Pool General Requirements, Section 13 11 00, as follows:
 - 1. Subcontract has, in the last five (5) years, constructed at least five (5) commercially designed cantilevered pool decks over perimeter gutters, each of which have incorporated a minimum size of 6,000 square feet of water surface area of the swimming pool.
 - 2. The following list of projects meet the requirements of section (b) above and the contact as reference by the Contractor, the Awarding Authority of their agent or designee.

SWIMMING POOL DECK SUBCONTRACTOR

- a. District: _____
Scope of Project: _____
Contact Person: _____
Phone Number: _____
Architect for Project: _____

- b. District: _____
Scope of Project: _____
Contact Person: _____
Phone Number: _____
Architect for Project: _____

- c. District: _____
Scope of Project: _____
Contact Person: _____
Phone Number: _____
Architect for Project: _____

- d. District: _____
Scope of Project: _____
Contact Person: _____
Phone Number: _____
Architect for Project: _____

- e. District: _____

Scope of Project: _____
Contact Person: _____
Phone Number: _____
Architect for Project: _____

1.15 OPERATING INSTRUCTIONS

- A. The Swimming Pool Subcontractor shall determine from actual samples of pool water supplied by the District, the proper water management program necessary for maximum operating efficiency and comfort. The Swimming Pool Subcontractor shall provide the services of experienced personnel familiar with this type of pool system operation, in conformance with Section 13 11 05 of the Specifications.

1.16 MAINTENANCE MANUALS

- A. The Swimming Pool Subcontractor shall provide six (6) bound sets for delivery to the District Representative of instructions for operating and maintaining all systems and equipment included in this Contract. Manufacturer's advertising literature or catalog pictures will not be acceptable for operating and maintenance instructions.
- B. Bound in ring binders shall be all parts lists, periodic maintenance instructions and troubleshooting guidelines for all pool equipment, including but not limited to filters, pumps, controllers, water chemistry control equipment, etc.

1.17 SECURE FROM THE DISTRICT

- A. A complete District-furnished filling of the swimming pools.
- B. The District's assistance, as specified herein, from the time of start-up until final written acceptance of the swimming pool system(s).
- C. Chemicals as required for swimming pool operation after Swimming Pool Subcontractor completes initial water chemistry balance and water treatment during the maintenance period described in Section 13 11 05 of the Specifications.

1.18 WARRANTY

- A. The Swimming Pool Subcontractor shall warrant all swimming pool structures, finishes and systems against defects in material and workmanship for a period of one year after the date of acceptance by the District. Any repair or replacement required due to defective material or workmanship will be promptly corrected by the Swimming Pool Subcontractor.

PART 2 PRODUCTS
NOT USED

PART 3 EXECUTION
NOT USED

END OF SECTION

SECTION 13 11 01

SWIMMING POOL EXCAVATION

PART 1 GENERAL

1.01 DESCRIPTION

- A. Finish and fine grading to bring the surface of the ground to the required grades and elevations as indicated on the Drawings.
- B. Subgrade improvements and placing of compacted fills.
- C. Excavation and backfill for all swimming pool, surge chamber and structural requirements, including footings, foundations, slabs and walls.

1.02 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies: Conform with requirements of the General Conditions, and more specifically the following:
 - 1. Comply with California Building Code, latest edition.
 - 2. Comply with applicable construction safety orders, latest edition, Federal and State OSHA.
 - 3. Comply with applicable trench safety provisions, latest edition, Federal and State OSHA.
- B. Qualifications of Workers:
 - 1. The entity performing the work of this Section shall have been successfully engaged in the respective trade for at least five (5) years immediately prior to commencement of the Work.
 - 2. For actual construction operations, use only trained and experienced workers with a minimum of three (3) years experience with the materials and methods specified.
 - 3. Provide at least one person who shall be present at all times during execution of the work of this Section, with a minimum of five (5) years experience with the type of materials being installed, the referenced standards, and who shall direct all Work performed under this Section.
- C. Project/Site Conditions:
 - 1. Be familiar with site and subsurface conditions.
 - 2. Excavation is unclassified and includes excavation to sub-grade elevations indicated or necessary, regardless of character of materials and obstructions encountered.
 - 3. Provisions for mitigation of wet soils due to seepage or rain shall be made during excavation and throughout construction. If wet soils are encountered within the swimming pool excavations, de-watering shall be provided and the Geotechnical Engineer shall make recommendations for moist soil mitigation.
 - 4. Where slope instability is encountered, all excavations within those areas shall be 1:1 or flatter. Forming of vertical walls may be necessary, and all soil conditions shall be field verified by the Geotechnical Engineer.
 - 5. Contractor shall review the Geotechnical Investigation Report as furnished by the District to determine the suitability of the soils.
- D. Adverse Weather Conditions:
 - 1. During the periods when site soil moisture content is substantially in excess of moisture

- content required for optimum compaction, do not perform fill compaction.
2. When unfavorable weather conditions necessitate interrupting filling and grading operations, prepare areas by compaction of surface and grading to avoid collection of water. Provide adequate temporary drainage to prevent erosion.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. Provide submittals in conformance with requirements of Section 01 33 00. Requests for substitution shall conform to requirements of Article 1.10 of Section 13 11 00.
- B. Required submittals include:
 1. Offsite fill material, if applicable.
- C. Submit proof of qualifications as specified in Article 1.02.B of this Section.

1.04 EXCAVATING & TRENCHING, GENERAL REQUIREMENTS

- A. Refer to Section 01 50 00, Temporary Facilities and Controls.
- B. All trenches, holes, etc. are to be completely protected using solid barricades, steel plates, and plywood both during construction and during off hours, including night time.
- C. Flashing warning light barricades are required on sidewalks, roads, and any other critical areas that require night time protection.
- D. Roads, paths and sidewalks shall not be blocked at any time or in any way. Trenching across roads, paths or sidewalks involves special instructions and review of the construction procedure by the District at least three (3) days prior to the Work actually being started.
- E. Construction equipment, including all trucks, cars, etc. shall not be parked or driven on roads, paths or sidewalks. Items not allowed on roads, paths or sidewalks include hoses, power cords, ropes, construction materials, dirt and debris, etc.
- F. All roads, paths and sidewalks must remain clear and the Contractor shall maintain temporary safe and effective pedestrian access at all times.
- G. Drawings show existing major underground utilities using the best information available. The Contractor shall also fully check public works reference drawings prior to excavation. Call local Dig Alert to locate utilities to ensure safety.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Fill Material, General: All material shall be subject to the review of the Geotechnical Engineer to determine acceptability.
- B. On-site soils are considered suitable for use in engineered fill construction, if they do not contain significant concentrations of organic materials, rubble debris, or particles greater than three inches in maximum dimension. However, the native untreated clayey soils are not considered suitable for use within 12 inches of exterior slab-on-grade subgrade elevation. Imported fill materials, if

required shall be granular materials with a Plasticity Index of 15 or less; an expansion index of 20 or less; an organic content less than four percent; do not contain particles greater than three inches in maximum dimension, and be within a compactable moisture content.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify drawing dimensions and elevations with actual field conditions. Inspect related Work and adjacent surfaces and report discrepancies and conditions which prevent proper execution of the Work to the District's Representative.

3.02 SUBGRADE IMPROVEMENTS

- A. Clearing: Strip site area (as defined within the Drawings) of any topsoil containing vegetation, trees and roots, organic matter, and other debris, and dispose of as specified.
- B. Following the site clearing operations, surfaces to receive fill and at-grade areas to receive improvements shall be scarified to a depth of at least 12 inches, moisture conditioned to at least two percent above the optimum moisture content, and compacted to at least 90 percent relative compaction. Relative compaction shall be based on the maximum dry density as determined in accordance with the ASTM D 1557 Test Method.
- C. The upper 12 inches of final subgrade for the pool decks shall consist of imported compactable, non-expansive (Expansion Index < 20) granular soils. All soils supporting exterior slab-on-grade concrete shall be uniformly compacted to 90 percent of the ASTM D 1557 maximum dry density.
- D. Compaction of the soil subgrade shall be achieved using a heavy, self-propelled, sheepfoot compactor and must be performed in the presence of the Geotechnical Engineer's Representative who will evaluate the performance of the subgrade under the compaction loads, and identify loose or unstable soil conditions that could require additional excavation. Loose, soft or saturated soil deposits encountered below the depth of scarification during compaction operations shall be removed to expose firm undisturbed soils as identified by the Geotechnical Engineer's Representative and backfilled with engineered fill as recommended in the is report. Difficulty in achieving subgrade compaction or unusual soil instability may be indication so loose soils associated with past subsurface items. Should these conditions exist, the materials shall be excavated to check for subsurface structures and the excavations backfilled with engineered fill.
- E. Engineered fill should be placed in lifts not exceeding six inches in compacted thickness with each lift being uniformly moisture conditioned to at least the optimum moisture content and compacted to not less than 90 percent of the maximum dry density per ASTM D 1557.
- F. Soils exposed following swimming pool wall excavations shall be maintained in a moist condition until the construction of the pool walls. The intent of this recommendation is to reduce the potential of desiccation cracking within clay soil behind the pool walls.

3.03 EXCAVATION

- A. Checking Layout: Contractor shall, before commencing the excavation work, check all lines, stakes and levels for dimensions, angles, elevations and grades with the survey.

- B. Dimensions: Excavate to proper dimensions as shown, cut square and smooth with firm level bottoms. Prepared excavations shall be approved by Geotechnical Engineer. Excavations shall be free of loose or disturbed materials.
- C. Excess Water Control: Keep all excavations free from standing water by pumping, draining or providing proper protection against water intrusion. If soil becomes soft, soggy or saturated, perform additional excavation to firm soil not affected by water.
- D. Form Removal: Make all excavations of sufficient size to permit installation and removal of forms and all other required work.
- E. Alternate Forming: Sides of structures may be formed by neat excavations where banks will stand without caving. If banks cave, provide forming as required and widen excavation to permit forming, bracing and inspection. Provide forming in conformance with Section 13 11 02 and all recognized safety standards. Form all grade beams.

3.04 BACKFILLING

- A. Method: After concrete has been placed, forms removed and concrete work approved, backfill the excavations with earth to indicated or required grades. Carry on backfilling simultaneously on each side of walls or grade beams. Remove all rubbish and wood from the excavations before placing backfill.
- B. Concrete Protection: Prior to placing any backfill, adequately cure all concrete and provide any bracing required to ensure the stability of the structure. Protect waterproofing and dampproofing against damage in a manner acceptable to the District's Representative. Remove bracing as backfill operations progress.
- C. The on-site granitic bedrock may be utilized for trench backfill once it is processed. The on-site lean and fat clay should not be used for trench backfill. Imported fill should be free of organic material and rocks over 2 ½ inches in diameter.
- D. Backfill of all trenches should be placed in thin lifts and mechanically compacted to achieve a relative compaction of not less than 95 percent in paved areas and 90 percent in other areas per ASTM 1557. Care should be taken not to damage utility lines.
- E. Moisture: Rigidly control the amount of water used to insure optimum moisture conditions for the type of fill material used. Excessive amounts of water causing saturation of earth will not be permitted. Compaction by flooding or jetting is prohibited.

3.05 GRADING

- A. Slopes: Grade to finish grades indicated on Drawings, with uniform slopes between all points.
- B. Subgrades: Blade to required grade and roll or tamp subgrades for exterior slabs, decks and paving.

3.06 CLEAN-UP

- A. Disposal: Haul away rubbish, debris, and rocks from site promptly and dispose of legally. Burning rubbish on site is prohibited.

- B. Dust and Noise Abatement: During entire period of construction keep area and material being loaded sprinkled to reduce dust in air and annoyance to premises and surrounding property.

END OF SECTION

SECTION 13 11 02

SWIMMING POOL CONCRETE

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Forming for cast-in-place concrete and shotcrete associated with swimming pools and pool decks.
- B. Reinforcement for cast-in-place concrete and shotcrete associated with swimming pools and pool decks.
- C. Cast-in-place concrete for swimming pool structures. Do not use waterproofing admixture of any kind.
- D. Cast-in-place concrete for swimming pool decks with Xypex C-500 crystalline waterproofing admixture. Waterproofing admixture for swimming pool decks only.
- E. Provide labor, materials and equipment as required to install sealant for all pool deck expansion joints, or any other caulking, as indicated on the aquatic Drawings and herein specified.

1.02 QUALITY ASSURANCE

- A. Qualifications of Workers:
 - 1. The entity performing the work of this Section shall have been successfully engaged in the respective trade for at least five (5) years immediately prior to commencement of the Work.
 - 2. For actual construction operations, use only trained and experienced workers with a minimum of three (3) years experience with the materials and methods specified.
 - 3. Provide at least one person who shall be present at all times during execution of the work of this Section, with a minimum of five (5) years experience with the type of materials being installed, the referenced standards, and who shall direct all Work performed under this Section.
- B. Standards:
 - 1. In addition to complying with the California Building Code (latest edition), comply with all pertinent recommendations contained in "Recommended Practice for Concrete Formwork," Publication ACI 347-78 of the American Concrete Institute.
 - 2. In addition to complying with California Building Code (latest edition), comply with all pertinent recommendations contained in "Manual of Standard Practice for Detailing Reinforced Concrete Structures," Publication ACI 315-74 of the American Concrete Institute.
 - 3. In addition to complying with all local codes and regulations, comply with all pertinent recommendations contained in American Society for Testing and materials (ASTM); ASTM C 920 "Standard Specification for Elastometric Joint Sealants."
- C. Tolerances: Construct all swimming pool concrete straight, true, plumb and square within a tolerance horizontally of one in 200 and vertically of one in 2000.

1.03 SUBMITTAL AND SUBSTITUTIONS

- A. Provide submittals in conformance with the requirements of Section 01 33 00. Requests for

substitution shall conform to requirements of Article 1.10.A of Section 13 11 00.

- B. Samples and Certificates, Concrete Reinforcement:
 - 1. Provide all data and access required for testing as described in Section 01 45 00 of the Specifications.
 - 2. All material shall bear mill tags with heat number identification. Mill analysis and report shall be made available upon request.
 - 3. Material not so labeled and identifiable may be required by the District to be tested by the testing laboratory selected by the District and at no additional cost to the District, in which case random samples will be taken for one series of tests from each 2-1/2 tons or fraction thereof of each size and kind of reinforcing steel.
 - 4. Design mix from batch plant demonstrating previous use history and associated strengths at 28 days.
 - 5. The Contractor shall submit a mix design stamped and signed by a licensed engineer for approval by the District's Representative prior to any placement of concrete.
 - 6. The Contractor shall submit a separate mix design stamped and signed by a licensed engineer for the swimming pool decks which contains the specified Xypex C-500 crystalline waterproofing admixture for approval by the District's Representative prior to any placement of concrete.
- C. Submit proof of qualifications as specified in Article 1.02.A of this Section.
- D. Submit reinforcing shop drawings for pool walls, gutters, floors, dike walls and balance tank, etc. as shown on the construction drawing.

1.04 PRODUCT HANDLING

- A. Delivery: Deliver materials to the Project Site in the manufacturer's original unopened containers with all labels intact and legible.
- B. Storage: Store materials under cover in a manner to prevent damage and contamination, and store only the specified materials at the Project Site.
- C. Protection: Use all means necessary to protect the swimming pool concrete before, during, and after installation and to protect the installed Work specified in other Sections.
- D. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the District.

PART 2 PRODUCTS

2.01 CONCRETE FORMWORK

- A. Form Materials:
 - 1. Form Lumber: All form lumber in contact with exposed concrete shall be new except as allowed for reuse of forms in Part 3 of this Section, and all form lumber shall be one of the following, a combination thereof, or an equal approved in advance by the District's Representative.
 - a. "Plyform," Class I or II, bearing the label of the Douglas Fir Plywood Association; "Inner-Seal" Form as manufactured by Louisiana-Pacific, or approved equal.
 - b. Douglas Fir-Larch, number two grade, seasoned, surfaced four sides.
 - 2. Form Release Agent: Colorless, non-staining, free from oils; chemically reactive agent that

shall not impair bonding of paint or other coatings intended for use.

- B. Ties and Spreaders:
 - 1. Type: All form ties shall be a type which do not leave an open hole through the concrete and which permits neat and solid patching at every hole.
 - 2. Design: When forms are removed, all metal reinforcement shall be not less than two (2) inches from the finished concrete surface.
 - 3. Wire Ties and Wood Spreaders: Do not use wire ties or wood spreaders.
- C. Alternate Forming Systems: Alternate forming systems may be used subject to the advance approval of the District's Representative.

2.02 CONCRETE REINFORCEMENT

- A. Bars: Bars for reinforcement shall conform to "Specifications for Deformed Billet-Steel Bars for Concrete Reinforcement," ASTM A-615, Grade 60.
- B. Wire Fabric: Wire fabric shall conform to "Specifications for Wire Fabric for Concrete Reinforcement," ASTM A-185.
- C. Tie Wire: Tie wire for reinforcement shall conform to "Specifications for Cold-drawn Steel Wire for Concrete Reinforcement," ASTM A-82 black annealed 16-gauge tie wire.

2.03 CAST-IN-PLACE CONCRETE

- A. Concrete:
 - 1. All concrete, unless otherwise specifically permitted by the District's Representative, shall be transit-mixed in accordance with ASTM C94. Concrete for water retaining structures that do not receive a waterproofing finish such as ceramic tile or swimming pool plaster shall receive a topical waterproofing finish.
 - 2. The control of concrete production shall be under the supervision of a recognized testing agency, selected by the District in accordance with Section 01 25 00 of the Specifications.
 - 3. Quality: All concrete shall have the following minimum compressive strengths at twenty-eight (28) days and shall be proportioned within the following limits:
 - a. 3,000 psi minimum compressive strength for cast-in-place concrete swimming pool structures.
 - b. 4,000 psi minimum compressive strength for cast-in-place swimming pool decks with Xypex C-500 waterproofing admixture.
 - c. 1" maximum size aggregate.
 - d. 6.0 minimum sacks of cement per cubic yard.*
 - e. Maximum water to cement ratio of 0.55.
 - f. 4" maximum slump.
 - g. Xypex Admix C-500 2% - 2.5% by weight of cement content. Contact Xypex Technical Services to confirm dosage. (To be used for swimming pool decks only.)
 - * For estimate only: to be determined by mix design.
 - 4. Cement: All cement shall be Portland Cement conforming to ASTM C-150, Type II or V and shall be the product of one manufacturer.
 - 5. Aggregates:
 - a. Shall conform to "Standard Specifications for Concrete Aggregates," ASTM C33, except as modified herein.
 - b. Coarse Aggregate: Clean sound washed gravel or crushed rock. Crushing may

- constitute not more than 30% of the total coarse aggregate volume. Not more than 5% flat, thin, elongated or laminated material nor more than 1% deleterious material shall be present. 1" aggregate graded from 1/4" to 1", fineness modulus 6.90 to 7.40. 1-1/2" graded from 1/2" to 1-1/2", fineness modulus 7.80 to 8.20.
- c. Fine Aggregate: Washed natural sand of hard, strong particles and shall contain not more than 1% of deleterious material, fineness modulus 2.65 to 3.05.
 - d. Aggregate must be certified, non-expansive from a "known" good source.
6. Water: Clean, fresh, free from acid, alkali, organic matter or other impurities liable to be detrimental to the concrete (potable).
 7. Admixtures: Admixtures shall be used upon approval of the District's Representative.
 - a. Air-entraining admixture: Conform to ASTM C260.
 - b. Water-reducing admixture: Conform to ASTM C494.
 - c. aterproofing admixture for swimming pool decks only: Xypex Admix C-500, No substitutions permitted. Conform to ASTM C494.
 8. Xypex Admix C-500 Dosage: To be used for swimming pool decks only.
 - a. General: Xypex Admix must be added to concrete mix at time of batching. It is important to obtain a homogeneous mixture of Xypex Admix with the concrete. Do not add dry Admix powder directly to wet mixed concrete as this could cause clumping and thorough dispersion may not occur.
 - b. Dosage Rate: Under normal conditions, the crystalline waterproofing powder shall be added to the concrete mix at the following rates:
 - 1.) Xypex Admix C-500 2% – 2.5% by weight of cement content
 - c. Weather Conditions: For mixing, transporting and placing concrete under conditions of high temperature or low temperature, follow concrete practices such as those referred to in ACI 305R (Hot Weather Concreting) and ACI 306R (Cold Weather Concreting) or other applicable standards.
 - d. Concrete Batching & Mixing Procedures: Procedures for the addition of Xypex admixture will vary according to type of batch plant operation and equipment. Prior to the placement of any concrete, the concrete batch plant and the contractor shall be responsible to consult with the local Xypex representative concerning additional procedures for the addition, mixing and to confirm dosage.
Note: For enhanced chemical protection or for meeting specific project requirements or where the concrete mix design contains higher than 25% type F fly ash content or includes a portland cement/slag cement/type C fly ash blend, consult with manufacturer or its authorized representative to determine appropriate dosage rates.
- B. Construction Joints: Use keyform for slab pour joints. Either preformed galvanized or PVC construction joint forms of a standard manufacturer may be used. Install per manufacturer's recommendations and tool edges of slabs.
 - C. Waterstops: PVC bulb-type for use between concrete pours / lifts, conforming with ASTM D 570, D 624, and D 638. Provide in configuration(s) as recommended by manufacturer for specific application. Greenstreak, W.R. Meadows, or approved equal.
 - D. Curing Materials:
 1. Liquid Membrane (covered slab): Chlorinated rubber membrane forming, curing-sealing compound conforming to ASTM C309.
 2. Liquid Membrane (exposed slab): Clear methyl and butyl methacrylate non-staining, membrane forming, curing-sealing compound conforming to ASTM C309.

- E. Cement Grout and Drypack:
 - 1. Cement Grout: Mix 1 part by volume of Portland Cement, 1/2 part by volume of water and fine aggregate enough to make mixture flow under its' own weight.
 - 2. Drypack: Mix 1 part by volume of Portland Cement, 1/2 part by volume of water and fine aggregate enough to make a stiff mix that will mold into a ball. Mix no more than can be used in 30 minutes.

2.04 JOINT SEALANT MATERIALS

- A. Caulking: Multipart, non-sag gun grade polyurethane based sealant meeting the requirements of ASTM C920-02, Type S or M, Mamemco International, Pecora, Sika Corp., Sonneborn Building Products, Tremco or approved equal. Self leveling caulking materials are not allowed.
- B. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- C. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- D. Sealant Backer Rod: Provide compressible polyethylene or polyurethane backer rod as recommended by the sealant manufacturer.
- E. Bond Breaker Tape: Provide polyethylene tape or other plastic tape as recommended by sealant manufacturer, to be applied to sealant-contact surfaces where bond to substrate or joint filler must be avoided for proper performance of sealant.
- F. Sand: Cover the surface of the caulking with #30 silica sand.

2.05 OTHER MATERIALS

- A. All other materials, not specifically described but required for proper completion of the work of this Section, shall be as selected by the Contractor subject to the advance review by the District's Representative.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

- A. Inspection:
 - 1. Prior to all Work of this Section, carefully inspect the installed Work of other trades and verify that all such Work is complete to the point where this installation may properly commence.
 - 2. Verify that all Work may be constructed in accordance with all applicable codes and regulations, the referenced standards, the original design, and in accordance with site specific Geotechnical Report.
- B. Discrepancies:
 - 1. In the event of discrepancy, immediately notify the District's Representative.
 - 2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.
 - 3. Failure to notify the District's Representative and give written notice of discrepancies shall

constitute acceptance by the Contractor of existing conditions as fit and proper to receive work.

3.02 CONCRETE FORMWORK

- A. Construction of Forms:
1. General: Construct all required forms to be substantial, sufficiently tight to prevent leakage of concrete paste, and able to withstand excessive deflection when filled with wet concrete.
 2. Layout:
 - a. Form for all required cast-in-place concrete to the shapes, sizes, lines and dimensions indicated on the Drawings.
 - b. Exercise particular care in the layout of forms to avoid necessity for cutting concrete after placement.
 - c. Make proper provisions for all openings, offsets, recesses, anchorages, blocking and other features of the Work as shown or required.
 - d. Perform all forming required for Work of other trades and do all cutting and repairing of forms required to permit such installation.
 - e. Carefully examine the Drawings and Specifications and consult with other trades as required relative to providing for pipe and conduit penetrations, reglets, chases and other items in the forms.
 3. Imbedded Items: Set all required steel frames, angles, bolts, inserts and other such items required to be anchored in the concrete prior to concrete being placed.
 4. Bracings:
 - a. Properly brace and tie the forms together so as to maintain position and shape and to ensure safety to workmen.
 - b. Construct all bracing, supporting members and centering of ample size and strength to safely carry, without excessive deflection, all dead and live loads to which they may be subjected.
 - c. Properly space the forms apart and securely tie them together, using metal spreader ties that give positive tying and accurate spreading.
 5. Wetting: Keep forms sufficiently wetted to prevent joints from opening up before concrete is placed.
- B. Plywood Forms:
1. Design: Nail the plywood panels directly to studs and apply in a manner to minimize the number of joints.
 2. Joints: Make all panel joints tight butt joints with all edges true and square.
- C. Footing Forms:
1. Wood Forms: All footing forms shall be wood unless otherwise specifically approved by the District's Representative, or as specified in paragraph 3.02(C)(2).
 2. Earth Forms:
 - a. Side walls for footings may be of earth provided the soil will stand without caving and the sides of the bank are made with a neat cut to the minimum dimensions indicated on the Drawings.
 - b. For excavation and backfill of earth forms, conform with applicable provisions of Section 13 11 01.
- D. Reuse of Forms:
1. Reuse of forms shall be subject to advance approval of the District's Representative.

2. Except as specifically approved in advance by the District's Representative, reuse of forms shall in no way delay or change the schedule for placement of concrete from the schedule obtainable if all forms were new.
 3. Except as specifically approved in advance by the District's Representative, reuse of forms shall in no way impart less structural stability to the forms nor less acceptable appearance to finished concrete.
- E. Removal of Forms:
1. General:
 - a. In general, side forms of footings may be removed seven (7) days after placement of concrete, but time may be extended if deemed necessary by the District's Representative.
 - b. Forms for footings, foundations, grade beams, slabs, walls, and other formed concrete may be removed fourteen (14) days after placement of concrete.
 2. Removal:
 - a. Use all means necessary to protect workers, passersby, the installed Work of other trades and the complete safety of the structure.
 - b. Cut nails and tie wires or form ties off flush, and leave all surfaces smooth and clean.
 - c. Remove metal spreader ties on exposed concrete by removing or snapping off inside the wall surface and pointing up and rubbing the resulting pockets to match the surrounding areas.
 - d. Flush all holes resulting from the use of spreader ties and sleeve nuts using water, and then solidly pack throughout the wall thickness with cement grout applied under pressure by means of a grouting gun; grout shall be one part Portland Cement to 2-1/2 parts sand; apply grout immediately after removing forms.

3.03 CONCRETE REINFORCEMENT

- A. Bending:
1. General:
 - a. Fabricate all reinforcement in strict accordance with the Drawings.
 - b. Do not use bars with kinks or bends not shown on the Drawings.
 - c. Do not bend or straighten steel in a manner that will injure the material. (When opposite end is already encased in concrete.)
 2. Design:
 - a. Bend all bars cold.
 - b. Make bends for stirrups and ties around a pin having a diameter of not less than two (2) times the minimum thickness of the bar.
 - c. Make bends for other bars, including hooks, around a pin having a diameter of not less than six (6) times the minimum thickness of the bar.
- B. Placing:
1. General: Before the start of concrete placement, accurately place all concrete reinforcement, positively securing and supporting by concrete blocks, metal chairs or spacers, or by metal hangers.
 2. Clearance:
 - a. Preserve clear space between bars of not less than one and one-half (1-1/2) times the nominal diameter of the round bars.
 - b. In no case let the clear space be less than one and one-half (1-1/2) inches nor less than one and one-third (1-1/3) times the maximum size of the aggregate.

- c. Provide the following minimum concrete covering of reinforcement:
 - 1) Concrete deposited against earth: three (3) inches minimum.
 - 2) Concrete below grade deposited against forms: two (2) inches minimum.
 - 3) Concrete elsewhere: As indicated on Drawings or otherwise approved by the District's Representative.
 - 3. Splicing:
 - a. Horizontal Bars:
 - 1) Place bars in horizontal members with minimum lap at splices sufficient to develop the strength of the bars.
 - 2) Bars may be wired together at laps except at points of support of the member, at which points preserve clear space described above.
 - 3) Whenever possible, stagger the splices of adjacent bars.
 - 4) Splice forty (40) bar diameters minimum.
 - 5) Provide non-contact lap slices for shotcrete.
 - b. Wire Fabric: Make all splices in wire fabric at least one and one-half (1-1/2) meshes wide.
 - c. Other Splices: Make only those other splices that are indicated on the Drawings or specifically approved by the District's Representative.
 - 4. Dowels: Place all required steel dowels and securely anchor them into position before concrete is placed.
 - 5. Obstructions: In the event conduits, piping, inserts, sleeves and other items interfere with placing reinforcement as indicated on the Drawings or otherwise required, immediately consult with the District's Representative and obtain approval of a new procedure prior to placing concrete.
- C. Cleaning Reinforcement: Steel reinforcement, at the time concrete is placed around it, shall be free from rust scale, loose mill scale, oil, paint and all other coatings which will destroy or reduce the bond between steel and concrete. Bend down all tie wire away from the top of the pool deck. Maintain a 2" clear from top of concrete to the tie wire.

3.04 SHOTCRETE REINFORCEMENT

- A. The maximum size of reinforcement shall be No. 5 bars unless it can be demonstrated by preconstruction tests that adequate encasement of larger bars can be achieved. When No. 5 or smaller bars are used, there shall be a minimum clearance between parallel reinforcement bars of 2-1/2 inches (64 mm). When bars larger than No. 5 are permitted, there shall be a minimum clearance between parallel bars equal to six diameters of the bars used. When two curtains of steel are provided, the curtain nearest the nozzle shall have a minimum spacing equal to 12 bar diameters and the remaining curtain shall have a minimum spacing of six bar diameters.
- B. Lap splices in reinforcing bars shall be by the non-contact lap splice method with at least 2 inches clearance between bars. The enforcement agency may permit the use of contact lap splices when necessary for the support of the reinforcing provided it can be demonstrated by means of preconstruction testing, that adequate encasement of the bars at the splice can be achieved, and provided that the splices are placed so that a line through the center of the two spliced bars is perpendicular to the surface of the shotcrete work.

3.05 CAST-IN-PLACE CONCRETE

- A. Conveying and Placing Concrete:
 - 1. Before placing concrete, mixing and conveying equipment shall be well cleaned, and the

- forms and space to be occupied by concrete shall be thoroughly cleaned and wetted. Ground water shall be removed until the completion of the work.
2. No concrete shall be placed in any unit of work until all formwork has been completely constructed, all reinforcement has been secured in place, all items to be built into concrete are in place, and form ties at construction joints tightened.
 3. Concrete shall be conveyed from mixer to place of final deposit in such a way to prevent the separation or loss of ingredients. It shall be placed as nearly as practicable in its' final position to avoid rehandling or flowing. Concrete shall not be dropped freely where reinforcing bars will cause segregation, nor shall it be dropped freely more than six (6) feet. Use tremies, spouts and dump boxes in deep sections. Vibrators are not acceptable for facilitating concrete transport.
 4. Concrete shall be tamped and spaded to insure proper compaction into all parts of forms and around reinforcement. A mechanical vibrator shall be used to thoroughly compact the concrete. Vibration must be by direct action in the concrete and not against forms or reinforcement.
 5. Mixing and transport time as indicated in ASTM C94 is required. If air temperatures are between 85° and 90° F the delivery time is to be reduced to 75 minutes. When air temperatures is in excess of 90° F the delivery time should be reduced to 60 minutes.
 6. Truck mixes without batch certificates will be rejected.
- B. Construction Joints / Expansion Joints: Construction joints and expansion joints shall be provided at locations and in the manner shown on the Drawings. With exception of existing concrete / new shotcrete joints, use PVC bulb-type waterstops appropriate for design condition between all concrete pours / lifts to avoid cold joints. Waterstops shall be placed in such a way to protect reinforcing steel from rust and oxidation. All expansion joints must be the full depth of the concrete section in which they are located.
- C. Slab Finishes: Concrete slabs shall be compacted and screeded uniformly to grades shown. Push large aggregates below the surface with a screen tamper, screed and bull float. As soon as the surface becomes workable, it shall be wood floated, then finished as indicated on the Drawings to a uniform smooth, true surface in a neat and workmanlike manner. Carefully coordinate slab finish requirements with other trades (ceramic tile, pool plaster) to ensure concrete finish is appropriate substrate for final finish material.
1. Contractor shall provide three mock-up deck samples, minimum 3'x 3', with a wedge anchor installed in one sample. These (3) samples shall be constructed; one with a light broom finish, one (1) with a medium broom finish and one (1) with a heavy broom finish for determination and selection of an appropriate deck finish. Each sample shall be edged on all four sides to demonstrate a 3/4" radius edge. Anchor installation shall demonstrate acceptable interface between anchor and the top of deck. Deck samples shall remain on job site through final inspection for reference.
 2. Pool Floor Slab: Heavy Wire Broom Finish.
- D. Protection and Curing:
1. Concrete shall be protected from injurious action of the elements and defacement of any nature during construction.
 2. All forms must be kept wet to prevent drying out of the concrete.
 3. All concrete surfaces including footings must be kept wet for at least seven (7) days after concrete is placed.
 4. Apply the appropriate curing materials, as specified in 2.03 of this Section, immediately after finishing slabs. Application shall be as specified by the manufacturer.

- E. Form Removal:
 - 1. Take care in removing forms so that surfaces are not marred or gouged and that corners are true, sharp and unbroken.
 - 2. No steel spreaders, ties or other metal shall project from or be visible on any concrete surfaces.

- F. Defective Work:
 - 1. Should the strength of any concrete for any portion of the work indicated by tests 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.
 - 2. Concrete work that is not formed as indicated, is not true to intended alignment, not plumb or level where so intended, not true to intended grades or elevations, not true to specified or selected finish, contains sawdust shavings, wood, or embedded debris, which exhibits cracks or contains fine or coarse sulfide particles, or expansive aggregates detrimental to performance or appearance of the concrete shall be deemed defective.
 - 3. Promptly perform work required to replace and properly clean (by sandblasting if necessary) any defective concrete panels (control joint or expansion joint to control joint or expansion joint), at Contractor's expense, including all expense of additional inspection, tests, or supervision made necessary as a result of defective concrete.

3.06 EXPANSION JOINTS

- A. Temperatures: Do not install sealants when air temperature is less than 40°F.

- B. Tooling: Tool exposed joints to a slightly concave surface using slicking materials recommended by the manufacturer. The tooling procedure shall press sealant against the sides of the joint. No materials shall be left "feathered" out or smeared on the abutting materials. Completed joints shall have a uniform professional appearance.

- C. Joint Construction: Sealant joint width, thickness and cross-sectional profile to be constructed in strict accordance with the sealant manufacturer's recommendations.

- D. Sand: At the appropriate time cover the sealant with sand to provide a sanded finish.

3.07 CLEAN-UP

- A. Upon completion of the Work of this Section, immediately remove all swimming pool concrete materials, debris and rubbish occasioned by this Work to the approval of the District's Representative.

END OF SECTION

SECTION 13 11 03

SWIMMING POOL SHOTCRETE

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide labor, materials and equipment as required to install wet mix shotcrete for swimming pool structures as indicated on the Drawings and herein specified.

1.02 QUALITY ASSURANCE

- A. Qualifications of Workers:
 - 1. The entity performing the work of this Section shall have been successfully engaged in the respective trade for at least five (5) years immediately prior to commencement of the Work.
 - 2. For actual construction operations, use only trained and experienced workers with a minimum of three (3) years experience with the materials and methods specified.
 - 3. Provide at least one person who shall be present at all times during execution of the work of this Section, with a minimum of five (5) years experience with the type of materials being installed, the referenced standards, and who shall direct all Work performed under this Section.
- B. Standards: Except as otherwise indicated, provide shotcrete per American Concrete Institute Standard ACI 506. In addition, conform to recommendations contained in "Shotcrete," Brochure G-84 as published by the Guniting Contractors Association, Sylmar, California and the California Building Code (latest edition).
- C. Mix Design: The Contractor shall submit a mix design stamped and signed by a licensed engineer for approval by the District's Representative prior to any placement of shotcrete. Mix design shall indicate source of aggregate and brands of cement and admixtures used. All mix designs shall take character of locally available aggregate into consideration and make adjustments as necessary to conform with specified design criteria.
- D. Testing and Inspection: One test panel shall be provided for each 50 yards (or portion thereof) of shotcrete placed. The size of the strength test panel shall be per the direction of the Special Shotcrete Inspector. At least three (3) cores shall be taken from each test panel. (At least three (3) cores shall be taken from the completed work for each day of shotcrete operation.) Testing shall be performed by the District's designated Testing Lab and comply with Section 1705A.3 and 1908A.10, California Building Code. Continuous inspection of the shotcrete operation by a deputy inspector provided by the District shall be required. Inspection of shotcrete work shall comply with Section 1908A of California Building Code, and coring, sampling, soaking and testing per 1908A.10 and preconstruction test per 1908A.5 is required. Contractor shall provide test panels for all required tests.
- E. Tolerances: Construct all swimming pool shotcrete straight, true, plumb and square within a tolerance horizontally of one in 200 and a tolerance vertically of one in 2000.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. Provide submittals in conformance with the requirements of Section 01 33 00. Requests for substitution shall conform with requirements of Article 1.10 of Section 13 11 00.
- B. Materials List: Within thirty (30) days after issuance of Notice to Proceed, and before shotcrete materials are delivered to the project site, submit to the District a complete list of materials proposed to be used in this portion of the Work, showing manufacturer's name and catalog number

of all items such as admixtures and curing membranes, and the name and address of the supplier of cement and aggregate to be used.

- C. Submit proof of qualifications as specified in Article 1.02.A of this Section.

1.04 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect shotcrete materials before, during and after installation and to protect the installed Work specified in other Sections.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the District and at no additional cost to the District.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cement: Cement shall be Type II Portland Cement conforming to ASTM C150. Cement type shall be the same for all shotcrete work.
- B. Aggregate: ASTM C33, washed hard dense durable clean sharp sand from approved pit, free of organic matter and opaline, feldspar, or silicious magnesium substances and containing not more than 3% by weight of deleterious substances. When tested for organic impurities by ASTM C40 method, fine aggregate color not darker than reference standard color. When tested for soundness by ASTM C88 method, loss after 5 cycles not over 10% of fine aggregate.
- C. Water: Potable, clean, fresh, free from acid, alkali, organic matter or other impurities liable to be detrimental to the shotcrete.
- D. Admixtures: Admixtures shall only be used upon approval of the District's Representative.

PART 3 EXECUTION

3.01 EXECUTION

- A. Inspection:
 - 1. Prior to all Work of this Section carefully inspect the installed Work of other trades and verify that all such Work is complete to the point where this installation may properly commence.
 - 2. Verify that items to be imbedded in shotcrete are in place and that shotcrete may be placed to the lines and elevations shown on the Drawings, with all required clearance from reinforcement.
- B. Discrepancies:
 - 1. In the event of discrepancy, immediately notify the District's Representative.
 - 2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.
 - 3. Failure to notify the District's Representative and give written notice of discrepancies shall constitute acceptance by the Contractor of existing conditions as fit and proper to receive the Work.

3.02 PREPARATION

- A. General:
 - 1. Thoroughly clean all areas where shotcrete is to be placed to insure proper bonding of shotcrete.

2. Where shotcrete is to be placed against smooth surfaces (i.e., cast-in-place concrete), sandblast surfaces to receive shotcrete to provide clean aggregate surface, thereby insuring proper bond between materials.
- B. Ground Wires: Adequate ground wires, to be used as screeds, shall be installed to establish the thickness and surface planes of the shotcrete work. Ground wires shall be placed so that they are tight and true to line and grade and in such a manner that they can be easily tightened.

3.03 PROPORTIONING AND MIXING

- A. Accurately control proportion of water to Portland cement to produce thorough and uniform hydration of the shotcrete that, when shot, forms a homogeneous mass containing neither sags nor dry sand formation.
- B. Strength: Minimum 3,000 psi 28-day compressive strength unless otherwise indicated.
- C. Discontinue shotcrete work if the time between the addition of mixing water to cement and aggregate, or cement to aggregates, and placement of shotcrete exceeds ninety (90) minutes when the ambient temperature is below 85 degrees Fahrenheit, or exceeds sixty (60) minutes when the ambient temperature is above 85 degrees Fahrenheit.

3.04 SHOTCRETE PLACING, FINISHING, AND CURING

- A. Operations: Utilize a standard type of air compressor, capable of providing a minimum of 250 cubic feet of air per minute per nozzle.
- B. Placing: Except when shooting reinforcing, hold the nozzle perpendicular to and 2-1/2 to 3 feet from surface. At reinforcing bars, hold the nozzle so as to direct shotcrete behind the bars, and shoot each side of each bars separately. A nozzleman's helper equipped with an air jet shall precede the nozzle and blow out rebound or sand lodged behind bars, on forms, or placed shotcrete. Placing shotcrete horizontal members from the top is not allowed unless approved methods are employed to eliminate all rebound. Material shall emerge from the nozzle in a uniform flow. If flow becomes intermittent for any reason, direct the nozzle away from the surface until the flow is again steady and constant. Do not reuse rebound or loose sand for any purpose.
- C. Puddled Shotcrete: Use of "puddled shotcrete" in which the air pressure is reduced and the water content is increased to facilitate placing in difficult locations is not allowed. Do not place shotcrete where nozzle stream cannot impinge directly on the involved surface. Where difficult shooting conditions occur, obtain proper results by maintaining correct air pressure and water ratio and reduce supply of material.
- D. Construction Joints: Form joints with sloping beveled edges. Clean and dampen the hardened joint surfaces before placing additional shotcrete. Square edged construction joints are not allowed. The film of laitance which forms on the surface of the shotcrete shall be removed within approximately two hours after application by brushing with a stiff broom. If this film is not removed within two hours, it shall be removed by thorough wire brushing or sand blasting. Construction joints over eight hours old shall be thoroughly cleaned with air and water prior to receiving shotcrete.
- E. Finishing: Rod exposed surfaces to true planes and lines on reaching the thickness and plane established by forms and ground wires. Tamp and wood float surfaces level and provide a rough raked finish. Carefully coordinate finish requirements with other trades (ceramic tile, pool plaster) to ensure shotcrete finish is appropriate substrate for final finish material.
- F. Curing: Keep shotcrete continuously damp for not less than seven (7) days after placing. Use sealed curing sheeting or other approved curing method where water curing is not feasible. Do not use curing compound of any kind.

3.05 DEFECTIVE WORK

- A. Cut out, remove and replace, or repair to the satisfaction of the District's Representative, shotcrete not meeting minimum strength, not true, plumb or level, not to required elevations, containing cracks detrimental to performance or appearance, containing shavings, debris or with honeycombs or voids.
- B. Promptly perform Work required to repair, patch, replace, render properly cleaned surfaces (by sandblasting if necessary) or otherwise make good any defective shotcrete at Contractor's expense, including all expense of additional inspection, tests, or supervision made necessary as a result of defective shotcrete.

3.06 CLEAN-UP

- A. Upon completion of the Work of this Section, immediately remove all swimming pool shotcrete materials, debris and rubbish occasioned by this work to the approval of the District's Representative.

END OF SECTION

SECTION 13 11 04

SWIMMING POOL CERAMIC TILE

PART 1 – GENERAL

1.01 WORK INCLUDED

- A. Swimming pool ceramic tile detailed on the Drawings, including, but not limited to, the following:
 - 1. Waterline Face Tile. (Deep Gutter Pool)
 - 2. Gutter Cap Tile. (Deep Gutter Pool)
 - 3. Lane Line / Target Tile / 4'-6" Depth Tile
 - 4. Depth Marker Tile. (At Cantilever Deck Face)
 - 5. Depth / Caution Marker Tile. (On Pool Deck)
 - 6. Trim Tile (at Steps.)

1.02 QUALITY ASSURANCE

- A. Qualifications of Workers:
 - 1. The entity performing the work of this Section shall have been successfully engaged in the respective trade for at least five (5) years immediately prior to commencement of the Work.
 - 2. For actual construction operations, use only trained and experienced workers with a minimum of three (3) years experience with the materials and methods specified.
 - 3. Provide at least one person who shall be present at all times during execution of the work of this Section, with a minimum of five (5) years experience with the type of materials being installed, the referenced standards, and who shall direct all Work performed under this Section.
- B. Standards: In addition to complying with all pertinent codes and regulations:
 - 1. Manufacture of all tile shall be in accordance with ANSI A-137.1.
 - 2. Install ceramic tile in accordance with the recommendations contained in the 2019 "Handbook for Ceramic Tile Installation" of the Tile Council of America, Inc.
- C. Tolerances: Install all swimming pool ceramic tile straight, true, plumb and square within a tolerance horizontally of one in 200 and a tolerance vertically of one in 500. Waterline and gutter bullnose tile shall be level to 1/8" (+/- 1/16") around entire perimeter of swimming pools.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. Provide submittals in conformance with the requirements of Section 01 33 00. Requests for substitution shall conform to requirements of Article 1.10 of Section 13 11 00.
- B. Samples: Submit samples of each color and pattern in the specified groups. Character samples can be representative for review prior to screening of actual tile.
- C. Master Grade Certificate: Prior to opening ceramic tile containers, submit a Master Grade Certificate, signed by the manufacturer of the tile used and issued when the shipment is made, stating the grade, kind of tile, identification marks for the tile containers, and the name and location of the Project.
- D. Specifications: Submit manufacturer's recommended installation specifications for the Work.

- E. Submit proof of qualifications as specified in Article 1.02.A of this Section.

1.04 PRODUCT HANDLING

- A. **Delivery:** Deliver all materials to the Project Site in the manufacturer's original unopened containers with all labels intact and legible.
- B. **Storage:** Store all materials under cover in a manner to prevent damage and contamination, and store only the specified materials at the Project site.
- C. **Protection:** Use all means necessary to protect swimming pool ceramic tile before, during and after installation and to protect the installed Work specified in other Sections.
- D. **Replacements:** In the event of damage, immediately make all repairs and replacements necessary to the approval of the District's Representative.

PART 2 – PRODUCTS

2.01 TILE

- A. **Waterline Face Tile: (Deep Gutter Pool)**
 - 1. **Material:** All waterline face tile shall be glazed ceramic tile (Group III standard) as manufactured by Dal-Tile or approved equal.
 - 2. **Size:** 6 x 6 inches.
 - 3. **Color:** Dal-Tile #D-129, 'Sky Blue'. Contact Kylee Midura kylee.midura@daltile.com (858) 344-0019.
- B. **Gutter Cap Tile: (Deep Gutter Pool)**
 - 1. **Material:** All gutter cap tile shall be glazed ceramic tile (Group III standard) as manufactured by Dal-Tile or approved equal.
 - 2. **Size:** 2-1/2 x 6 inches (#A-7250).
 - 3. **Color:** Dal-Tile #D-129, 'Sky Blue'.
- C. **Lane Line / Target / 4' - 6" Depth Tile:**
 - 1. **Material:** Group 3 quality, frost proof unglazed ceramic mosaic tile with absorption rate of less than 1% as manufactured by Dal-Tile or approved equal.
 - 2. **Size:** 1 x 1 inches.
 - 3. **Color:** Dal-Tile #D-311, 'Black' in 25-yard direction, and Dal-Tile #D023 'Galaxy Blue' at 4'-6" depth.
- D. **Depth Marker Tile (At Cantilever Deck Face):**
 - 1. **Material:** All depth marker tile shall be glazed ceramic tile as manufactured and/or distributed by Dal-Tile, Precision Tile Co., or approved equal.
 - 2. **Size:** 4-1/4 x 4-1/4 inches.
 - 3. **Color:** Dal-Tile #X-114, 'Desert Gray' with Black silk screen numbers.
- E. **Depth / Caution Marker Tile (on pool deck):**
 - 1. **Material:** Group 3 quality, frost proof unglazed ceramic mosaic tile with absorption rate of less than 1% as manufactured by Dal-Tile or approved equal.
 - 2. **Size:** 1 x 1 inches.
 - 3. **Color:** Dal-Tile #D-311, 'Black' letters and numbers on #D-014, 'Light Gray' field.
- F. **Trim Tile (on underwater steps):**

1. Material: Group 3 quality, frost proof unglazed ceramic mosaic tile with absorption rate of less than 1% as manufactured by Dal-Tile or approved equal.
2. Size: 1 x 1 inches with S-812 quarter round. Color: Dale-Tile #D-311. 'Black'.
3. Size 2 x 6 inches with integral quarter round. Color: Black, non-slip. Inlays #CPC00022.

2.02 MORTAR

- A. Sand for Mortar: Comply with requirements of fine aggregate for concrete.
- B. Cement: Type I Portland Cement, conforming to ASTM C150.
- C. Hydrated Lime: Conforming to ASTM C206 or 207, Type S.
- D. Water: From a potable source.

2.03 THIN SET MORTAR

- A. Laticrete 254 Platinum. Laticrete, Custom or equal
- B. Water from potable source.
- C. Mortar shall meet ASTM C627

2.04 GROUT

- A. All tile grout shall be waterproof grout complying with the recommendations of TCA and ANSI A118.6 (4) standards. Grout color shall be grey for dark backgrounds, white for light backgrounds (verify colors with Architect).

2.05 OTHER MATERIALS

- A. All other materials, not specifically described but required for a complete and proper installation of ceramic tile as indicated on the Drawings, shall be new, first quality of their respective kinds, and subject to the approval of the District's Representative.

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

- A. Inspection:
 1. Prior to all Work of this Section, carefully inspect the installed Work of other trades and verify that all such Work is complete to the point where this installation may properly commence.
 2. Verify that ceramic tile can be installed in accordance with the original design and all referenced standards.
- B. Discrepancies:
 1. In the event of discrepancy, immediately notify the District's Representative.
 2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.
 3. Failure to notify the District's Representative and give written notice of discrepancies shall constitute acceptance by the Contractor of existing conditions as fit and proper to receive

its Work.

3.02 INSTALLATION

A. Method:

1. Install all ceramic tile in strict accordance with installation method P601-90 of the 2019 Handbook for Ceramic Tile Installation of the Tile Council of America, Inc.
2. Be certain to install all ceramic tile perfectly level, flush, plumb, and to the finish grades and elevations indicated on the Drawings.

B. Interface:

1. Carefully establish and follow the required horizontal and vertical elevations to insure proper and adequate space for the work and materials of other trades.
2. Coordinate and cooperate as required with other trades to insure proper and adequate interface of ceramic tile Work with the Work of other trades.

3.03 GROUTING

A. Follow grout manufacturer's recommendations as to grouting procedures and precautions.

B. Remove all grout haze, observing grout manufacturer's recommendations as to use of acid and chemical cleaners.

3.04 EXTRA STOCK

A. Provide one (1) unopened box of extra tile for 2.01A, 2.01B, and 2.01C for Districts use at a future time.

3.05 CLEAN-UP

A. Upon completion of the swimming pool ceramic tile installation, thoroughly clean and polish the exposed surfaces of tile work. Completely clean work area of debris and rubbish occasioned by this Work and dispose of to the approval of the District's Representative.

END OF SECTION

SECTION 13 11 05

SWIMMING POOL PLASTER

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Swimming pool plaster and waterproofing of swimming pool structures as indicated on the Drawings and herein specified.
- B. Start-up and operation instructions to District's operations and maintenance personnel and properly balance swimming pool water chemistry until the District takes occupancy.

1.02 QUALITY ASSURANCE

- A. Qualifications of Workers:
 - 1. The entity performing the work of this Section shall have been successfully engaged in the respective trade for at least five (5) years immediately prior to commencement of the Work.
 - 2. For actual construction operations, use only trained and experienced workers with a minimum of three (3) years experience with the materials and methods specified.
 - 3. Provide at least one person who shall be present at all times during execution of the work of this Section, with a minimum of five (5) years experience with the type of materials being installed, the referenced standards, and who shall direct all Work performed under this Section.
- B. Standards: Swimming pool plaster shall conform with requirements of Chapter 31B of California Building Code, latest edition. In addition, meet requirements of applicable portions of most current edition of the "Technical Manual," National Plasterers Council, Mission Viejo, California.
- C. Start-up:
 - 1. Furnish a swimming pool water chemistry consultant, with a minimum of five (5) years experience, possessing either AFO (Aquatic Facility Operator) or CPO (Certified Pool Operator) certification(s), to supervise and properly balance swimming pool water chemistry.
 - 2. Demonstrate to the District that all systems are fully operational and that calcium hardness, total alkalinity, chlorine residual and pH levels are within specified limits.
 - 3. Standards: Furnish labor and chemicals as required to condition the water properly to the following specifications:
 - a. Calcium Hardness: 200-400 parts per million (PPM)
 - b. Total Alkalinity: 80-100 PPM, minimum
 - c. Chlorine Residual: 1 .00 to 2.00 PPM
 - d. pH Factor: 7.2 to 7.6

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. Provide submittals in conformance with the requirements of Section 01 33 00. Requests for substitution shall conform with requirements of Article 1.10 of Section 13 11 00.
- B. Submit proof of qualifications as specified in Article 1.02 and 1.02.C.1 of this Section.

1.04 PRODUCT HANDLING

- A. Delivery: Deliver materials to the Project Site in the manufacturer's original unopened containers with all labels intact and legible.
- B. Storage: Store materials under cover in a manner to prevent damage and contamination, and store only the specified materials at the Project Site.
- C. Protection: Use all means necessary to protect the swimming pool plaster before, during, and after installation and to protect the installed Work specified in other Sections.
- D. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the District.

1.05 ENVIRONMENTAL CONDITIONS

- A. No plastering shall be done under unsuitable conditions of weather or temperature. No plastering shall be done when prevailing temperature is 40 degrees Fahrenheit or less.
- B. Do not install plaster during rain and, if rain commences after plastering has begun, immediately protect the plaster from rain by all means necessary until the plaster has set.
- C. Do not install plaster during wind greater than 10 mph and, if wind commences after plastering has begun, immediately protect the plaster from wind by all means necessary until the plaster has set.

PART 2 PRODUCTS

2.01 CEMENT / AGGREGATE

- A. Luna Quartz® tiny pebble finish by Wet Edge Technologies. Altima® quartz finish by Wet Edge Technologies. Pebble-Fina® pool finish by Pebble Technologies.

2.02 COLOR

- A. All swimming pool plaster shall be white in color. Wet Edge Technologies shall be Luna Quartz® "Polar White". Wet Edge Technologies shall be Altima® "White". Pebble Technology shall be Pebble-Fina® "Classico". Contractor to obtain written approval on selected pebble color from the local Health Department prior to installation. Submit cut sheet, color sample and written approval for review by Architect and District."

2.03 WATER

- A. Water for swimming pool plaster shall be clean and free from injurious amounts of acid, alkali, and organics.

2.04 GUTTER, PUMP PIT, BACKWASH PIT & SURGE CHAMBER WATERPROOFING

- A. Xypex, Miracote Miraflex Membrane C, or approved equal. Mix and apply per manufacturer's recommendations for specific application. Color shall be Gray.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

- A. Inspection:
1. Prior to Work of this Section, carefully inspect the installed Work of other trades and verify that all such Work is complete to the point where this installation can properly commence.
 2. Verify that swimming pool plaster can be installed in accordance with the original design and all referenced standards, including proprietary application techniques and application training/certifications.
- B. Discrepancies:
1. In the event of discrepancy, immediately notify the District's Representative.
 2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.
 3. Failure to notify the District's Representative and give written notice of discrepancies shall constitute acceptance by the Contractor of existing conditions as fit and proper to receive the Work.

3.02 INSTALLATION OF GUTTER, PUMP PIT, BACKWASH PIT & SURGE CHAMBER WATERPROOFING

- A. Provide two (2) coats of the specified gutter and surge chamber waterproofing prior to plastering the swimming pool. Prepare surfaces to receive waterproofing and cure in conformance with manufacturer's recommendations. Provide steel trowel application method to ensure uniform smooth, dense surface finish.

3.03 INSTALLATION OF POOL PLASTER

- A. Outdoor Pools or Spas:
1. Completion of other work: DO NOT commence plastering of swimming pool(s) or spa(s) until the following conditions have been met:
 - a. The Health Department and/or other governing agencies have approved the pool(s) and/or spas) for plaster.
 - b. All concrete pool deck construction is complete and the pool decks have been thoroughly cleaned.
 - c. All landscaping in areas adjacent to the pool(s) or spa(s) is complete and the landscape irrigation system is operable.
 - d. All painting in the pool area is complete.
 - e. All welding and grinding in locations adjacent to the pool area are complete.
 - f. The backwash sewer connection is complete.
 - g. Pool(s) and/or spa(s) area(s) perimeter fencing installation is complete.
 - h. All trash and debris have been removed from areas adjacent to the pool(s) or spa(s), particularly those areas that are normally upwind from the pool(s) or spa(s).
 - i. All dust raising construction and/or activities in areas adjacent to the pool(s) or spa(s) are complete or mitigated.
 - j. The circulation pump(s) is/are operational.
 - k. The mechanical system has been flushed sufficiently to remove all dirt and debris from the piping system.
 - l. All necessary chemicals (Chlorine, pH adjuster, Sodium Bicarbonate and Calcium Chloride or any other required chemicals) are on site and ready for use.
 - m. Obtain written approval from the District and the Architect.

- B. Indoor Pools or Spas:
1. Completion of Other Work: DO NOT commence plastering of swimming pool(s) or spa(s) until the following conditions have been met:
 - a. The Health Department has approved the pool(s) and/or spa(s) for plaster.
 - b. All work above the pool(s) and/or spa(s) is complete.
 - c. All painting in the pool area is complete.
 - d. All welding and grinding in locations adjacent to the pool area are complete.
 - e. The backwash sewer connection is complete.
 - f. All concrete pool deck construction is complete and the pool decks have been thoroughly cleaned.
 - g. The circulation pump(s) is/are operation.
 - h. The mechanical system has been flushed sufficiently to remove all dirt and debris from the piping system.
 - i. All necessary chemicals (Chlorine, Acid, Sodium Bicarbonate and Calcium Chloride) are on site and ready to use.
 - j. Obtain written approval from the District and the Architect.
- C. Contractor accepts all liability from damage done to the pool plaster if the pool(s) or spa(s) is (are) plaster before the completion of the above listed items or without the written approval of the District and the Architect.
- D. POOL PLASTER AUTHORIZATION FORM:
1. The pool(s) and or spa(s) at Chavez High School is/are hereby approved for the installation of the pool plaster. Pursuant to the requirements of specification section 131105, paragraph 3.03.

District

Date

Architect / Project Manager

Date

- E. Preparation:
1. Do not apply plaster over dirt, rust, scale, grease, moisture, scuffed surfaces or conditions otherwise detrimental to the formation of a durable plaster finish.
 2. Consult with manufacturer on application to specific surfaces being treated. Follow manufacturer's recommendation for curing of cast-in-place concrete or shotcrete surfaces prior to application of plaster.
 3. Protect ceramic tile, decking, deck equipment, gratings, fittings and other items by suitable covering or masking.
 4. Mask or remove all hardware, hardware accessories, machined surfaces, plates, lighting fixtures and similar items in place not to receive pool plaster. Following completion of plaster for each space or area remove masking. Re-install all removed items utilizing workers skilled in the trades involved.
- F. Application:
1. Finish shall be applied to a uniform thickness of 3/8" to 1/2" over the entire surface. The walls shall be scratch-coated followed by a finish coat. Material applied to the floor after the walls

have been applied shall be accelerated to assure uniform setting time throughout the pool surface.2. Float the plaster to a uniform plane and trowel to a smooth, dense, impervious surface using extreme care to avoid stains.

3. Take special care in finishing around pool fittings, making sure to mask off or plug openings so as not to fill such openings with excess plaster. Be certain to completely enclose pool fittings with plaster to insure a leak-proof seal around pipes, fittings, lights, anchors, etc.
4. Accurately interface with the finish planes of items installed by other trades.
5. Quartz and pebble plaster is to be applied by a licensed applicator as approved by the manufacturer, and in accordance with manufacturer's training.

3.04 CURING

A. Preparation: Anticipate the need for required equipment and have all such equipment immediately available for use upon completion of pool plastering.

B. Pool Filling:

1. After the plaster has sufficiently dried and before drying has proceeded to a damaging point, cure the plaster by gradually filling the pool with water, preventing all damage to finished plaster surfaces.
2. Flow the water continuously until the pool is filled.
3. When the weather is hot and/or water pressure is low, keep the pool walls damp while the pool is filling.
4. Coordinate with Contractor to ensure that the pool is continuously monitored while filling to prevent overfill.

3.05 EQUIPMENT ACTIVATION

A. All water chemistry and filtration mechanical equipment shall be operational upon filling of pool after plaster. Chemicals and other related support items as supplied by Contractor, shall be in supply at start-up.

B. For the first fourteen (14) calendar days after completion of the pool plaster, brush all plastered surfaces at least twice a day and coordinate with General Contractor to ensure that the plaster is carefully maintained after the initial fourteen-day period. In addition, coordinate with the Contractor to ensure that pool filtration equipment is continuously running during the initial fourteen-day period.

C. Start-up and provide qualified personnel to operate pool equipment for a period not less than fourteen (14) days after the pool is placed in operation, or until the District takes occupancy of the facility or letter of substantial completion. During this time, Contractor shall instruct and supervise the District's personnel in the various operating and maintenance techniques involved. Contractor shall be responsible for supply of chemicals during this not less than fourteen (14) day period and at time of turnover to District, chemical storage tanks shall be full. (District's personnel shall be fully trained and capable of assuming swimming pool maintenance tasks, training may begin before District takes occupancy).

3.06 CLEAN-UP

A. Upon completion of swimming pool plaster, remove all materials, equipment and debris occasioned by this Work and leave the job site in a clean and presentable condition. Perform all such clean-up to the approval of the District's Representative.

3.07 WARRANTY

- A. All applicators must provide a minimum of five (5) year warranty for application and workmanship additional to the manufacturer's warranty for product.

END OF SECTION

SECTION 13 11 06

SWIMMING POOL EQUIPMENT

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Swimming pool equipment items required for this Work as indicated on the Drawings and specified herein.

1.02 QUALITY ASSURANCE

- A. Qualifications of Workers:
 - 1. The entity performing the work of this Section shall have been successfully engaged in the respective trade for at least five (5) years immediately prior to commencement of the Work.
 - 2. For actual construction operations, use only trained and experienced workers with a minimum of three (3) years experience with the materials and methods specified.
 - 3. Provide at least one person who shall be present at all times during execution of the work of this Section, with a minimum of five (5) years experience with the type of materials being installed, the referenced standards, and who shall direct all Work performed under this Section.
- B. All equipment supplied or work performed shall comply with regulations governing public swimming pools and spas as contained within Chapter 31 of California Building Code, latest edition.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. Provide submittals in conformance with the requirements of Section 01 33 00. Requests for substitution shall conform with requirements of Article 1.10 of Section 13 11 00.
- B. Required submittals include:
 - 1. Swimming Pool Safety Equipment and Maintenance Equipment as specified in Article 2.01 and 2.02 of this Section.
 - 2. Swimming Pool Fittings, Deck and Mechanical Equipment as specified in Article 2.03-2.12 of this Section.
- C. Submit proof of qualifications as specified in Article 1.02.A of this Section.
- D. The equipment shown on the plans represent the first listed items in the technical specifications. The Contractor shall be responsible for all required field coordination and installation of any approved equal product to provide a fully working and warranted system. The Contractor shall submit detailed shop drawings for any products used other than the first listed specified items. Contractor provided shop drawings shall include details and quality equal to the original plans and construction documents. The Contractor shall provide any and all required engineering including but not limited to structural and anchorage requirements for any proposed equipment other than the first listed specified equipment. The Contractor is responsible to provide a factory certified representative(s) to start-up and provide on-site training for all swimming pool mechanical equipment provided.

1.04 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect swimming pool equipment items before, during and after installation and to protect the installed work specified in other Sections.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the District's Representative.

PART 2 PRODUCTS

2.01 SAFETY EQUIPMENT

- A. First Aid Kit for 50 Persons with two (2) wool blankets: Marine Rescue or approved equal. Quantity as required by the Department of Health, one (1) minimum.
- B. Rescue Tubes (minimum 49" long) and Life Ring Buoy (minimum 24" in diameter) U.S. Coast Guard Approved: Marine Rescue or approved equal. Quantity as required by the Department of Health, one (1) minimum.
- C. Throw Rope (3/16" diameter) complete with lemon foot, for use with Life Ring Buoy: Kiefer, United Industries, or approved equal. Quantity as required by the Department of Health, one (1) minimum.
- D. Rescue Hooks, 16' long x 1-1/2" aluminum pole and stainless steel mounting hardware: Kiefer, Pentair, or approved equal. Quantity as required by the Department of Health, one (1) minimum.
- E. Pool Safety Signs: As required by the Department of Health. Submittal required. Placement at the pool site shall be in conformance with Health Department Inspector. One (1) set minimum.
- F. Eyewash / Shower: Haws model #8309WC CRP combination eyewash / shower, with corrosion resistant protection. Two (2) required. See MEP sheets for water supply piping.

2.02 MAINTENANCE EQUIPMENT

- A. Commercial Pool Vacuum: Provide pool vacuum cart with lid-mounted handle, separate lid-mounted bracket for electrical cord, and two rubber-tired ball bearing wheels with grease fittings. Cart and filter shall be fabricated from schedule 304 stainless steel with welds treated and passified. Provide an all-bronze pump with a 1 1/2 hp, 115/230 volt, maximum 20 amp draw @ 120 volts, single phase motor and a 6" bronze trap. Pump shall be UL and NSF listed, have 2" suction and 1 1/2" discharge fittings, and have a brass priming valve with hose bib. Entire pump assembly shall be anchored to vacuum cart with two stainless steel bolts. Provide a 100 foot 10 AWG 3/C SJ electrical cord with ground fault interrupter (GFI) plus. Cord shall be wired to a double pole, 30-amp switch which shall be mounted on pump motor. One (1) required.
- B. Heavy Duty Vacuum Hose: 2" x 50', with hose connector. Pentair, Smooth Bore or approved equal. Two (2) required.
- C. Utility Pole: 24' fiberglass with connectors. Pentair, Skimlite or approved equal. Two (2) required.
- D. Commercial Vacuum Head: 24" wide "flexible" vacuum head. Pentair Model #R201186, or approved equal. One (1) required.
- E. Pool Wall Brush: 36" wide professional quality. Pentair or approved equal. One (1) required.
- F. Leaf Skimmer: 30" x 8" x 12", professional quality. Pentair, Spectrum or approved equal. One

required.

- G. Water Quality Test Kit, Professional Grade, Taylor Technologies Model #1741C, LaMotte Model #PRO250-NJ, or approved equal. One (1) required.

2.03 FITTINGS

- A. Main Drain Frame & Grate (18" x 36"): Lawson Aquatics #MLD-FG-1836, Super Sump with VGB Compliant Grates, or approved equal, two (2) required. Provide two (2) Hayward #SP-1056 1-1/2" collector tubes and two (2) #SP-1055 Hayward 1-1/2" hydrostatic relief valve, one per main drain sump. Contractor shall provide to the District a Certificate of Compliance, signed by a licensed design professional, for main drain sump(s) and frame(s) and grate(s), as required by the Virginia Graeme Baker Act.
- B. Gutter Outlet Frame and Grate (12"x12"): Lawson Aquatics #MLD-FGD-1212. Twelve (12) required.
- C. Floor Return Inlet 1-1/2" Adjustable: StaRite #08417-0000, United Industries, or approved equal. Fifty-four (54) required.
- D. Swimming Pool Underwater Lights: 'PureWhite LED' #LPL-F5W-120-100 (100' cord) with polished stainless steel face rings, 87 watt lamps and LWC (J&J Electronics); provide stainless steel niches, Pentair #78210600 with 1" hubs, or approved equal. Thirty-two (32) required.
- E. Junction Box for Underwater Lights, complete with strain reliefs: Hydrel #1719, Appleton, or approved equal. Sixteen (16) required.

2.04 DECK EQUIPMENT

- A. Starting Platform Anchors: KDI Paragon 'Competitor' #23103DW, 6" deep, no known equal. Eleven (11) required, for concrete deck. 'Competitor' #23074, cover for dual wedge, 'Competitor' #23303, cover removal tool, two (2) required.
- B. Adjustable Starting Platforms: Track Start Competitor, side step #25427 no known equal. Eleven (11) required.
- C. Stanchion Sockets: 1.90" I.D. Bronze. KDI-Paragon 38201TC, no known equal. Eighteen (18) required.
- D. Stanchion Posts: 1.90" O.D. x .145 wall. KDI-Paragon, Six (6) #38105, and Six (6) #38301, no known equal.
- E. Lane Line Anchors: Heavy eye bolt with insert. KDI-Paragon #73017/18 or equal. Forty-six(46) required.
- F. Racing Lanes, Anti Wave' maximum 6", no known equal, verify colors with District prior to ordering. Fourteen (14) required. Provide vinyl covered stainless steel lane line extensions, Knorr System model #EP-009-0020 or approved equal, two (2) per lane line. Provide floating water polo goal tethers, eight (8) total. Provide two (2) additional lanes to be utilized with floating water polo goals as side lanes and three (3) lanes utilized for stationary water polo courses.
- G. Racing Lane Reel with Cover: KDI-Paragon #75111SS with cover #75133, no known equal. Three (3) required.

- H. Moveable Lifeguard Chair: 1.90" O.D. x .065 wall. KDI-Paragon 20302, Spectrum 20160 or equal. Two (2) required.
- I. Figure 4 Grab Rails: KDI-Paragon #30102, 1.90" O.D. x .109" wall, no known equal. Four (4) sets required.
- J. Cross Braces Ladder: Paragon #42123, with custom 5" wide stair treads, no known equal. Two (2) required.
- K. Recessed Steps, Set of 3: KDI-Paragon #3212, no known equal. Four (4) sets of three required.
- L. Handrail: KDI Paragon #34203, 3 bend, 1.90" O.D. x 0.65" wall. Three (3) required.
- M. Anchor Sockets for Grab Rails & Handrails: KDI-Paragon 28102, no known equal. Twenty-six (26) required.
- N. Stainless Steel Escutcheon Plates for Grab Rails, Handrails and Ladders: Spectrum Model #35214, no known equal. Twenty-six (26) required.
- O. Stationary Water Polo Goals: KDI-Paragon 36104, 36201, no known equal. Furnish complete with anchors and nets. Two (2) pair required.
- P. Floating Water Polo Goals: 'Antiwave' #AW060 or equal. One (1) pair complete with nets and tethers.
- Q. Disabled Lift: Spectrum Traveler XRC BP500 #27610 Swim-Lift II self operated, or approved equal. Furnish complete with anchors, cover, extra battery pack and transporter cart. One (1) required.
- R. Backstroke Pennants: 'Champion' 3/16" diameter vinyl coated cable #50-175; 'Champion' hardware package #53-030, and 'Champion' 12" x 18" vinyl coated polyester pennants #53-020 Lincoln Equipment, Knorr Systems or equal.
- S. Pool Cover System:
 - 1. A pool cover system as described below shall be provided and shall include all the specified features, without exception. Submittal data must include complete documentation relating to all the specified features and include manufacturer's sales literature, specification sheets, and installation/operation/maintenance manuals. Upon written request by the specifying agent, the following samples must be provided: samples of tubing used for storage reel winding tubes and end frames; a sample winding tube bearing; a sample castor wheel assembly; and a cover sample measuring at least 8" x 11", including weighted side edge, reinforced end edge, and grommet.
 - 2. Cover Material:
 - a. Material shall be woven, 10 by 10 count per inch, high-density polyethylene, ultraviolet stabilized film fabric, laminated to both sides of 1/8" thick, closed cell, medium density, white, polyethylene foam. The woven polyethylene film fabric shall be coated on both sides with an ultraviolet stabilized, chemically resistant polyethylene coating. The combination of film, foam and woven components shall be non-toxic, non-absorbent, non-permeable and buoyant. Color shall be blue on upper surface and black on under surface. In addition to the above, cover must meet the following requirements:

Thickness	1/8 inch minus or plus 10%
Foam Density	2 lbs. per cubic foot
Weight	5 oz. per square foot
*Tensile Strength	318 lbs. (ASTM 1682264)
*Tear Strength	60 lbs. (ASTM D2261-71)
*Bursting Strength: (Mullen Tester)	425 psi (ASTM 751-73)
Service Temperature	-40°F to +160°F
K Factor	.25 BTU/sq. ft.-Hr – degrees F/inch (ASTM D2326)
Reinforced Edge Tear Strength	1225 lbs. pull strength, corner to corner
Open Seam Tear Strength	70 lbs.

3. Cover Design Criteria:

- a. Cover panels shall totally cover the surface of the pool without gaps or overlaps with reinforced cutouts to accommodate rounded corners, step areas, rails, etc. Cover panels shall be of the following quantities and sizes:

Qty.	Size
8	13 feet, 4 1/2 inch x 75 feet, 1 inch

- b. Along end and side edges of each panel, a weighted material shall be sewn in and shall be continuous, non-corrosive and conform to the flat shape of the cover. End edges shall be reinforced with a double layer of polyethylene-coated film fabric and designed in such a manner as to prevent panels from dividing when the covers are being pulled across the water. On all corners, weighted edge shall wrap corners and be itself encapsulated by the two layers of end reinforcement. The entire corner construction shall be reinforced with an 1/8" thick load dispersion plate and non-corrosive grommet.
- c. Both ends of each cover panel shall be equipped with no less than three (3) non-corrosive grommets and quick-release loops for easy connection to the storage reel or to the next cover panel. All sewing shall be ultra-violet stabilized and chemically resistant 100% polyester thread. Main body seams shall be welded, glued or heat sealed. Complete mechanical attachment with lock-stitched thread shall be required. Warning labels consistent with the recommendations of the Federal Consumer Protection Agency shall be permanently affixed to each end of each cover panel and to the sides of perimeter panels.

4. Storage Reels:

- a. The following quantity, type, and size of storage reels shall be provided:

Qty.	Winding Tubes Per Reel	Length of Winding Tubes
2	3	16 Foot
1	2	16 Foot

- b. Storage reel frame, winding tubes, castors, brake shafts, cranks and fasteners shall be made of type 304 stainless steel. Each reel shall have six wheels, each of which shall be 6 inches in diameter, be rated at 1150 pounds load capacity and be made of solid polyurethane. Wheels shall be lubricateable through grease fittings on stainless steel axle shafts and have stainless steel swivel yoke assemblies. The reel shall have two frame mounted, screw-type brakes with pads that lock directly to the pool deck and have a total of 18 square inches of total braking surface. Castor brakes or other types of foot-operated or lever-operated brakes will not be considered equal. Each winding tube shall be 4 1/2 inches in diameter; have a wall thickness of .120 inches; and shall consist of continuous length of tubing without joints

or welds. Reels with tubes fabricated from two or more pieces of tubing joined together will not be acceptable. End frames shall be fabricated from 1 1/2 inch square Schedule 304 stainless steel box beam tubing with .120" wall thickness. To facilitate field repair, 3/8" stainless steel bolts, nuts and washers shall be used to connect major reel frame parts, wheels, brakes, bearings and winding tubes. Reels that use welding to connect these components will not be considered equal. Winding tube bearings shall be heavy duty, self-aligning, pillow block ball bearings with set screws to secure tube shafts and prevent their lateral movement. All bearings shall be lubricateable through grease fittings. Plastic surface bearings will not be acceptable.

- c. Each storage reel shall be provided with a protective cover constructed of vinyl-laminated polyester cloth, 1000 denier, totaling 13 ounces per square yard.
5. Measuring and Training:
 - a. A representative of the manufacturer shall visit pool site to confirm measurements prior to fabrication of cover, and once cover is delivered, train operating personnel and supervise initial installation of cover.
 6. Warranty:
 - a. Cover panels shall be provided with manufacturer's three- year full replacement warranty covering defects in material and workmanship. Storage reel shall be provided with manufacturer's 10-year warranty covering defects in material and workmanship.

2.05 SWIMMING POOL STRAINER

- A. 'MerMade' F.O. series FRP reducing basket strainer: One (1) 10" x 8" standard, with acrylic lid and two (2) stainless steel strainers each (150 lbs.)

2.06 SWIMMING POOL CIRCULATION PUMP

- A. 'Paco' #6015-7; 6" x 8" x 15" Type 'LC' end suction centrifugal pump; outdoor rated, 1150 RPM 460V, 3PH; 25HP; rated at 1150 GPM @ 60 Ft. TDH; 83% efficient; premium efficiency TEFC motor; epoxy coat all wet surfaces. 'Paco', 'Aurora' or equal. (760 lbs.) Provide smart pump control system SPCS-EKO-FLEX #SPCS025EF4 (20.5" x 41" x 13.9") variable frequency drive for use with 'BecSys 7' controller. Coordinate mounting location to maintain required clearances, 480V 3PH. (228 lbs.)

2.07 SWIMMING POOL FILTRATION SYSTEM (Eko³, Nemato or equal)

The filter system specified herein shall be the standard cataloged product of a company regularly engaged in the manufacture of water treatment equipment. The purpose of this specification is to establish the minimum design, performance, quality, and service standards for the proposed equipment. Equipment provider shall have a minimum of five year's experience in the manufacture of such specified Commercial/Industrial grade water treatment equipment. The equipment shall consist of filter vessel(s), internal distribution and collection system, immediate face piping, operating valves, backwash sightglass, air relief systems, gauges, hydraulic pressure supply system, electronic operational control systems, system operating setup/startup and fifteen (15) year warranty.

Requests for substitutions for the specified components and materials will not be considered unless equal to the specified system in every respect and must be submitted to the specifying agent not less than twenty (20) calendar days prior to bid date. Requests for substitutions must include, but not be limited to:

- List containing contact name and telephone number of ten like systems, each of which shall utilize all specified features and employ fiberglass filament wound vessels, and electronic filter control devices.

- Complete documentation and that proves proposed unit includes all of the specified features.
- Manufacturer's sales literature.
- Engineering drawings, structural and seismic calculations prepared by a licensed Civil Engineer.
- Certification listings.
- Installation/operation/maintenance manuals.
- Name and address of the site-local, factory-authorized startup and service representative with affidavit of last date of certification.

Failure to provide this or any other information necessary to confirm that all specified features are provided will be cause for rejection of substitution request. Prior to ten (10) days before bid date, all prospective bidders will be notified in writing of any proposed substitutions.

A. Filter Area and Flow Rate:

1. The filter system(s) shall consist of one (1) 'EKO³ System Gen 2' #EKO-42210-1006-T-4 tank system high-rate permanent media filter vessels with a total effective filter area of 84.0 square feet. When operating at 15 gallons per minute, per square foot of filter area, the filter system will have a capacity of filtering 1260 gallons per minute. **Provide filter influent isolation valves for each filter tank typical of four (4).**

B. Filter Vessel:

1. Vessel :
 - a. The filter vessel will be 42" inside diameter, will have 21 square feet of filter area and shall be designed for a maximum working pressure of 100 psi with a 4-to-1 safety factor for minimum burst. The design shall be capable of withstanding, without leaks or structural failure, a repetitive pressure test consisting of 250,000 cycles of 0 to 100 psi. This is required to ensure long service life, reduce potential liability and guarantee safe operation.
 - b. Materials used in the construction of the vessel shall be in accordance with Article RM-1 of ASME Boiler and Pressure Vessel Code, Section X and ASME RTP-1, most current versions. The vessel shell shall be fabricated throughout of a continuous and woven premium grade glass fiber roving with a laminate matrix of unpigmented polyester resin and hardener. High stress areas shall be reinforced with Kevlar® and/or carbon fiber. Resin-rich layers shall be resistant to UV, weathering, stress cracking and de-laminating, and shall have a field history of performance. The minimum laminate properties shall be as follows:

Tensile Strength (ASTM D-638)	-	42,000 psi
Tensile Modulus	-	2.2 x 10 ⁶ psi
Flexural Strength (ASTM D-790)	-	50,000 psi
Flexural Modulus	-	1.6 x 10 ⁶ psi
Heat Distortion Temp. (ASTM D-638)	-	180° F @ 264 psi
Barcol Hardness (ASTM D-2533)	-	45 (Mod #934)
Structural Adhesive Bond Strength	-	1,500 psi

- c. Attachments, if any, to the vessel shall be made with a structural adhesive compatible with the laminate used to fabricate the vessel.
- d. The vessel shall incorporate two (2), six-inch (6") grooved pipe ports located in the top of the vessel side shell to serve as influent and effluent plumbing connections. One (1), three-inch (3") port shall be located in the lower front portion of the vessel to serve as a winterizing and media dump port connection. One (1), three-inch (3") port shall be located in the upper-most portion of the side shell to serve as a connection for a manual air relief valve. Bulkhead

- through-port connections will not be considered for this application in order to preclude fitting failure and structural weaknesses inherent with vessels using bulkhead fittings.
- e. A 12" x 16" viewing window/access manway shall be fitted at the front end of the vessel to provide operation and periodic media examination, and ease of access for media loading. Manways or manholes located in the side shell of the vessel will not be permitted. Manways or manholes with metal reinforcement will not be allowed, due to inherent weaknesses.
 - f. Following fabrication, the entire vessel shall be cured to ensure uniformity of strength.
 - g. Each filter vessel shall be subjected to an in-shop hydro pressure test of 100 psi for a period of four (4) hours. Verification of this test and results shall be submitted to the District at time of delivery.
 - h. Vessel shall be supported by two (2) foam-filled, molded polyethylene saddles, which shall allow the vessel to withstand load forces specified for seismic zone 4 without damage. Certified engineering drawings are required to confirm this capability. Saddles shall be attached to vessel with a permanent adhesive. Vessel to saddle attachment with tank through-bolts is not acceptable. A positioning template, and four (4) 3/4" x 7" anchor bolt sets with leveling shims shall be provided with each vessel to ensure proper installation.
 - i. Coated and/or non-coated metal vessels and/or fiberglass vessels with metal reinforcement or fiberglass vessels employing inner tanks (bladders) will not be considered for this application. Historical problems, related to corrosion of metal tanks, an inability to bond inner and outer fiberglass tanks (bladders), and the extreme difficulty associated with the repair of tank bladders, will not allow their use.
2. Distribution and Collection System
 - a. Internal components shall be hydraulically balanced to prevent migration and channeling of the filter media during the filter cycle and must uniformly fluidize the filter media in the backwash cycle without breakthrough at any one location. Internal component design shall accommodate, during "OFF" cycle, that the filter system shall remain full of water.
 - b. The influent distribution system shall be fabricated of no less than 12 ABS distribution lenses - each having two-inch (2") IPS connections, PVC pipe, and fittings. The distribution system design shall accommodate a Reynolds Number not to exceed 2000. The collection system shall consist of PVC fittings, six-inch (6") Schedule 80 PVC pipe and molded polypropylene reverse "V" slotted laterals. The laterals shall be designed to retain filter media with minimum head loss. A minimum of 20 molded laterals shall be utilized in the filter vessel with flow velocity not exceeding 6 feet per second at designed filter flow rate. Non-molded laterals will not be considered acceptable for this application. Collection system hydraulic design calculations will be required.
 3. Air Relief System
 - a. An automatic air bleed system shall be provided. An anti-plug protective shield screen shall be a part of the assembly. A manually operated external air relief shall also be provided for the vessel.
 4. Winterizing/Drain and Media Dump Port
 - a. At the lowest point of the front of the vessel a three-inch (3") port shall be provided. The port shall allow the evacuation of all water from the vessel for the purpose of winterizing or service. No media shall be allowed to leave the vessel during the draining process. The port shall also facilitate the removal of the filter media from the vessel.

- C. Backwash Valving And Piping: Each filter vessel within the system shall be cleaned individually using filtered water provided by adjacent filter vessels. Reverse flow backwash with raw source water will not be allowed. Maximum allowable backwash flow rate will be 450 gallons per minute.
1. Backwash Valve:
 - a. One (1), two-way, three-port, six-inch (6") backwash valve shall be supplied with each vessel. The valve body shall be injection-molded of ABS plastic all external components will incorporate UV inhibitors. Valves using metal bodies and covers, coated or non-coated, will not be approved. Grooved-type fittings shall be provided at each of the valve ports for connection to the filter vessel and manifold piping. Couplers shall be provided at each of the valve ports for connection to the filter vessel and manifold piping. The couplers shall be injection-molded of Isoplast 101LGF40NAT plastic and shall contain UV inhibitor.
Each valve shall be fitted with a hydraulic diaphragm designed to operate a sliding flow direction piston. Valve internal shaft, nuts, washers and bolts shall be 316 stainless steel. All stainless steel components shall be passivated and rinsed after forming and machining.
 - b. The backwash valve shall be designed to allow for continuous circulation pump operation during the backwash of the filter system that will prevent the loss of circulation pump prime and damage to boiler, chemical feed systems and piping that can result by repetitive on/off cycling of circulation pump. Valves requiring external linkage for synchronization of their operation will not be allowed.
 2. Rate of Flow Valve:
 - a. A tamperproof, gate-type valve shall be supplied for use on the effluent manifold. The valve shall be made of PVC, will be field-adjustable, ensuring the proper system flow rate. The rate of flow valve shall be manually set using a removable tool. Standard butterfly and/or gate-type valves will not be allowed.
 3. Backwash Sightglass Valve:
 - a. A tamperproof, gate-type valve shall be supplied for use on the waste manifold. The valve shall be made of PVC, will be field-adjustable, ensuring the proper system backwash flow rate. The backwash rate shall be manually set using a removable tool. Standard butterfly and/or gate-type valves and separate sightglass will not be allowed.
 4. Piping:
 - a. To minimize floor space requirements and provide unhindered access to filter controls, backwash valves, media dump port, and vessel access openings, all piping shall be located on top of the horizontal filter vessel. All 6" manifolds shall be fabricated from Schedule 80 PVC pipe and fittings. All manifolds 8" and larger shall be fabricated Schedule 80 piping with pulled fittings, in manifold sections not exceed two tank lengths. Influent and effluent manifolds shall be 10" IPS and the waste manifold shall be 6" IPS. All piping shall be factory-assembled and pressure tested.
- D. Operational Control
1. Automatic Control Device:
 - a. An Automatic Control System (ACS) shall be provided, which will allow for the automatic and manual manipulation of the filter backwash operation.
 2. Functions And Features
 - a. The ACS shall perform the following functions and features:
 3. Automatic Filter Backwash:
 - a. Initiate - at filter system via field-adjustable differential set point

- b. Ability for the optional initiation of backwash via and external device, i.e., time of day/day of week set point time clock or System6 chemical controller
 - c. Initiate - manually activated automatic backwash cycle
 - d. Initiate - backwash by manual manipulation of multiport valve
 - e. Initiate on/off - Pressure Accumulation System "HydroForce" pump actuation
4. Multiport Valve:
- a. Distribute water for the hydraulic actuation of filter system valves
 - b. 24 VAC, continuous drive motor
 - c. Constructed of non-corrosive ABS and stainless steel, metallic multiport valves will not be approved - multiple solenoid valves will not be approved
5. Housing and Mounting:
- a. The ACS shall be housed in a non-metallic NEMA 4X rated enclosure. The enclosure and connections shall be designed to eliminate any possibility of corrosion or damage to the internal components of the control.
6. Multiport Valve:
- a. The multiport valve wetted components shall be injection-molded ABS with stainless steel shaft and springs. The unit shall distribute water for the hydraulic actuation of the filter system valves. Porting shall be 3/8" IPS minimum, employing 1/2" IPS tubing, and shall not retard the opening or closing of the backwash valves beyond 10 seconds. The multiport valve will be equipped with an indicating dial for valve operating sequence and home position. The multiport valve 24 VAC stager drive motor shall be installed in an independent enclosure of the NEMA 4X type.
 - b. System serial number, model number, operating pressure, media information and basic operating instructions shall be permanently affixed to the multiport valve enclosure. The label shall be treated to resist the mechanical room environment. The enclosure shall be directly attached to the filter system.
7. Transformer:
- a. A line voltage to 24 VAC transformer shall be provided. The transformer shall be mounted in an independent enclosure of the NEMA 4X type. The transformer and enclosure shall be of the wall-mount type and shall be posted near the electronic mechanical room control device.
- E. Gauges:
- 1. Two (2), four-inch (4") pressure gauges shall be provided. The gauges shall indicate influent and effluent pressures of the filter. The gauges shall be mounted with the filter system multiport valve enclosure, within a common gauge-mounting bracket.
- F. Hardware:
- 1. All fasteners (nuts, bolts, washers) employed in the system shall be cadmium-plated steel.
- G. Service Access:
- 1. Access to manway, backwash valves, and filter control console shall be from the front of the filter system and shall not require disassembly of any piping or climbing over or around vessel, manifolds or valves to perform operation, service or routine maintenance.
- H. Filter Media
- 1. Filter media depth shall be as indicated on the drawings; measurements will be taken at the site and will be from top of the collection laterals to the top of the media. The media shall be of a single grade, consisting of uniformly graded, angular shaped, crushed silica sand, which shall be free of limestone or clay.

2. Filter system manufacturer shall provide a filter media analysis for the media being utilized. Media supplier shall supply two (2) pounds of filter media from installation site. Consulting engineer, prior to its installation, must approve filter media analysis.

3. #20 Sand

- a. Filter media shall be Grade #20, effective size .45 millimeter with a uniformity coefficient of 1.5 maximum.

MEDIA ANALYSIS

Sieve No.		Percent Retained On
US Series	MM Opening	Sieve (By Weight)
20	0.833 (0.333 in)	2
30	0.589 (0.023 in)	58
40	0.417 (0.016 in)	36
50	0.295 (0.012 in)	4

4. Alternate Filter Media

- a. #30 Sand

- 1) Filter media shall be Grade #30, effective size .27 millimeter with a uniformity coefficient of 1.6 maximum.

MEDIA ANALYSIS

Sieve No.		Percent Retained On
US Series	MM Opening	Sieve (By Weight)
30	0.589 (0.023 in)	2
40	0.417 (0.016 in)	36
50	0.295 (0.012 in)	46
70	0.208 (0.008 in)	11
100	0.147 (0.006 in)	5

- I. "HydroForce®" System:

1. The HydroForce® system shall consist of a stainless steel centrifugal pump, hydro-pneumatic pressure sustaining tank, adjustable pressure switch, 50 feet of 3/8 inch Nylo Seal® tubing and all necessary tubing connectors.
2. Pump
 - a. The pump housing shall be made of stainless steel and the impeller shall be molded of Lexan®. A mechanical seal shall be provided and shall be a precision-lapped, highly- polished, carbon-ceramic stainless steel shaft seal, ensuring drip-proof protection. The motor shall be a 1/2 HP, single phase, 60 cycle, 3450 RPM, suitable for service with filter control console. The motor shall be a NEMA 'C' face flange mounting with a drip-proof enclosure. The motor shall be equipped with sealed ball bearings. The pump shall be performance rated at 5 gallons per minute at 80 feet of head.
3. Tank
 - a. Pressurized water shall be contained in a hydro-pneumatic steel tank that shall be lined with an epoxy coating. The tank will employ a flexing diaphragm, separating wet and dry chambers. The steel tank shall be designed for a maximum working pressure of 100 psi. Tank connection shall be 3/4" NPTM.
4. Pressure Switch
 - a. A pressure switch shall be mounted directly to the pump motor and shall be rated for the operation of a 1-1/2 HP motor at 115 volts, single phase. The switch will allow for adjustment of cut-in and cut-out pressure.
5. Check Valve:

- a. A half-inch, spring-loaded check valve shall be supplied as part of the assembly. The check valve shall be installed on the pump suction and shall be designed to retain water pressure accumulated within the amplification system.
- 6. Tubing and Fittings:
 - a. Fifty (50) feet of 1/2 inch Nylo Seal® tubing and all necessary tubing to pipe fittings shall be supplied for the connection of the HydroForce system to the filter system and the filter control.
- 7. Finish:
 - a. The system shall be coated with an industrial-grade polyurethane high-gloss protective finish.

- J. Packaging:
 - 1. To protect and safeguard filter vessel, it shall be skidded and supplied with a plastic wrapping to facilitate shipment, handling, and/or storage on job site. The plastic wrap shall also act as a protective barrier during installation. All other components shall be packaged in a manner that will ensure damage-free transportation and facilitate storage at job site.

- K. Instructions:
 - 1. Printed and bound operating, installation and service manual with exploded parts list shall be supplied with the system described herein.

- L. Certification:
 - 1. Certified/stamped engineering calculations and drawings will be required for the structural strength of filter vessel and seismic loading. The filter supplied must be listed by the National Sanitation Foundation (NSF) ANSI 50 for a flow rate of up to 20 gallons per minute, per square foot of filter area. Proof of National Sanitation Foundation (NSF) listings will be required.

- M. Startup, Training and Field Service:
 - 1. Local factory representation for the products contained herein is mandatory. A site specific/site local factory-authorized and trained service specialist shall provide eight hours (8) of startup and training service. The startup shall include adjustments to the filter system and all of its controlling components, calibration and setup of the control system, and instructions to the District/operator of the system's workings.
 - 2. Prior to the completion of one (1) years' service, the site specific/site local factory-authorized service specialist shall visit the filter system installation site. With the District/operator, the service specialist shall inspect all of the filter system components for signs of wear/malfunction at that time. Any and all worn or malfunctioning items shall be repaired or replaced at no expense to the District. The service specialist will thoroughly instruct the District/operator on annual service procedures for the filter system, all at no expense to the District.

- N. Warranty:
 - 1. A 15-year limited warranty shall be provided covering all components of the filter system specified herein. The first (1st) year of the warranty period shall be unconditional. The second (2nd) year through the fifteenth (15th) year may be limited and prorated.

2.08 POOL HEATER(S)

- A. 'Raypak' XTherm ultra high efficiency condensing modulating boiler, titanium plate and frame heat exchanger with CPVC connections, factory assembled skid mounted package, California Code Controls,

1 1/4" natural gas connection, 6" water connections, 8" diameter flue, PVC vented. Two (2) units at 1,500,000 BTU per hour output, 97% efficient, 'Raypak #1505A' (1,448 lbs. each.) Provide 3/4" cold water to each unit with adjacent floor sink for condensate. Refer to mechanical plans for combustion air intake and exhaust flues.

2.09 CHLORINE FEED SYSTEM

- A. Provide 'Chem-Tainer' 500 Gallon #TC5971DC; dual storage/containment tank with lid seismically restrained; (4,165 lbs.). Complies with Fed. Reg. #40CFR-264-163. Feed pump shall be 'LMI' #SD43-88P-KSI; 288 GPD @ 150 PSI with FRP shelf bracket. Hard pipe to point of injection.

2.10 ACID STORAGE/FEED SYSTEM

- A. Provide 'Chem-Tainer' 150 Gallon #TC3448DC; dual storage/containment tank with lid seismically restrained; (1,250lbs). Complies with Fed. Reg. #40CFR-264-163. Feed pump shall part of the Carbon Dioxide alkalinity control system. Provide a complete acid vapor recovery system.

2.11 CARBON DIOXIDE STORAGE/FEED SYSTEM

- A. Provide one (1) 'Novo-600', 600 lb. cryogenic liquid CO₂ storage tank with remote fill port. 594 liquid lbs. (5195 cubic feet of gaseous CO₂ at NTP) one (1) total. Provide EKO3- PH-MTS CO₂ high efficiency feed system with alkalinity control, 0 to 160 SCFH feed capacity booster pump, piping injector, flowmeter, relays and acid feed alkalinity control. One (1) system total (92 lbs.) Provide hard wired 'Analox' #API KIT CO₂ detector with audible and visual alarms in each chemical room, UL 1971 Standard Listed, one (1) total.

2.12 SWIMMING POOL WATER CHEMISTRY CONTROLLER

The equipment room controller package shall be BECS Technology model CS-BECSYS7-BP-E packaged by Eko³ Systems.

A. General

- 1. The integrated equipment room control system shall provide continuous monitoring and control of sanitizers, oxidizers, pH, temperature, system flow rate monitoring, total dissolved solids (TDS), turbidity, chemical inventory levels, surge tank and backwash holding tank water levels, system pressures, and water chemistry balance calculations. The control system shall also provide automatic control of the filtration system including backwash operation. Installation of the system shall be per the manufacturer's specification and no exceptions shall be allowed. A factory trained/authorized representative shall provide system commissioning and training to the District.

B. Certifications

- 1. The controller shall carry the following product certifications:
 - a. UL 61010-1
 - b. (CSA) C22.2 Number 61010-1
 - c. European Union Low Voltage Directive 73/23/EEC EN 61010-1

C. Sensors

- The controller shall include pH, ORP, ppm and temperature sensors meeting the following requirements:
- 1. pH sensor

- a. The controller shall continuously monitor, display and data log pH with 0.1 or 0.01 resolution (programmable) and provide a measurement of pH by utilizing a sensor with the following characteristics:
 - 1) 0 – 14 sensing range;
 - 2) ABS body with ½” NPT process connection;
 - 3) Minimum of 32 milliliters of inorganic electrolyte gel; organic electrolytes, susceptible to breakdown in the presence of strong oxidants, shall not be considered equal;
 - 4) A porous Teflon liquid junction to provide a stable, low impedance reference contact, and to prevent fouling and clogging of the liquid junction;
 - 5) A silver/silver chloride (Ag/AgCl) reference element;
 - 6) A general purpose glass membrane pH sensing element;
 - 7) Operating temperature range of 0 - 80 degrees C;
 - 8) Operating pressure range of 0 - 100 psiG.
2. ORP / HRR sensor
 - a. The controller shall continuously monitor, display and data log ORP with 1mV resolution and provide a measurement of ORP by utilizing a sensor with the following characteristics:
 - 1) -1000 to +1000mV sensing range;
 - 2) ABS body with ½” NPT process connection;
 - 3) Minimum of 32 milliliters of inorganic electrolyte gel; organic electrolytes, susceptible to breakdown in the presence of strong oxidants, shall not be considered equal;
 - 4) A porous Teflon liquid junction to provide a stable, low impedance reference contact, and to prevent fouling and clogging of the liquid junction;
 - 5) A silver/silver chloride (Ag/AgCl) reference element;
 - 6) A solid platinum or solid gold ORP sensing element with a minimum of 1 cm² surface area; platinum-plated and gold-plated sensing elements, which are susceptible to abrasives, shall not be considered equal;
 - 7) Operating temperature range of 0 - 80 degrees C;
 - 8) Operating pressure range of 0 - 100 psig.
3. Amperometric (ppm) Sensor
 - a. The optional Free Chlorine sensor shall be an amperometric probe system with a measuring range of 0.05 to 20 mg/l with a fully selectable scale and a temperature range of 36°-113° Fahrenheit. The amperometric probe shall come with a PVC body, replaceable PTFE membrane and electrolyte, gold cathode and silver/ silver chloride anode.
4. Temperature Sensor
 - a. The controller shall continuously monitor, display and data log temperature with 1°F resolution and provide a measurement of water temperature by utilizing a sensor with the following characteristics:
 - 9) 32 – 212°F (0 – 100°C) sensing range;
 - 10) 2 wire, 100Ω resistive temperature detector (RTD) with an 0.00385 Alpha.
5. Flow Sensor
 - a. The controller shall continuously monitor, display and data log flow rate with 0.1 gpm resolution and shall provide a measurement of pool circulation flow rate and volume by utilizing a flow sensor with the following characteristics:
 - 1) 0-8800 gpm (0-33265 liter/min) measuring range,
 - 2) Paddle wheel flow sensor with a frequency output,

- 3) Dual O-ring seal,
 - 4) 25-foot cable,
 - 5) Iron pipe saddle,
 - 6) Flow volume: 999 trillion gallons, 1-gallon resolution; 999 trillion liters, 1 liter resolution.
6. 4-20mA Sensor
- a. The controller shall be capable of reading a total of eight (8) 4-20mA output sensors, including the following:
 - 1) Pressure Transducers (Quantity 2)

The controller shall continuously monitor, display and data log pressure(s) with 1 psiG resolution and provide measurement of filter influent and/or filter effluent pressure by utilizing pressure transducer(s) with the following characteristics:

 - a) 0 to 100 psiG measuring range,
 - b) $< \pm 2\%$ span max @ 25° C which includes linearity, hysteresis and repeatability,
 - c) 0.25% static error band and 1.5% typical thermal error band,
 - d) Temperature compensated and fully calibrated,
 - e) Stainless steel wetted components with plumbing connections of 1/4".
 - 2) Vacuum Transducer (Quantity 1)

The controller shall continuously monitor, display and data log vacuum(s) with 1 psiG resolution and provide measurement of strainer vacuum by utilizing a vacuum transducer with the following characteristics:

 - a) -15 to +85 psiG measuring range,
 - b) $< \pm 2\%$ span max @ 25° C which includes linearity, hysteresis and repeatability,
 - c) 0.25% static error band and 1.5% typical thermal error band,
 - d) Temperature compensated and fully calibrated,
 - e) Stainless steel wetted components with plumbing connections of 1/4".
 - 3) Liquid Level Sensors - Three (3) total. **Provide float switch within backwash tank to shut down system if water level is too high.**

The controller shall provide measurement of liquid levels for surge tanks, backwash holding tanks and/or liquid chemical inventory by utilizing liquid level sensor(s) with the following characteristics:

 - a) Field configurable sensing range from 3 ft to 16 ft,
 - b) Field calibration for various tank levels, shapes and sizes,
 - c) Non-contacting sensing elements enclosed in PVC.
 - 4) Conductivity/TDS Sensor

The controller shall continuously monitor, display and data log conductivity/TDS with 1 micromho/ppm resolution and provide a measurement of conductivity/TDS by utilizing a sensor with the following characteristics:

 - a) 0-20,000 micromhos (0-10,000 ppm TDS) measuring range
 - b) A 316 stainless steel electrode,
 - c) PTFE insulator as well as a dual EPR O-ring seals,
 - d) AC operation, which resists electrode plating.

- D. User Interface
1. Standard Display

The standard display shall be a backlit transfective LCD with 14-line x 40 alpha/numeric graphical characters that will continuously display information related to the following:

- a. All installed sensor readings,
 - b. Set points, with current control status,
 - c. All active alarms, including time activated,
 - d. Smart menus w/ integrated on-screen help.
2. Contrast adjustment of the backlit LCD shall be provided through clearly marked keys on the front-panel without the need for access to internal controller circuitry. After initial adjustment, controller shall monitor internal temperature and automatically adjust contrast to prevent LCD blackout in extreme ambient temperature conditions. Controllers that do not include front-panel contrast adjustment and automatic temperature compensation shall not be considered equal.
 3. The standard user interface shall include single-touch access to Set Points, Relay Modes, Calibrations, Backwash status and settings, Menu access, and Reset Fail/Safes. An alphanumeric keypad shall be provided for ease of system configuration.

E. Control Functions

1. Water Chemistry
 - a. pH Control: The controller shall continuously control pH. Chemical feed shall be configurable for feed-up, feed-down, or dual feed and either on/off or time-based proportional feed.
 - b. Sanitizer Control: The controller shall continuously control sanitizer based upon the ORP reading, the amperometric sensor, or both with a bracketed control program. Chemical feed shall be configurable for either on/off or time-based proportional feed.
 - c. Bracketed Sanitizer Control: With the amperometric ppm sensor, the controller shall be configurable for bracketed sanitizer control; The bracketed control algorithm shall allow either the ORP or ppm setpoint to be chosen as the primary control point, while using other parameter to create a secondary boundary (min and max settings) that must be maintained in addition to the primary control point.
 - d. Sanitizer Booster Feed: The controller shall have a sanitizer booster program with selectable ORP and/or ppm set points with separate ending set points, allowing the option of the booster sanitizer to control to a lower set point while the primary system can recovers.
 - e. Ozone/UV Control: The controller shall provide feed-up control of an ozone or UV system based upon ORP and/or ppm set points. A Fireman Cycle feature shall turn off the Ozone/UV relay 0 to 60 minutes (settable) prior to backwash initiation or recirculation pump shutdown. The Ozone/UV control algorithm shall include an Energy Conservation mode, with on/off set time and secondary set point.
 - f. Superchlorination: The controller shall have a programmable superchlorination function, based ORP or ppm superchlor setpoint, which is triggered manually.
 - g. Dechlorination: The controller shall have a programmable dechlorination function, based upon ORP or ppm dechlor setpoint, which is triggered either manually or by the completion of the superchlorination function.
 - h. LSI & RSI: The controller shall compute the Langelier Saturation Index and the Ryznar Saturation Index based upon current inputs and the Ca Hardness and Alkalinity entered by the operator.
 - i. Flow Monitoring: The controller shall continuously monitor, display, and data log system flow, maintaining a total flow volume. A low flow alarm shall be operator settable, which can be programmed to disable chemical feeds.
 - j. Heater Control: The controller shall perform on/off control of a heater based upon an operator settable temperature set point. A Fireman Cycle feature shall turn off

the heater 0 to 60 minutes (settable) prior to recirculation pump shutdown. Heater control algorithm shall include an Energy Conservation mode, with on/off set time and secondary temperature set point.

- k. Chemical Inventory Monitoring: The controller shall continuously monitor, display, and data log liquid pH adjuster and sanitizer inventory levels. The controller shall include low chemical level alarm points for each chemical being monitored.
- l. Backwash tank Monitoring: The controller shall continuously monitor, display, and data log backwash holding tank levels.
- m. Surge tank Monitoring: The controller shall continuously monitor, display, and data log surge tank levels.
- n. Autofill: The controller shall automatically control a water makeup relay to add makeup water to maintain pool level set point, based upon surge tanks (or equivalent) level, with an overflow delay feature. The controller shall provide a programmable alternate set point (4 event 28 day timer). Use in conjunction with 3" valve specified in Section 13157 2.03G
- o. Sensor Wash: The controller shall include a programmable sensor wash with start and end time, feed duration, and number of cycle to allow multiple feed cycles per day.

F. Energy Conservation

- 1. Alternate Setpoints: The controller shall have alternate Sanitizer, Heater, and Autofill setpoints, based upon a 4 event 28 day timer.
- 2. Energy Conservation Mode: The controller shall have the capability to disable all mechanical and chemical functions during programmed conservation cycle. The Energy Conservation Mode shall include the ability to periodically monitor and satisfy all operation requirements based upon a programmed time schedule.

G. Automatic Backwash

- 1. Backwash Initiation: The controller shall be user configurable to initiate backwash upon any of the following conditions:
 - a. Time, based upon a 24 hour, 7 day programmable calendar,
 - b. Pressure Differential, taken from either a pressure differential switch or an operator settable low pressure differential setpoint based upon the differential between two installed pressure transducers,
 - c. Low System Flow, an operator settable low flow set point based upon the installed system flow meter,
 - d. Totalized filter water volume, an operator settable totalized filter water volume set point based upon the total system flow maintained by the controller from the installed system flow meter,
 - e. High filter effluent turbidity, an operator settable turbidity set point based upon the installed turbidity sensor,
 - f. Manual, which only initiates backwash when manually activated by operator.
- 2. Normal Operation: The controller shall be capable of controlling the backwash operation of up to 16 filters, with the following backwash features included as part of normal programming.
 - a. Inhibit Period, Operator settable daily time period during which backwash is prevented from being triggered.
 - b. Backwash Frequency Fail Safe: Prevents an automatically triggered backwash from starting within this time period from the end of the previous backwash. Does not prevent a Manual initiation of backwash.
 - c. Fireman Cycles: The controller shall provide operator settable independent Fireman Cycle settings for the Heater and Ozone/UV controls. The controller shall

- automatically delay the start of the backwash operation until the Heater and Ozone/UV controls have been deactivated and the corresponding Fireman Cycles have expired.
- d. Primary/Priority Valve Management: Primary/Priority valve control closes a Primary/Priority valve during backwash of a filter to increase the flow through the filter being backwashed.
 - e. Alternate Lead Filter, In multiple filter systems, the controller shall automatically alternate the lead filter in each successive backwash cycle, in order to assure an effective full backwash of all filters in the system.
 - f. Backwash duration: Operator settable length of time to backwash each filter.
 - g. Dwell Time: Operator settable length of time to delay after each filter is backwashed.
3. Backwash Holding Tank Management: The controller shall be capable of monitoring the backwash holding tank to prevent overflow, by adjusting the backwash cycle as follows:
 - a. Suspend backwash when the holding tank is full, allowing time for the holding tank to drain.
 - b. Automatically resume backwash when the holding tank is empty.
 - c. An operator settable timeout which monitors the amount of time the backwash holding tank takes to drain. If this timeout is exceeded, a limit timer alarm is activated and the backwash cycle cancelled.
 4. Advanced Backwash Optimization: The controller shall be capable of the following advanced features as part of the normal backwash programming:
 - a. Backwash accessory: Turns on an additional relay before, during, and/or after backwash operations based upon operator settable parameters; useful for sites where application of a dechlorination agent to backwash water (holding tank) is required.
 - b. Water Saving (Turbidity): The controller shall be capable of monitoring backwash effluent turbidity and ending a filter backwash early upon reaching a desired turbidity set point.
 - c. Filter Isolation: During backwash suspension due to full backwash holding tank, allows suspended filter to be isolated from the system rather than being returned to filter mode. This prevents the filter bed from recompacting, making the resumed backwash rapidly effective. Requires properly equipped filters.
- H. Main Recirculation Pump
1. On/Off Control with Relay:

Controller shall provide the capability to interface to and control a recirculation pump with a programmable relay. The controller shall include the following capabilities, available as appropriate based upon installed sensors and implemented features:

 - a. Fireman Switch: The following events shall satisfy Fireman Switch timing requirements prior to turning off recirculation pump:
 - 1) Backwash Operations
 - 2) Energy Conservation mode (24 hr, 7 day function)
 - 3) Manual off
 - b. Immediate: The following events immediately turn off recirculation pump, regardless of Fireman Switch timing requirements:
 - 1) Surge Tank Level Low Alarm: Turn off pump immediately (surge tank is almost empty)
 - 2) Strainer Vacuum High Alarm: Turn off pump immediately (possible entrapment)
 - 3) Emergency shutdown, triggered by front-panel Emergency Off: Turn off pump immediately (per Operator)

- I. Total Dynamic Head (TDH)
 - 1. Controller shall provide the capability to continuously monitor the Total Dynamic Head (TDH) of the main recirculation pump, directly calculated by the controller from recirculation pump influent vacuum and filter influent pressure transducers. TDH shall be displayed on the user interface and recorded in data logs, with user-programmable High and Low TDH Alarm settings.

- J. Control Outputs
 - 1. Relay Outputs - Solid-State Relays:
The controller shall come with a total of 4 integral line or dry contact 5A solid-state relay outputs capable of switching 3A under all normal operating conditions, accounting for the effects of the temperature gradient inside the NEMA 4X enclosure. Systems that utilize relays that are not de-rated must submit an engineering evaluation justifying the use of relays at their full, optimal-condition capacity.
 - 2. Mechanical Relays
The controller shall come with a total of 3 mechanical relays:
 - a. 1 integral 8A dry contact mechanical relay, and
 - b. 4 integral 3A dry contact or line powered mechanical relays.
 - c. Since mechanical relays have the inherent risk of failing in the closed (active) position, as a safety measure the controller shall preclude the ability to assign any of the integral mechanical relays to chemical feed functions. Systems that do not preclude mechanical relays from being configured for chemical feeds shall not be considered equal.
 - 3. Expansion Relay Outputs
 - a. The controller shall be capable of expanding the number of relay outputs available by adding up to 3 expansion modules in any combination.

- L. Solid-State Relay Expansion Modules
 - 1. Each Solid-State Relay Expansion Module provides 5 integral 5A solid state dry contact or line powered relays capable of switching 3A under all normal operating conditions. Systems that utilize relays that are not de-rated must submit an engineering evaluation justifying the use of relays at their full, optimal-condition capacity.

- M. Mechanical Relay Expansion Modules
 - 1. Each Mechanical Relay Expansion Module provides 5 integral mechanical relays:
 - a. 1 integral 8A dry contact mechanical relay, and
 - b. 4 integral 3A dry contact or line powered mechanical relays.
 - c. Since mechanical relays have the inherent risk of failing in the closed (active) position, as a safety measure the controller shall preclude the ability to assign any of the integral mechanical relays to chemical feed functions. Systems that do not preclude mechanical relays from being configured for chemical feeds shall not be considered equal.

- N. Safety Features
 - 1. Manual-On limit
 - a. The controller shall have built-in limits to the amount of time any relay control output may be forced on (i.e. in "Manual On" mode). This is an important safety feature to prevent control outputs from inadvertently being left forced on after service or diagnostics.
 - 2. High/Low Alarm Settings & Control Lockouts

- a. The controller shall have programmable high and low alarm settings for pH, ORP, PPM, temperature, low flow & no flow and chemical overfeed, turbidity, pressure & vacuum, surge tank levels, chemical inventory.
 - b. The controller shall have a programmable lockout of sanitizer feed upon pH high or low alarm.
3. No Flow Alarm & Flow Restored Delay
- a. The controller shall activate a No Flow alarm when the dedicated sample stream flow switch indicates there is insufficient flow through the sample stream. This No Flow alarm shall lockout all chemical feed control operations.
 - b. The controller shall include a Flow Restored Delay, which shall extend the No Flow lockout user-programmable amount of time after the No Flow alarm ends (i.e. flow is restored). This feature is necessary to assure that the system has valid, stable sensor readings of circulating water prior to making chemical feed control decisions.
- a. Feed Limit Alarms
 - b. The controller shall trigger a Failsafe alarm if a chemical feed relay remains on longer than the programmable Feed Limit Timer. Chemical feeds shall automatically be disabled if the corresponding reading goes into a Failsafe alarm condition.
4. Emergency Off
- a. The controller shall have a dedicated Emergency Off button on the front panel of the system, which immediately halts all chemical feeds and control outputs when pressed. This feature shall be password protectable, which shall require entry of one of the Security passwords.
5. Safety Shield
- a. The controller shall include a safety shield or other mechanism for allowing fuse replacement without access to high voltage circuitry or wiring.
- O. Security
1. The controller shall have three security password levels: six for operators, two for managers and one for the distributor providing for a history of access identified by the user.
- P. Data Logging
1. The controller shall have 512K battery backed-up RAM for input level recording and events. All input level shall be recorded for 10 to 56 days depending on sample rate (2 to 10 minutes).
 2. The controller shall record and maintain the latest 1100 events over a maximum of 14 days recording all alarms, parameter changes, user logins, and operational cycles related to all control features
- Q. Local Alarms / Indicators
1. The controller shall signal all alarm conditions with the following indicators:
 - a. A bright red flashing LED on the front of the controller,
 - b. Activation of a master alarm signal provided as a dry contact relay enabling the use of 0-240 VAC alarms, and each active alarm listed on the LCD display along with time activated.
- R. Remote Communication, Access and Alarm Notification
1. Ethernet
 - a. The controller shall come with a standard, integral 100BaseT Ethernet connection. The controller shall be capable of providing Remote Access via PC with Ethernet connection and Alarm Notification via email or text message via an Ethernet connection to the Internet.

- S. Enclosure
 - 1. The controller shall be housed in a NEMA 4X polycarbonate enclosure.

- T. Flow Cell
 - 1. PVC flow cell
 - a. The flowcell shall have a PVC body with two 1/2" NPT ports for pH and ORP sensors, two 1/4" NPT ports for temperature sensor and sensor wash acid injection, and a clear acrylic front viewing window. The flowcell design shall provide precise sample flow rate and water velocity regulation past the probes. The flowcell shall come provided with PVC 1/2" isolation ball valves, PVC 1/4" wet test valve and standard reed or optional rotary flow switch.
 - b. Each flowcell shall be equipped with a pressure-sensing device. The pressure sensor shall consist of a compound pressure/vacuum gauge manufactured in stainless steel, 2 1/2" diameter, liquid filled with an operating pressure range of 0 to 60 psig and vacuum of 0 to -30 in./ Hg.

- U. Packaged System Enclosure
 - 1. The equipment room controller and flowcell with sensors shall be mounted onto a 3/8" thick PVC backplate. The flowcell shall be completely assembled and reading for integration into the plumbing.

- V. AC Surge Suppression
 - 1. An integrated solid state device shall be furnished to protect each mechanical room control system from excessive line voltage at controller.
 - 2. Device shall be housed in a tamper proof enclosure provided with mounting tabs and have 1/2" NPT hardwire connection, with LED indicator light, UL listed.

- W. Commissioning / Start-Up, Warranty and Manuals
 - 1. Controller and sensing probes (ORP, pH, ppm) shall be covered by a standard manufacturer's 5-year warranty. Manufacturer's representative shall provide a complete set of new probes on the fifth year of operation.
 - 2. The control system shall be provided with on-site start-up, on-site operator training, and 2 years on-site warranty service performed by a factory trained and certified representative of the controller manufacturer.
 - 3. Manufacturer's representative shall supply an Operator's Manual describing system features and operating instructions.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

- A. Inspection:
 - 1. Prior to installing the items of this Section, carefully inspect the installed Work of other trades and verify that all such Work is complete to the point where this installation may properly commence.
 - 2. Verify that the swimming pool equipment items may be installed in strict accordance with original design, pertinent codes and regulations, and the manufacturers' recommendations.

- B. Discrepancies:
 - 1. In the event of discrepancy, immediately notify the District's Representative.
 - 2. Do not proceed with installation in areas of discrepancy until all such discrepancies are fully resolved.

3. Failure to notify the District's Representative and give written notice of discrepancies shall constitute acceptance by the Installer of existing conditions as fit and proper to receive its Work.

3.02 INSTALLATION

- A. Supply and install items of swimming pool equipment in strict accordance with applicable codes and regulations, the original design, and the manufacturer's published recommendations, anchoring firmly and securely for long life under hard use.
- B. Coordinate with other trades to insure all imbedded items are set plumb and flush. Railing ends must have anchor sockets and escutcheon plates. Be certain that deck equipment and railings are properly bonded prior to imbedding.
- C. All equipment shall be braced and/or anchored to resist a horizontal force acting in any direction using the criteria shown on the Drawings.

3.03 INSTRUCTION

- A. The Contractor shall provide a factory certified representative(s) to start-up and certify proper installation, operation and full warranty status of all swimming pool mechanical equipment. The Contractor shall provide not less than two 8-hour days of on-site training for facility staff in the operation and maintenance of the swimming pool mechanical equipment and systems. The two 8-hour days shall be separated by a minimum of seven calendar days and be completed within the 14-day start-up period.

3.04 EQUIPMENT ACTIVATION

- A. All water chemistry and filtration mechanical equipment shall be operational upon filling of pool after plaster. Chemicals and other related support items as supplied by Contractor, shall be in supply at start-up.
- B. For the first fourteen (14) calendar days after completion of the pool plaster, brush all plastered surfaces at least twice a day and coordinate with General Contractor to ensure that the plaster is carefully maintained after the initial fourteen-day period. In addition, coordinate with the Contractor to ensure that pool filtration equipment is continuously running during the initial fourteen-day period.
- C. Start-up and provide qualified personnel to operate pool equipment for a period not less than fourteen (14) days after the pool is placed in operation, or until the District takes occupancy of the facility or letter of substantial completion. During this time, Contractor shall instruct and supervise the District's personnel in the various operating and maintenance techniques involved. Contractor shall be responsible for supply of chemicals during this not less than fourteen (14) day period and at time of turnover to District, chemical storage tanks shall be full. (District's personnel shall be fully trained and capable of assuming swimming pool maintenance tasks, training may begin before District takes occupancy).

3.05 CLEAN-UP

- A. Upon completion of swimming pool equipment, remove all debris, materials and equipment occasioned by this Work to the approval of the District's Representative.

END OF SECTION

SECTION 13 11 07

SWIMMING POOL MECHANICAL

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Swimming pool mechanical piping as indicated on the Drawings for circulation and filtration systems, pool water heating systems, chemical control systems, booster pump systems and appurtenances.
- B. Domestic water system from points of connection within swimming pool mechanical equipment room to make-up water system.
- C. Filter backwash piping to point of connection with backwash retention pit as required.

1.02 QUALITY ASSURANCE

- A. Qualifications of Workers:
 - 1. The entity performing the work of this Section shall have been successfully engaged in the respective trade for at least five (5) years immediately prior to commencement of the Work.
 - 2. For actual construction operations, use only trained and experienced workers with a minimum of three (3) years experience with the materials and methods specified.
 - 3. Provide at least one person who shall be present at all times during execution of the work of this Section, with a minimum of five (5) years experience with the type of materials being installed, the referenced standards, and who shall direct all Work performed under this Section.
- B. Standards:
 - 1. All equipment supplied or work performed shall comply with Chapter 31B of California Building Code, latest edition.
 - 2. Work shall be performed in accordance with the applicable editions of all National, State and local codes, laws, regulations and ordinances, including the following:
 - a. American National Standards Institute (ANSI).
 - b. American Society for Testing Materials (ASTM).
 - c. American Waterworks Association (AWWA).
 - d. American Welding Society (AWS).
 - 3. Do not construe anything in the Drawings or Specifications to permit Work not conforming to these requirements.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. Provide submittals in conformance with the requirements of Section 01 33 00.
- B. Required submittals include:
 - 1. Pipe and Fittings as specified in Article 2.02 of this Section.
 - 2. Valves as specified in Article 2.03 of this Section.
 - 3. Pressure / Vacuum Gauges as specified in Article 2.04 of this Section.
 - 4. Pipe Hangers and Supports as specified in Article 2.05 of this Section.
 - 5. Sleeves and Waterstops as specified in Article 2.06 of this Section.

- C. Submit proof of qualifications as specified in Article 1.02.A of this Section.

1.04 PRODUCT HANDLING

- A. **Delivery:** Deliver all materials to the Project Site in the manufacturer's original unopened containers with all labels intact and legible.
- B. **Storage:** Store all materials under cover in a manner to prevent damage and contamination, and store only the specified materials at the Project site.
- C. **Protection:** Use all means necessary to protect swimming pool mechanical items before, during and after installation and to protect the installed Work specified in other Sections.
- D. **Replacements:** In the event of damage, immediately make all repairs and replacements necessary to the approval of the District's Representative and at no additional cost to the District.

1.05 JOB CONDITIONS

- A. Cooperate with entities performing Work specified in other Sections to so that no conflict of new construction or occupied space may occur. Should any installation Work be done without such craft coordination, that Work so installed shall be removed and re-installed.

PART 2 - PRODUCTS

2.01 PRODUCT QUALITY

- A. Materials and equipment shall be new, of the best quality for the purpose intended, and shall be clearly marked with the manufacturer's name and nameplate data or stamp and rating. As far as practicable, materials and equipment shall be of one manufacturer.

2.02 PIPE AND FITTINGS

- A. PVC Schedule 40: Type 1, normal impact, NSF approved for solvent welding applications, ASTM Specification D-1785, color shall be white. Dura, Lasco, or approved equal.
- B. PVC Schedule 80: Type 1, normal impact, NSF approved for solvent welding applications, ASTM Specification D-1785, color shall be gray. Dura, Lasco, or approved equal.
- C. CPVC Schedule 80 Influent/Effluent Heater Piping: Type 1, normal impact, NSF approved for solvent welding applications, ASTM Specification D-1785, color shall be gray. Dura or Lasco.
- D. PVC DR25: Conforming to AST D-1784, use with epoxy coated bell and spigot-type fittings or epoxy coated mechanical joint by flange adapters with epoxy coated cast iron fittings as specified in Article 2.02 (F), below. Johns-Manville "Big Blue", Diamond Plastics, or approved equal.
- E. Copper Tubing: ASTM Specification B-88, hard drawn, with ANSI Standard B16.22 wrought copper fittings.
- F. Steel: ASTM Specification A-120, Schedule 40 black or galvanized pipe with ASTM A-47 150 lb. banded malleable iron threaded fittings.

- G. Cast Iron: ASTM Specification B16.1, cast iron flanged fittings, provide epoxy coating as required for use with chlorinated water.

2.03 VALVES

- A. Ball Valves:
 - 1. For pool system: True-Union design, PTFE seat material with FPM or FKM Double O-ring stem seals, locking handle, NSF certified. PVC schedule 80 body for below grade installation. PVC Schedule 80 body for above grade installation. Furnish ball valves on all pipe diameters 2½" or less with a rating of at least 200psi at 73°F. Asahi, Ipex, or Nibco.
 - 2. For copper pipe system: 3-piece full-port Bronze body valve with Teflon seat, 'Apollo', 'Nibco' or approved equal.
- B. Butterfly Valves:
 - 1. Epoxy coated cast or ductile iron body, 316 stainless steel disc and stem, viton seat material, furnish hand wheel/gear operators on all valves 8" and larger. DeZurick, Keystone, Ipex, or equal.
 - 2. PVC body, PVC disc and EPDM construction suitable for chlorinated water applications. Stem shall be of 316 stainless steel and non-wetted. Valves shall be self-gasketed design with a convex sealing arrangement. Valves 1-1/2" – 10" shall be rated to 150 psi and 12" valves shall be rated to 100 psi at 70°F. Asahi Pool-Pro, no known equal.
- C. Check Valves: Wafer-type, epoxy coated cast or ductile iron body, 316 stainless steel plates and shaft, viton seat material. Centerline, Metraflex, or approved equal.
- D. Surge Chamber Float Valve: EPD #2-0020-230 Float Control Valve, 10" line size, as manufactured by Environmental Products Division of Doughboy Recreational, Rancho Cucamonga, CA, no known equal.
- E. Surge Chamber Isolation Valve: Butterfly valve, tapped lug style, bronze body, stainless steel stem, bronze disc, phenolic back-up ring, EPT seat material. Provide stainless steel shaft extension, shaft housing and tool operator located 2'-0" above floor level with deck access grate as required. DeZurick, Keystone, Asahi, Spears or Ipex or approved equal.
- F. RP Backflow Preventer: Febco #835-B for 2" and smaller; #825 for 2-1/2" and larger. Febco, Watts, or approved equal.
- G. Make-up Water Control: 3" 'Cla-Val' fill system to include 3" 'Cla-Val' solenoid control valve #136-01BY, 3" ductile iron, epoxy coated body with cast iron disc retainer and diaphragm washer, bronze trim, flanged globe pattern, 120V at 60 Hz. Solenoid wiring shall be wired to water chemistry controller. Provide 6" air gap at fill point.

2.04 PRESSURE / VACUUM GAUGES

- A. Furnish and install pressure and vacuum gauges on the discharge and suction sides of all pumps. 2" or 2 ½" dial, bottom connection, chrome ring, shut-off cock and snubber. Ranges shall be selected to indicate between mid-point and two-thirds of maximum range under design conditions. Marsh, Terrice, or approved equal.

2.05 PIPE HANGERS AND SUPPORTS

- A. General:
1. The requirements of this Section relates to various requirements of the Agreement, General and Supplementary Conditions, Specifications, Drawings, and modifying documents which are part of the Construction Contract. Responsibility for coordination of all such applicable requirements will be that of the Contractor.
- B. Description:
1. This section provides guidelines and limitations for the support of all mechanical, electrical, plumbing or architectural items from the building structure, and for the seismic bracing of such items.
 2. Design and install all support and bracing systems as required for the swimming pool systems. Provide for attachment to portions of the building structure capable of bearing the loads imposed. Design these systems to not overstress the building structure.
- C. Quality Assurance:
1. Design and install all support systems to comply with the requirements of the 2016 California Building Code, Chapter 16A.
 2. Seismic bracing is to be designed by a professional engineer licensed in the State of California.
 3. For the seismic bracing of mechanical, electrical and plumbing system, refer to "Guidelines for Seismic Restraints of Mechanical Systems and Plumbing Piping Systems" by Sheet Metal and Air conditioning Contractors National Association, Inc., (SMACNA) for guidelines.
- D. Submittals:
1. Submit shop drawings for all substructures and attachment methods.
 2. Submit proposed alternative methods of attachment for review and approval by the Architects, prior to deviating from the requirements given below.
 3. For all pipe hangers and support systems, submit structural calculations and details which include all resultant forces applied to the building structure and are prepared and signed by the Contractor's licensed California professional engineer. Calculations will be reviewed for compliance with design criteria, not for arithmetic.
- E. Materials:
1. Use Kin-Line, Grinnel, or approved equal.
 2. Support all pipelines individually with hangers, each branch having at least one hanger. Lateral brace as noted and required.
 3. Support piping near floor with steel stanchions welded to end plates secured to pipe and floor.
 4. Support vertical piping at each floor level. Install coupling in piping at each support. Coupling shall rest on and transmit load to support. Isolate copper from steel supports with vinyl electrician's tape around pipe and coupling.
 5. Use Stoneman "Trisolator," Unistrut, or approved equal, isolators at each hanger and other support points on bare copper tubing system.
 6. For PVC pipe, space hangers four (4) feet apart for pipe sizes 1" and under, five (5) feet apart for pipe sizes 1-1/4" to 2", and six (6) feet apart for pipe sizes over 2". Space hangers for horizontal pipes at a maximum of six (6) feet for copper 2" and smaller and for steel 1-1/4" and smaller; ten (10) feet for copper 2-1/2" and larger and for steel 1-1/2" and larger.
 7. Size hanger rods, screws, bolts, nuts, etc., according to manufacturer's sizing charts.
 8. Trapeze hangers may be used for parallel lines.
 9. Use galvanized or cadmium plated hangers, attachments, rods, nuts, bolts, and other

accessories in pool mechanical room, high humidity areas, or where exposed to weather. Hot dip galvanize all items which are not factory furnished. Plating for hinged movements must be done at the factory.

10. Lateral Bracing: To prevent swaying of the piping systems, provide angle iron bracing and anchor into wall or overhead framing. Piping shall be braced or anchored in such a way as to resist a horizontal force of 50% of its operating weight in any direction.
11. Do not use wire or other makeshift devices for hangers.
12. Furnish all substructures and fasteners required to comply with the limitations given below. Use material as specified in the various sections and as appropriate to their use.

F. Guidelines & Limitations:

1. Each Contractor will coordinate the load requirements from all subcontractors so that no combination of loads overstresses the building structure or exceed the limitations given below.
2. Concrete Structure:
 - a. Support all loads hung from concrete structure with cast-in-place inserts, unless drilled-in anchors are specifically approved in writing prior to placing the concrete.
 - b. Concrete anchors must not penetrate into reinforcing bars. Where the anchors boring indicates the presence of reinforcing bar, patch hole with an epoxy type grout and relocate anchor 12 diameters away.
 - c. Individual expansion anchors cannot support any loads greater than 300 pounds or manufacturer's specified load capacity without approval.
3. Steel Structure:
 - a. Hang no more than 20 pounds per metal deck rib in any span.
 - b. At beams, hang all beam loads greater than 40 pounds concentric to beam, not off the flanges.
 - c. Attached no loads to the beams or girders greater than the following without specific approval from the architect;
 - 1) Roof beams and girders: 300-pound point load or 600-pound total load for a single span.

G. Seismic Bracing:

1. Design and install seismic bracing to not ground out vibration and sound isolation systems.
2. All items of mechanical and electrical equipment 60" or more in height are to be seismically braced whether such bracing is shown or not.

2.06 SLEEVES AND WATERSTOPS

- A. Provide sleeves where work of this Section passes through fire rated partitions, floors and ceilings, concrete slabs or exterior of structure. Caulk clearance space using sealant appropriate for application in conformance with manufacturer's recommendations and Title 24 of California Code of Regulations. 3m, Dow Corning, or approved equal. In lieu of sleeves and caulking, "Link Seal" products may be used.
- B. Provide prefabricated waterstops as indicated on the Drawings at all pipe penetrations through structures containing stored water (i.e., swimming pools, balance/surge tanks, etc.) to insure leak-proof seals.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Inspection:
 - 1. Prior to Work of this Section, carefully inspect the installed Work of other trades and verify that such work is complete to the point where this installation may properly commence.
 - 2. Verify that items of this Section may be installed in accordance with the original design and referenced standards.

- B. Discrepancies:
 - 1. In the event of discrepancy, immediately notify the District's Representative.
 - 2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.
 - 3. Failure to notify the District's Representative and give written notice of discrepancies shall constitute acceptance by the Contractor of existing conditions as fit and proper to receive his work.

3.02 ABBREVIATIONS AND SYMBOLS

- A. Abbreviations and symbols on the Drawings are those most commonly used. Obtain clarification from the District's Representative on any questionable items before bid.

3.03 GENERAL PIPING REQUIREMENTS

- A. Size any section of pipe for which size is not indicated or any intermediate section erroneously shown undersized the same size as the largest pipe connecting to it. Sizes listed are nominal.

- B. Cut pipe accurately to job measurements and install without springing or forcing, true to line and grade, generally square with building and/or structures and adequately supported to prevent undue stress on pipe, fittings and accessories.

- C. Make changes of direction with manufactured fittings. Street ells, bushings, reducing flanges, close nipples or bending of pipe is not allowed.

- D. Use great care to install piping in accordance with best practice. Plastic pipe shall be "snaked" in trenches to allow for thermal expansion.

- E. All above grade, below grade and buried or imbedded PVC shall be installed using solvent weld fittings. Also, each and every fitting and pipe end shall be prepared with solvent primer. Fittings shall be joined individually and with enough time between assembly of adjacent joints to allow them to seal solidly. After joining, an even ring of primer must be visible around the entire fitting. If any fittings are installed without visible primer, the fitting shall be removed and discarded and piping recut, rechamfered and joint made up again using a new fitting. All procedures, methods and techniques used to make up solvent weld joints shall be in strict accordance with manufacturer's recommendations.

- F. Arrange pipe and hangers to allow for expansion, contraction and structural settlement. No pipe shall contact structure except penetrations as shown on the Drawings.

- G. Provide dielectric connections between copper and dissimilar metals. In copper systems, threaded piping including connections to equipment shall be brass pipe and fittings. Install dielectric connections in vertical sections of piping only.

- H. Run pipe full size through shut-off valves, balancing valves, etc. Change pipe size within three (3)

pipe diameters of final connection to control valves, fixtures and other equipment.

- I. Provide unions or flanges at connections to equipment, on service side of valves and elsewhere as required to facilitate ease of maintenance.
- J. Locate equipment shut-off valves as close to equipment as possible maintaining easy valve access.
- K. Make all connections between domestic water systems and equipment or face piping with approved backflow prevention devices as required.
- L. All PVC pipe exposed to direct sunlight shall be painted with two coats of Exterior Acrylic Semi-Gloss Paint, Sherwin Williams or equal. Color to be selected by the Architect. Prior to painting the PVC pipes, the exterior of all PVC pipes shall be wiped with Methyl Ethyl Ketone, or an approved equal, to remove the glaze from the pipes.
- M. The Main Drain pipe must run either level or uphill from the main drain sump, through the surge pit (if applicable) and then to the circulation pump.

3.04 TRENCH EXCAVATION AND BACKFILL

- A. Excavation:
 - 1. Excavate and backfill trenches as required for the Work of this Section. Conform to requirements of Section 13 11 01
 - 2. The Contractor shall perform all excavation of every description and of whatever materials encountered, to the depths indicated on the Drawings or as necessary. The Contractor shall dispose of the excavated materials not required or suitable for backfill as directed, and shall perform such grading as may be necessary to prevent surface water from flowing into the trenches. The Contractor shall provide adequate equipment for the removal of storm or subsurface waters, which may accumulate in the excavated areas.
- B. Trenching:
 - 1. Excavate trenches to lines and grades as indicated on the Drawings and with banks as nearly vertical as practicable.
 - 2. Bottoms of trenches shall be accurately graded to provide uniform bearing on undisturbed soil for the entire length of each section of pipe.
 - 3. The width of the trench at and below the top of the pipe shall be such that the clear space between the barrel of the pipe and the trench wall shall not exceed 8" on either side of the pipe. The width of trench above the top of pipe may be wider if necessary.
 - 4. Over-depth excavations shall be filled with tamped sand to required grades.
 - 5. Excavations of five (5) feet or more in depth shall be shored or supported in conformance with rules, and regulations of State and Federal Governments. Shoring shall be constructed, maintained and removed in a manner to prevent caving of the excavation walls or other load on the pipe.
- C. Backfilling:
 - 1. Material for backfilling of pipes shall be approved granular material less than two (2) inches in diameter obtained from the excavation. No material of a perishable, spongy or otherwise unsuitable nature shall be used as backfill.
 - 2. Backfilling of pipe trenches shall commence immediately after installation and testing to preclude damage to the installed pipe. Backfill around pipe shall be carefully placed so as not to displace or damage the pipe, and shall be carried up symmetrically on each side of the pipe to one foot above the top of the pipe. The material shall be carefully compacted or consolidated before additional backfill is placed.

3. Backfill above an elevation of one foot above the top of pipe in conformance with requirements of Section 13 11 01. Material for balance of backfill shall be approved granular material less than six (6) inches in diameter taken from the excavation.
4. Unless otherwise indicated on the Drawings, all pipe shall have a minimum of eighteen (18) inches of cover.

3.05 GENERAL EQUIPMENT REQUIREMENTS

- A. Position equipment to result in good appearance and easy access to all components for maintenance and repairs.
- B. Install piping, flues, breeching and ducts so that they do not interfere with equipment access.
- C. Install level, secure and out of moisture. Provide shims, anchors, support straps, angles, grouted bases, or other items as required to accomplish proper installation.
- D. All screws, nuts, bolts and washers shall be galvanized, cadmium plated or stainless steel. After fabrication, hot-dip galvanize unfinished ferrous items for outdoor, below grade or other use subject to moisture.
- E. Extend 1/2" Schedule 40 black steel pipe lubrication tubes from all hard to reach locations to front of equipment or to access points. Terminate with proper type of lubrication fitting.

3.06 VALVES AND STRAINERS

- A. If no shut-off is indicated, provide ball valves at inlet connections and balance valves at outlet connections to fixtures and equipment. Provide proper valve trim for service intended.
- B. Use no solder end valves unless noted otherwise; provide adapters in copper tubing systems.
- C. Locate valves with stems above horizontal plane of pipe. In general, locate valves within six (6) feet of floor, out from under equipment, in accessible locations with adequate clearance around hand wheels or levers for easy operation.
- D. Provide all valves, cocks and strainers, full pipe size unless indicated otherwise.
- E. Provide hand wheel operators on all valves 6" and larger, under 6" lever operators may be used.
- F. Provide tool operated valve with stainless steel shaft extension and 'on deck' tool operation for surge chamber butterfly isolation valve.

3.07 IDENTIFICATION OF PIPING

- A. Identify each valve by a numbered brass tag with hole and brass chain mounted on valve stem or handle. Tag to be a minimum of 1" in diameter and numbers at least 1/4" high stamped into tag.
- B. Install an identification chart in a plastic or glass framed enclosure, which schematically illustrates the proper operation of all piping systems and indicates number and location of all valves and control devices within the system.
- C. The direction of flow for the recirculation equipment shall be labeled clearly with directional symbols such as arrows on all piping in the equipment area. Where the recirculation equipment for

more than one pool is located on site, the equipment shall be marked as to which pool the equipment serves.

3.08 TESTS

- A. Perform tests in presence of District's Representative with no pressure loss or noticeable leaks.
- B. Do not include valves and equipment in tests. Include connection to previously tested sections if systems are tested in sections.

- C. Perform tests as follows:

System	Test Pressure	Test Medium	Duration
Skimmer Lines and Lawson Main Drain sump lines	20psig	Water*	4 hours
Pool Piping	50 psig	Water*	4 hours
Pool Main Drains	30 psig	Water*	4 hours
Domestic Water	150 psig	Water*	4 hours

*Never test PVC pipe or fittings with air or other gases, always use water.

3.09 PIPE MATERIAL APPLICATION

- A. PVC Schedule 40: Below grade swimming pool piping and domestic water piping up to 12" line size; use standard solvent weld fittings.
- B. PVC Schedule 80: Above grade swimming pool piping up to 12" line size; use solvent weld Schedule 80 or epoxy coated cast iron fittings.
- C. Type L Hard Copper: Above grade domestic water piping.
- D. CPVC Schedule 80; Pool Heater Piping.
- E. Schedule 40 Steel: Natural gas piping.

3.10 CUTTING AND DRILLING

- A. Cutting or drilling necessary for installation of Work of this Section shall be done only with approval of District's Representative.

3.11 CLOSING-IN OF UNINSPECTED WORK

- A. Do not cover or enclose Work before testing and inspection. Re-open Work prematurely closed and restore all Work damaged.

3.12 QUIETNESS

- A. Quietness is a requirement. Eliminate noise, other than that caused by specified equipment operating at optimum conditions, as directed by District's Representative.

3.13 FLUSHING OF LINES

- A. Flush or blow out pipes free from foreign substances before installing valves, stops or making final connections. Clean piping systems of dirt and dust prior to initial start-up.

- B. Just prior to plastering the pool, under the observations of the IOR, the pool mechanical system shall be flushed using the pool circulation pump. Circulate water through the mechanical system until the effluent water from the pool return heads runs clean.

3.14 CLEAN-UP

- A. After all Work has been tested and approved, the Swimming Pool Subcontractor shall thoroughly clean all parts of the equipment installations, including all pool pipe and fittings in the pool mechanical room. Exposed parts shall be cleaned of cement, plaster and other materials and all grease and oil spots removed with solvent.
- B. The Swimming Pool Subcontractor shall remove debris from the Project site. Cartons, boxes, packing crates and excess materials not used, occasioned by this work shall be disposed of to the satisfaction of the District's Representative.
- C. If the above requirements of clean up are not performed to the satisfaction of the District's Representative, the District reserves the right to order the work done, the cost of which shall be borne by the Swimming Pool Subcontractor.

END OF SECTION

SECTION 13 11 08

SWIMMING POOL ELECTRICAL

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide labor, materials and equipment as required to install the swimming pool electrical system including but not limited to:
 - 1. A complete and operable system of service equipment, switchboards, panelboards, conduits, switches, time clocks and wiring for power and lighting, motor control centers.
 - 2. Junction and/or pull boxes, conduits, disconnects, starters, contactors, wiring and connection of all motors and mechanical equipment, including connection and wiring of line voltage controls associated with the mechanical systems.
 - 3. Swimming pool underwater lighting systems.
 - 4. Swimming pool timing system.
 - 5. Complete grounding system as required and shown on the Drawings.
 - 6. Adjusting and preliminary operation of the completed electrical system as described in Article 3.06, A of this Section.
 - 7. Cleaning of all completed Work and installation adjustment of all trim and decorative items.

1.02 QUALITY ASSURANCE

- A. Qualifications of Workers:
 - 1. The entity performing the work of this Section shall have been successfully engaged in the respective trade for at least five (5) years immediately prior to commencement of the Work.
 - 2. For actual construction operations, use only trained and experienced workers with a minimum of three (3) years experience with the materials and methods specified.
 - 3. Provide at least one person who shall be present at all times during execution of the work of this Section, with a minimum of five (5) years experience with the type of materials being installed, the referenced standards, and who shall direct all Work performed under this Section.
- B. Ordinances and Codes: Materials and construction shall conform with all applicable code requirements, including:
 - 1. National Electrical Code; Electrical Safety Orders of the State of California; Department of Industrial Relations; regulations of the State Fire Marshal; rules and regulations of the Board of Underwriters of the Pacific.
 - 2. Chapter 31 of California Building Code, latest edition.
- C. Verification of Conditions:
 - 1. The locations shown on the Drawings are diagrammatic only and the exact finish location of equipment and materials cannot be indicated. Therefore, locations of all Work and equipment shall be verified to avoid interferences, preserve head room and keep openings and passageways clear. Changes shall be made in locations of equipment and materials which may be necessary to accomplish these purposes.
- D. Preliminary Operations and Testing:
 - 1. Motor driven equipment shall be tested for correct rotation and completion of all connec-

tions.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. Provide submittals in conformance with the requirements of Section 01 33 00. Requests for substitutions shall conform with requirements of Article 1.10 of Section 13 11 00.
- B. Required submittals include:
 - 1. Conduit and Fittings as specified in Article 2.02 of this Section.
 - 2. Panelboards as specified in Article 2.06 of this Section.
 - 3. Circuit Breakers as specified in Article 2.07 of this Section.
 - 4. Motor Starters as specified in Article 2.10 and 2.11 of this Section.
 - 5. Fuses as specified in Article 2.13 of this Section.
 - 6. Time Clocks as specified in Article 2.14 of this Section.
 - 7. Ground Fault Circuit Interrupters as specified in Article 2.15 of this Section.
- C. Submit proof of qualifications as specified in Article 1.02.A of this Section.

1.04 PRODUCT HANDLING

- A. Delivery: Deliver all materials to the Project Site in the manufacturer's original unopened containers with all labels intact and legible.
- B. Storage: Store all materials under cover in a manner to prevent damage and contamination, and store only the specified materials at the Project site.
- C. Protection: Use all means necessary to protect swimming pool electrical materials before, during, and after installation and to protect the installed Work specified in other Sections.

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

- A. Materials shall be new, in unbroken packages and bear the U.L. label of approval.
- B. Equipment of one type shall be by same manufacturer. One type of equipment for classifications such as:
 - 1. Switchboards, panels, buss duct, disconnect switches and allied items.
 - 2. Conduit.
 - 3. Wire.
 - 4. Conduit fittings.
 - 5. Fixtures of the same general type.
 - 6. Wiring devices.

2.02 CONDUIT AND FITTINGS

- A. Conduit within or under buildings or where exposed outdoors shall be rigid threaded, hot dipped, galvanized, or U.L. approved plastic except where noted otherwise on the Drawings. Metallic conduit shall be of the same metal between outlets or terminals.
- B. Use flexible metallic conduit only for short connections of motors and where specifically called for

on Drawings. Maximum length shall be 40". Use only liquid tight flexible metal conduit. Install an unbroken #12 AWG insulated copper grounding conductor in each liquid tight flexible conduit with permanent connection at motor junction box and service panel ground.

- C. Protect, before installation, metallic conduit runs in all slabs laid on grade or in contact with the earth or exposed in damp locations, with two (2) heavy coats of asphaltum rust-resisting compound.
- D. Encase conduits 2-1/2" or larger run underground, outside, or under buildings, in concrete envelopes a minimum of 3" thick, except as indicated otherwise on Drawings or stubouts. Conduits 2 and smaller laid 18" below finish surface in soil.
- E. Low voltage runs underground outside buildings, 1-1/4" or smaller, may be G.I. or sherardized steel conduit, with machine applied wrapping equal to double wrap or Scotch-Wrap #50 tape, half lapped and quadrupled at joints in lieu of concrete encasement.
- F. Service conduits through foundations or concrete members shall run through metal sleeves with adequate clearances for full movement of the conduit. Do not run conduits through footings.
- G. Secure conduits run exposed on surfaces with one hole heavy-duty straps or fasten with matching fittings to inserts or trapezes, parallel to building walls and ceilings.
- H. Cap all conduit or duct stub-outs with standard factory caps; except cap threaded steel conduit with B.I. water pipe caps in outdoor locations.
- I. Use conduit fittings as manufactured by Crouse-Hinds Company, Appleton Electric Co., or approved equal.
- J. Employ U.L. liquid tight fittings for use with liquid tight flexible metal conduit.
- K. Use unions as manufactured by Appleton, O-Z/Gedney, or approved equal. The use of running threads will not be permitted.
- L. Exposed conduit in mechanical/chemical rooms shall be rigid NEMA 3R Type suitable for installation in corrosive atmospheres.

2.03 GROUNDING

- A. Bond together and ground to a common ground at a single point all metallic conduit, piping systems, pool reinforcing steel, metal parts of ladders, lifeguard stands, handrails and their supports and the like. The bonding conductor shall not be smaller than #8 copper.

2.04 WIRING CONNECTIONS

- A. Make connections without strain on conductors, allowing the conductors to take a natural position after connections or taps are made. Include all strand of wire in making the connection.
- B. Make connections for wiring by one of the following means:
 - 1. Make all taps or connections to conductors with compression type connectors except those smaller than #8 B&S gauge may have soldered connections. Solderless connections for #10 AWG or smaller may be used and shall be "Scotchlok", Buchanan, or approved equal. For #8 AWG or larger, they shall be T&B "LockTite", Burndy "Versitaps", or

- approved equal.
- 2. All cable or conductor terminal lugs shall be Burndy "Quicklug", IlSCO, or approved equal. Two-piece stamped lugs and solder lugs will not be approved.
- 3. Paint taped splices in damp or outdoor locations with two (2) coats of insulating paint.
- 4. Tag all branch circuit wires with circuit number at the panelboard and at each point of use with linen or plastic tags.

2.05 CONDUCTORS

- A. Copper RHW or THW. Do not make splices between boxes.

2.06 COLOR CODING

- A. Neutrals (identified conductors shall be white).
- B. Phase conductors shall be red for phase B; blue for phase C.
- C. Green shall be used for mechanical equipment and receptacle grounds only.

2.07 MOTOR WIRING

- A. Make final connections to motors with the required AWG (Minimum #12), Flamenol machine tool wire, 19 strand. Control wiring for equipment shall be Flamenol machine tool wire, 19 strand of required AWG. Provide junction boxes at each item of equipment to change from standard building wiring to machine tool wire.
- B. Phase motors as proper in direction of rotation.

2.08 PANELBOARDS

- A. Panelboards shall be flush or surface mounting as indicated with circuit breakers as shown on panel schedule, hinged lockable doors, index card holders and proper bussing.
- B. Where indicated on the drawings, panelboards shall be furnished with subfeed breakers and/or lugs, split bussing, contractors, time switches, relays, etc., as required.
- C. All panelboards shall be keyed alike.
- D. All panelboards shall be finished with one coat of zinc chromate and coat of primer sealer after a thorough cleaning where exposed to public view (e.g., corridors, covered passages, offices, etc.) and gray in switchboard, janitor's heater and storage rooms. Prime coated panelboard shall be painted to match surroundings after installation. Panelboards shall be fabricated of sheet steel of the following minimum gauges: Doors and trim #12; enclosure - code gauge steel.
- E. Furnish all panelboards and terminal cabinets with Yale 46515 flush locks and LL806 keys except where indicated otherwise herein. Fasten the trim to panel boards and terminal cabinet by means of concealed, bolted or screwed fasteners accessible only when the door is open.
- F. Panelboards 208/120 volt, three phase, 4 wire, S/N or 120/240 volt, single phase, 3 wire, S/N.

Panelboard types as manufactured by:
Westinghouse

Type B10B

General Electric	Type NLAB
Square D	Type NQOB

- G. Panelboards for 480/277 volt, three panes, 4 wire, S/N.
Panelboard types as manufactured by:
- | | |
|------------------|---------------------|
| Westinghouse | Type Pow-R-Line 2 |
| General Electric | Type AE |
| Square D | Type NEHB |
| Sylvania | Type NH1B |
| I.T.E. | Type Approved Equal |
- H. Panelboard for bussing sizes thru 400 amp shall be 20" wide surface mounted type. Recess mounted type shall have a 20" wide (maximum) recess metal enclosure with trim plate cover extending 1" on all sides of enclosure. Depth shall be 5-3/4" nominal. Height of panel as required for devices.
- I. Provide 6" additional gutter space in all panels where double lugs are required, or where cable size exceeds bus size. Minimum bottom gutter space shall be 6" high. 12" additional gutter space may be required for aluminum feeders where used.
- J. Panelboards shown on the drawings with relays, time clocks or other control devices shall have a separate metal barriered compartment mounted above panel with separate hinged locking door to match panelboard. Provide mounting sub-base in cabinet for control devices and wiring terminal strips.
- K. Panelboard shall have a circuit index card holder removable type, with clear plastic cover. Index card shall have numbers imprinted to match circuit breaker numbers.

2.09 CIRCUIT BREAKERS

- A. Breakers shall have a minimum short circuit interrupting rating of 10,000A symmetrical for panelboard voltage thru 240 volt and 14000A for panelboards thru 600 volts or as specified on the drawings. In no case shall the interrupting rating be less than the bus withstand rating unless noted otherwise on the drawings.
- B. Circuit breakers as manufactured by the following companies only are acceptable:
1. General Electric Company
 2. Square D Company
 3. Westinghouse Company
 4. I.T.E. Company
- C. Circuit breakers shall be arranged in the panels so that the breakers of the proper trip settings and numbers correspond to the numbering in the panel schedules on the drawings. Circuit numbers of breakers shall be black-on-white micarta tabs or other previously approved method. Circuit number tabs which can readily be changed from front of panel will not be accepted. Circuit number tabs shall not be attached to or be a part of the breaker.
- D. Where two or three pole breakers occur in the panels, they shall be common trip units. Single pole breakers with tie-bar between handles will not be accepted.
- E. All circuit breakers shall be padlockable in the "off" position. Locking facilities shall be riveted or mechanically attached to the circuit breaker (submit sample for approval). Other means of attachment shall not be accepted without prior written approval of Architect.

- F. Where branch circuit breakers supply the power to motors and signal systems, the breakers shall be furnished with lockout clips, mounted in the "on" position. The breakers shall be able to trip automatically with lockout clips in place.
- G. Panelboard circuit breakers shall be bolt-on type.

2.10 BUSSING

- A. Bussing shall be rectangular cross section copper, or full length silver or tin-plated aluminum.
- B. Bussing shall be braces to withstand symmetrical short circuit ratings as follows or as noted on drawings. In no case shall bus short circuit bracing be less than specified circuit breakers.
- C. Each panelboard shall be equipped with a ground bus secured to the interior of the enclosure. The bus shall have a separate lug for each ground conductor. No more than one conductor shall be installed per lug.

2.11 TERMINAL CABINETS

- A. Terminal cabinets shall be fabricated of code gauge sheet steel for flush mounting (except where noted a surface) of size indicated on the drawings, and complete with hinged lockable doors and the number of 2-way screw terminals required for termination of all conductors. Terminal cabinet locks to operated form same key used for panelboards. The trim to terminal cabinets shall be fastened by means of concealed bolted or screwed fasteners accessible behind door to terminal cabinets. Terminal cabinets shall have 5/8" plywood backing. Cabinets shall be finished with one coat of zinc chromate and one coat of primer sealer after a thorough cleaning where exposed to public view Prime coated cabinets shall be painted to match surroundings after installation.
- B. Provide engraved nameplate on each cabinet indicating its designation and system (i.e., Swimming Pool - Panel 'SP').

2.12 MOTOR CONTROL INDIVIDUAL STARTERS

- A. Manual Motor Starters:
 - 1. Provide flush or surface mounting manual motor starters with number of poles and size of thermal overload heaters as required for the motor being controlled (equipped with overload heaters, one for each motor lead). Back boxes shall be supplied with all flush mounting starters whether they are toggle type requiring only a 4" square outlet box or the larger type requiring a special box and cover designed to accept the particular unit.
 - 2. Unless otherwise noted on the drawings, all manual starters for single phase motors, smaller than 1 h.p., shall be the compact toggle type. Manual starters for all single phase motors, 1 to 5 h.p., and all three phase motors up to 5 h.p. shall be the heavy duty type.
 - 3. Where manual motor starter is shown with pilot light, the pilot light shall be installed in a separate outlet box adjacent to the starter outlet, and engraved nameplate in indicate function of pilot light.
 - 4. The following motor starters as manufactured by:

Manufacturer	Single Phase 1HP and Below	Others
--------------	-------------------------------	--------

Arrow Hart	Type RL	Type LL
General Electric	CR 101	Class CR 1062
I.T.E.	Class C10, C11 or C12	Class C20
Square D Company	Class 2510, Type A	Class 2510, Type B & C
Westinghouse	Type MS	Type A100
Allen Bradley	Approved Equal	Approved Equal.

B. Individual Magnetic Motor Starters:

1. Magnetic motor starters shall be A.C. line voltage, across-the-line units in NEMA Type I enclosure, unless other types of enclosures are indicated.
2. All starters located outside of a building whether or not indicated shall be W.P. (weatherproof), and all starters noted W.P. shall be furnished in NEMA type 4 cast or stainless steel enclosures.
3. Starter shall be horsepower rated for the motor controlled, and shall be equipped with properly sized overload elements. Every pole shall be with overload element.
4. Verify the exact motor current and voltage characteristics with the Contractor supplying the motor before installation of a starter.
5. Each starter shall be equipped with "Hand-Off-Auto" switch or stop-start pushbutton as required.
6. Coils shall be designed to operate on voltage indicated on control diagrams and have built-in-under the voltage release for coil circuit to drop motor starter off the line when the line voltage drops below normal operating voltage.
7. The coil control circuit shall be independently fused, sized to protect coil.
8. Starters to be equipped with running pilot light indication with a "Push-to-Test" feature.
9. Magnetic starters shall have a minimum of two auxiliary contacts. Additional auxiliary contacts shall be provided as required to comply with the requirements of the wiring diagrams on the electrical and mechanical drawings and the description of the function in the Mechanical Section of the Specifications.
10. Minimum starter size shall be NEMA size I unless indicated otherwise.
11. The following types of magnetic motor starters as manufactured by:

Manufacturer	Type
General Electric	Class CR 106
I.T.E.	Class A20
Square D Company	Class 8536
Westinghouse	Type A200 (Size 4 Max.) or Class II-200 (Sizes 5-8)

2.13 INDIVIDUAL COMBINATION MOTOR STARTERS

- A. Combination starter shall incorporate fused disconnect switch and individual magnetic motor starter in a common enclosure. Combination starters shall be mounted in general purpose enclosures unless otherwise indicated on the plans. Starters shall comply with NEMA standards, size and horsepower as indicated on drawings General Electric, Square D, Westinghouse or I.T.E.
- B. The disconnect handle used on combination starters shall control the disconnect device with the door opened or closed. The disconnect handle shall be clearly marked as to whether the disconnect device is "ON" or "OFF", and shall include a two-color handle grip, the black side visible in the "OFF" position indicating a safe condition, and the red side visible in the "ON" position indicating an unsafe or danger condition.

- C. All starters used in combination starters shall be manufactured in accordance with the latest published NEMA standards, sizes, and horsepower ratings. These starters shall be furnished with three melting alloy type thermal overload relays.
- D. Thermal units shall be of one-piece construction and interchangeable. The starter shall be inoperative if a thermal unit is removed.

2.14 MOTOR CONTROL INTERLOCKS AND CONTROL DEVICES

- A. Refer to mechanical and plumbing drawings and specifications and provide all control devices including timeswitches, relays and interconnection of starters of required.
- B. Mount all relays and timeswitches in a separate compartment in motor control center unless otherwise indicated.
- C. Whether shown on mechanical and plumbing drawings or control center schedules or not, where motors are controlled by external devices (i.e., thermostats, relays, float or pressure switches, etc.) or interlocked with other motors, each motor starter to be equipped with a "Hand-Off-Auto" selector switch in starter cover. Other starters equipped with a "Start/Stop" pushbutton station in starter cover.

2.15 FUSES

- A. Fuses shall be dual element, current limiting type, U.L. Class RK5 unless otherwise indicated on the drawings. Provide one spare set of fuses of each size and type in each motor control center.

2.16 TIME CLOCKS

- A. Time clocks shall be provided for all underwater lighting systems and swimming pool circulation pumps not controlled by filter microprocessors.
- B. Contacts shall have a minimum rating of 40 amperes at 277V.
- C. Timing motor shall be heavy duty synchronous, self starting, high torque type, and shall be rated at 120, 208, 240, 277 volt 60 Hz.
- D. Motor shall operate normally at temperature range of -60 degrees Fahrenheit to +120 degrees Fahrenheit.
- E. Dial shall be 3" diameter, clearly calibrated with day/night zones and 24 hour rotation, with gear to provide one revolution yearly which automatically varies the on/off settings each day according to seasonal changes. Day and month of the year shall show clearly through calendar window on the dial.
- F. Time clocks shall be equipped with 7-spoke omitting wheel marked with days of the week.
- G. Time clocks shall be housed in a flush enclosure where supply circuits emanate from a flush mounted panelboard and surface enclosure when supply circuits are from a surface mounted panel.
- H. Acceptable manufacturers are Tork, Paragon, or approved equal.

2.17 GROUND FAULT CIRCUIT INTERRUPTERS

- A. Minimum rating shall be 20 amperes, 125V, 5 milliampere trip setting, Class A per UL943.
- B. Manufacturer to be Crouse-Hinds, Leviton, or approved equal.

2.18 BOXES

- A. Boxes shall be of the size required by ordinances or larger, and of pressed galvanized code gauge steel where concealed or exposed on ceilings. Exposed boxes on walls below 7'6" shall be cast steel similar to "FA" condulets.
- B. Outlets to be surface where wiring is exposed and flush in areas where conduit is concealed.
- C. Provide surface outlets with proper galvanized steel surface cover. Box and cover shall be deep enough to provide at least 1/4" clearance between back of device and back of box. Where box contains more than one device, use proper gang box with proper cover. Surface outlet boxes shall be of the threaded hub type wherever below 8'0".
- D. Provide exposed junction boxes with proper flat blank galvanized cover. If necessary for cable installation, additional pull boxes or junction boxes may be installed in accessible locations.
- E. Where pull boxes larger than outlet boxes are required, galvanized code gauge sheet steel boxes may be used with covers attached by brass machine screws. Boxes exposed to the weather shall be approved for the purpose, and conduit entrances shall be on the bottom made by means of an interchangeable hub with gasket and adapter nut. Pull boxes not shown on Drawings may be added only after approval of size and location is obtained.
- F. For outlets exposed to weather or where noted, cast outlet boxes shall be Crouse-Hinds, Appleton, or approved equal. Boxes shall have proper number and size hubs. Device plates, covers, adapters and boxes shall be as manufactured by Crouse-Hinds, Appleton, or approved equal.
- G. Exposed junction boxes, outlet boxes and pull boxes for pool chemical rooms shall be NEMA 3R type suitable for corrosive atmosphere, non-metallic.

2.19 IDENTIFICATION MARKINGS

- A. Plainly mark all motor and electrical appliance control equipment indicating the equipment controlled with engraved metal tags.
- B. Provide laminated plastic nameplates on panelboards on the outside of the door at the top indicating panel designation and feeder source.
- C. Provide laminated plastic nameplates on distribution switchboards and motor control centers at the top center indicating panel designation and feeder source.
- D. Identify each distribution switchboard and motor control center circuit breaker with a laminated plastic nameplate indicating its' use.
- E. Type panelboard directories on the forms provided with the equipment, indicating the use of each branch circuit breaker.

- F. Fasten all laminated plastic nameplates to surfaces with two (2) or more screws.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify conditions at the Project site before submitting bid. Be responsible for providing all necessary wiring for the new electrical systems. Wherever wiring is being disrupted due to remodeling or changes, reconnect existing and provide new wiring circuits to accomplish a fully operable system at no additional cost to the District.

3.02 COORDINATION

- A. The Drawings are essentially diagrammatic and indicate the desired location, size, routes, connection points, etc., and are to be followed as closely as possible. Proper judgment must be exercised in executing the Work so as to provide the best possible installation in the available space and to overcome difficulties, limitations or interference wherever encountered. Be responsible for the correct placement of this Work, the proper location and connection in relation to Work of other trades, for determining the exact location of all conduits, outlets and equipment, and for installing the conduits in such a manner as to conform to the structure, avoid obstruction, preserve headroom and keep openings and passageways clear. Particular attention is directed to the close coordination required on exposed Work. Locations shown on Architectural or Mechanical Drawings if different than those shown on Electrical Drawings should be communicated to the District's Representative in writing for clarification.

3.03 INSTALLATION

- A. Trenching and Backfill: Conform with requirements of Section 13 11 01. Provide minimum cover as required by Code.
- B. Conduit Installation:
 - 1. Conduit and metallic raceway systems shall be mechanically and electrically continuous from sources of current to all outlets in a manner to provide a continuous grounding path. Close ends of conduit during construction to prevent entrance of dirt or moisture.
 - 2. Securely fasten conduit to the building construction within three feet of each outlet and within every ten feet thereafter. Secure it to boxes, cabinets, pull boxes, terminals with two locknuts and ends equipped with bushings or a terminal fitting. Cut square with ends carefully reamed.
 - 3. Make bends or elbows so that the conduit will not be injured or flattened.
 - 4. Use insulated metallic bushings in all places where bushings are required.
 - 5. Run exposed conduits level or plumb and parallel to the construction members of the building. No cutting across or diagonal runs will be permitted. Neatly surmount structural obstructions encountered on conduit runs by the use of fittings or pull boxes.
 - 6. Identify feeder conduits by stamped metal tags secured to exposed section of conduit in main or sub-panels.
 - 7. Make up all threaded conduit joints gas and watertight with conductive sealer except conduit above ground in dry indoor locations.
 - 8. Rigidly support all boxes independently of the conduit system.
- C. Connections to Equipment:
 - 1. Fully connect, in an approved manner, all electrical outlets, apparatus, motors, equipment,

fixtures, wiring devices and appliances whether they are installed under the Electrical Contract or not, which require electrical connections, to the corresponding electrical system outlet.

2. Where the Work of this Section requires connections to be made to equipment that is furnished and set-in-place under other Sections, obtain such roughing-in dimensions from the manufacturer or supplier of each item as required and assume full responsibility for the installation of the connections thereto.

3.04 ADJUSTMENT AND CLEAN-UP

- A. Preliminary Operation: Should the District's Representative deem it necessary to operate the electrical installation or any part thereof prior to Substantial Completion of the Work, consent to such preliminary operation and supervise conduction of same. Subcontractor shall pay all costs occasioned by such operation. Preliminary operation shall not be construed as an acceptance of any Work installed under this Contract.
- B. Clean-up: Upon completion of the Work of this Section, immediately remove all swimming pool electrical materials, debris and rubbish occasioned by this Work to the approval of the District's Representative.

END OF SECTION

SECTION 13 31 23

PRE-ENGINEERED FABRIC SHADE STRUCTURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. A single, State of California-licensed fabric shade structure contractor shall be responsible for the design, wet-stamped engineering drawings, permitting, fabrication, supply, and erection of the work specified herein, including foundations. The intent of this specification is to have only one shade contractor be responsible for all of the functions listed above.

1.03 SUBMITTALS

- A. With Bid Submittals:
 - 1. Provide proof of existing reference sites with structures of similar project scope and scale, and engineered to the specified CBC requirements.
 - 2.
 - 3. Provide a minimum of 7 fabric samples to demonstrate fabric color range, and a digital (PDF) or paper document showing a minimum of 9 powder coat color choices. Also, provide a letter of authorization from the fabric manufacturer delineating authorized use of the specified fabric.
 - 4. Provide proof of all quality assurance items, including;
 - a. A list of at least 3 reference projects in California that have been installed a minimum of 12 years
 - b. Proof of General Liability, Professional Liability, and Umbrella insurance, as per Section 1.4C
 - c. Proof of current State of California Contractor's License, Class A or Class B
 - d. Proof of City of Los Angeles Approved Fabricator license
 - e. Proof of a minimum of \$25,000,000 aggregate bonding capacity
 - f. Proof of current IAS certification, as per Section 1.4E
 - g. Proof of an Annual Maintenance Inspection Program
 - h. Proof of a Corporate Safety and/or Injury & Illness Prevention Program
 - i. Proof of current status as an ISNetworld Member Contractor

1.04 QUALITY ASSURANCE

- A. Fabrication and erection are limited to firms with proven experience in the design, fabrication, and erection of fabric shade structures, and such firms shall meet the following minimum requirements. No substitutions shall be allowed for the following:
 - 1. A single shade structure contractor shall design, engineer, manufacture, and erect the fabric shade structures, including the foundations, and shall provide a dedicated Project Manager throughout the entire Scope of Work related to the shade structure(s).

2. All bidders shall have at least 15 years' experience in the design, engineering, manufacture, and erection of fabric shade structures, engineered to California Building Code requirements with similar scope, and a successful construction record of in-service performance.
3. All bidders shall provide proof with bid submittal of a minimum of \$1,000,000 General/Public Liability insurance, \$3,000,000 Professional Liability (PL) insurance, and additional \$10,000,000 Umbrella/Excess Liability insurance.
4. All bidders shall be a currently licensed contractor in the State of California, and shall provide proof of a single bonding capacity of \$6,000,000, and a minimum aggregate bonding capacity of \$25,000,000.
5. Manufacturer shall have a City of Los Angeles Approved Fabricator license and be accredited by the IAS (International Accreditation Service) for Structural Steel Fabrication under CBC specified requirements.
6. The fabric shade structure contractor shall have a Corporate Quality Control program (manual), which describes their complete quality assurance program.
7. All bidders must be a current Member Contractor with ISNetworld, which confirms the bidder's strict adherence to Safety, Insurance, Quality, and Regulatory standards.

1.05 PROJECT CONDITIONS

- A. Field Measurements: Verify layout information for fabric shade structure(s) shown on the drawings in relation to the property survey and existing structures, and verify locations by field measurements prior to erection of the fabric shade structure(s).

1.06 WARRANTY

- A. The successful bidder shall provide a 12-month warranty on all labor and materials.
- B. A supplemental warranty from the manufacturer shall be provided for a period of 10 years (pro-rated) on fabric and 10 years on the structural integrity of the steel, from date of substantial completion.
- C. The warranty shall not deprive the District of other rights the District may have under the provisions of the Contract Documents, and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.01 GENERAL

- A. The structures shall consist of One (1) Joined Hip Unit – 18'-0" x 47'-6-1/2" with a maximum 15' entry height and One (1) Joined Full Cantilever Unit – 18'-0" x 150'-0" with a maximum 15' entry height. Structural HSS columns for the Hip unit shall be a minimum of 5.0" x 5.0" x .250". Structural HSS columns for the Cantilever unit shall be a minimum of 10.0" x 10.0" x .625". Columns are to have a minimum embedment of 2'-6" in concrete piers.
- B. The structures shall be manufactured by Shade Structures, Inc., d/b/a USA SHADE & Fabric Structures, or approved equal with valid PC at time of bid that includes the engineering drawings, fabric roof, steel cables, all fasteners, and erection of structure(s), including foundations.
- C. Contact: USA SHADE & Fabric Structures
1085 N. Main Street, Suite C
Orange, CA 92867
Erik Anslinger

Mobile: 408-478-1646
Toll Free: 800-966-5005
eanslinger@usa-shade.com
www.usa-shade.com

- D. To qualify as an approved equal, please submit product documentation, fabric samples, and all quality assurance criteria, as per Section 1.4, at least 10 days prior to bid in order to be considered. No substitutions will be allowed after the deadline. Any approval of alternate manufacturers shall be by addendum prior to the bid date and shall not be allowed without written notification.
- E. The fabric shade structure(s) shall conform to the current adopted version of the California Building Code.
- F. All fabric shade structures are designed and engineered to meet the minimum of 110mph Wind Load, Risk Category II, Exposure C, and Seismic (earthquake) Load based on Seismic Design Category D, Seismic Risk Category II, and a Live Load of 5psf. All fabric shade structures shall be engineered with a zero wind pass-through factor on the fabric. When ASD Steel Design Method is used based on CBC 2013 Section 1605A.3.1, the load combinations Dead Load + 0.75 Live load + 0.75 Wind Load, and 0.6 Dead Load + Wind Load must be analyzed. NO EXCEPTIONS.
- G. Steel:
1. All steel members of the fabric shade structure shall be designed in strict accordance with the requirements of the "American Institute of Steel Construction" (AISC) Specifications and the "American Iron and Steel Institute" (AISI) Specifications for Cold-Formed Members and manufactured in a IAS- (International Accreditation Service) accredited facility for Structural Steel Fabrication under CBC 2013 Section 1704.2.5.2.
 2. All connections shall have a maximum internal sleeving tolerance of .0625" using high-tensile strength steel sections with a minimum sleeve length of 6".
 3. All non-hollow structural steel members shall comply with ASTM A-36. All hollow structural steel members shall be cold-formed, high-strength steel and comply with ASTM A-500, Grade C. All steel plates shall comply with ASTM A-572, Grade 50. All galvanized steel tubing shall be triple-coated for rust protection using an in-line electroplating coat process. All galvanized steel tubing shall be internally coated with zinc and organic coatings to prevent corrosion.
- H. Bolts:
1. All structural field connections of the shade structure shall be designed and made with high-strength bolted connections using ASTM A-325, Grade B or SAE J249, Grade 8.
 2. Where applicable, all stainless steel bolts shall comply with ASTM F-593, Alloy Group 1 or 2. All bolt fittings shall include rubber washers for water-tight seal at the joints. All nuts shall comply with ASTM F-594, Alloy Group 1 or 2.
- I. Welding:
1. All shop-welded connections of the fabric shade structure shall be designed and performed in strict accordance with the requirements of the "American Welding Society" (AWS) Specifications. Structural welds shall be made in compliance with the requirements of the "pre-qualified" welded joints, where applicable and by certified welders. No onsite or field welding shall be permitted.
 2. All full penetration welds shall be continuously inspected by an independent inspection agency and shall be tested to the requirement of specified CBC requirements.

J. Powder Coating:

1. Galvanized steel tubing preparation prior to powder coating shall be executed in accordance with solvent cleaning SSPC-SP1. Solvents such as water, mineral spirits, xylol, and toluol, which are to be used to remove foreign matter from the surface. A mechanical method prior to solvent cleaning, and prior to surface preparation, shall be executed according to Power Tool Cleaning SSPC-SP3, utilizing wire brushes, abrasive wheels, needle gun, etc.
2. Carbon structural steel tubing preparation prior to powder coating shall be executed in accordance with commercial blast cleaning SSPC-SP6 or NACE #3. A commercial blast cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, mill scale, rust, coating, oxides, corrosion, and other foreign material.
3. Powder coating shall be sufficiently applied (minimum 3 mils thickness) and cured at the recommended temperature to provide proper adhesion and stability to meet salt spray and adhesion tests, as defined by the American Society of Testing Materials.
4. Raw powder used in the powder coat process shall have the following characteristics:
 - a. Specific gravity: 1.68 +/- 0.05
 - b. Theoretical coverage: 114 +/- 4ft²/mil
 - c. Mass loss during cure: <1%
 - d. Maximum storage temperature: 80°F
 - e. Interpon[®] 800 is a high-durability TGIC powder coating designed for exterior exposure. Tested against the most severe specifications, Interpon[®] 800 gives significantly improved gloss retention and resistance to color change.
5. When the fabric shade structure(s) will be located within 15 miles of the ocean or standing body of water, rust protection undercoat primer will be required on all structures. Sherwin-Williams[®] POWDURA[®] epoxy powder coating Z.R Primer shall be applied in accordance with the manufacturer's specifications. Primer should be fused only and then top coated with the selected powder coat to ensure proper inter-coat adhesion.
 - a. The primer's attributes shall be:
 - a. Specific gravity (g/ml): 2.37
 - b. Coverage at 1.0 mil (ft²/lb): 81.6
 - c. Adhesion: ASTM D-3359 5B
 - d. Flexibility: ASTM D-552 Pass 1/8"
 - e. Pencil hardness: ASTM D-3363 H-2H
 - f. Impact resistance (in.lb): ASTM D-2794 Dir & Rev, 120 in-lbs
 - g. Salt spray resistance: ASTM B-117 2000 hours
 - h. Humidity resistance: ASTM D-4585 2000 hours
 - i. 60° Gloss: ASTM D-523 50 ~ 70
 - j. Cure schedule (metal temp): 10min @ 200°C (390°F)
25min @ 135°C (275°F)
 - k. Film thickness tange (mils): 2.0 ~ 3.0

K. Tension Cable: Steel cable is determined based on calculated engineering loads.

1. For light and medium loads, 0.25" (nominal) galvanized 7x19 strand cable shall be used.
2. For heavy loads, and depending on structural size, either 0.375" (nominal) or 0.5" (nominal) galvanized 7x19 strand cable shall be used.

L. Fabric Roof Systems:

1. UV Shade Fabric:
 - a. Colourshade® FR UV shade fabric is made of a UV-stabilized, high-density polyethylene (HDPE), as manufactured by Multiknit® (Pty) Ltd. HDPE mesh shall be a heat-stentered, three bar Rachel-knitted, lockstitch fabric with one monofilament and two tape yarns to ensure that the material will not unravel if cut. Raw fabric rolls shall be 9.8425 feet wide.
 - b. Fabric Properties:
 - ~ Life Expectancy: minimum 8 years with continuous exposure to the sun
 - ~ Fading: minimum fading after 5 years (3 years for Red)
 - ~ Fabric Mass: 5.31 oz/yd² ~ 5.6 oz/yd² (180gsm ~ 190gsm)
 - ~ Fabric Width: 9.8425 feet (3m)
 - ~ Roll Length: 164.04 feet (50m)
 - ~ Roll Dimensions: 62.99 inches x 16.5354 inches (160cm x 42cm)
 - ~ Roll Weight +/- 66 lbs (+/- 30kg)
 - ~ Minimum Temp: -13°F (-25°C)
 - ~ Maximum Temp: +176°F (80°C)
 - c. Fabric shall meet the following flame spread and fire propagation tests:
 - 1) ASTM E-84
 - 2) NFPA 701 Test Method 2
 - 3) California's Office of the State Fire Marshal, Registered Flame Resistant Product
2. Stitching & Thread:
 - a. All sewing seams are to be double-stitched.
 - b. The thread shall be GORE® TENARA® mildew-resistant sewing thread, manufactured from 100% expanded PTFE (Teflon™). Thread shall meet or exceed the following:
 - 1) Flexible temperature range
 - 2) Very low shrinkage factor
 - 3) Extremely high strength, durable in outdoor climates
 - 4) Resists flex and abrasion of fabric
 - 5) Unaffected by cleaning agents, acid rain, mildew, salt water, and is unaffected by most industrial pollutants
 - 6) Treated for prolonged exposure to the sun
 - 7) Rot resistant
3. Shade and UV Factors:
 - a. Shade protection and UV screen protection factors shall be as follows:

Color	UV Block %	Shade %
Pacific Blue	85%	80%~86%
Rain Forest Green	85%	79%~86%
Red	86%	80%~83%
Silver	81%	80%~85%
Desert Sand	92%	80%~84%
Terracotta	82%	80%~83%
Yellow	89%	80%~82%

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The installation of fabric shade structures shall be performed by manufacturer or manufacturer-approved contractor, which shall be bonded and holding a current contractor's license with the State of California's Contractors State License Board. All installation personnel must have experience in the erection of tensioned fabric structures.

- B. The installation shall comply with the manufacturer's instructions for assembly, installation and erection, per approved drawings.
- C. Concrete:
1. Unless noted otherwise for footings and piers by the Project Engineer, the concrete specification for footings and/or piers shall meet a minimum 3,500psi at 28-day strength.
 2. Concrete work shall be executed in accordance with the latest edition of American Concrete Building Code ACI 318-99.
 3. Concrete specifications shall comply in accordance with the Section 03300 Cast-in-Place Concrete, detailed as per plans, and shall be as follows:
 - a. 28 Days Strength $F'_c = 3000$ psi
 - b. Aggregate: HR
 - c. Slump: 3 ~ 5 inch
 - d. Portland Cement shall conform to C-150
 - e. Aggregate shall conform to ASTM C-33
 4. All reinforcement shall conform to ASTM A-615 grade 60.
 5. Reinforcing steel shall be detailed, fabricated, and placed in accordance with the latest ACI Detailing Manual and Manual of Standard Practice.
 6. Whenever daily ambient temperatures are below 80 degrees Fahrenheit, the contractor may have mix accelerators and hot water added at the batch plant (See Table 1).
 7. The contractor shall not pour any concrete when the daily ambient temperature is to be below 55 degrees Fahrenheit.

TABLE 1

Temperature Range	% Accelerator	Type Accelerator
75~80 degrees F	1%	High Early (non calcium)
70~75 degrees F	2%	High Early (non calcium)
Below 70 degrees F	3%	High Early (non calcium)

- D. Foundations:
1. All anchor bolts set in new concrete shall comply with ASTM F-1554 Grade 55 (Galvanized).
 2. Footings and full rebar cages shall be drilled, set, and poured as per manufacturer's specifications. The joined Hip fabric shade structure is to have a minimum footing of 2'-0" x 7'-6" deep and the joined Cantilever fabric shade structure is to have a minimum footing of 2'-6" x 12'-6" deep with minimum embedment of 30" in concrete pier with full rebar cage, as per final approved manufacturer's engineered specifications and drawings.

END OF SECTION 13 31 23

DIVISION 22 00 00

PLUMBING GENERAL

PART I GENERAL

1.1 GENERAL

- A. The General Conditions and Supplementary General Conditions are hereby a part of this Section as fully as if repeated herein.
- B. Scope includes plumbing work only. Architect for this project is the mechanical engineer.

1.2 SCOPE

- A. The work includes, but is not necessarily limited to, the furnishing of all labor, materials, equipment, and services necessary for, and reasonably incidental to, providing and installing complete piping systems, plumbing systems, and other mechanical work as shown or indicated in the Drawings and Specifications.
- B. Specifically refer to the following sections:
Section 22 05 00 Plumbing
- C. Make all connections to all buildings and equipment requiring service from systems installed under this Section.

1.3 COORDINATION

- A. Before submitting a bid for the work, the Contractor shall visit the site and become familiar with all the work on other related Drawings and Specifications, and plan the work to provide the best possible assembly of the combined work of all trades.
- B. Contractor is responsible for coordinating the schedule of inspections by Engineer at appropriate stages of construction such as rough-in, pre-final, and final, and at other times required by the Specifications or by the construction. Notify Architect and Engineer five (5) working days in advance of proposed site visit. Notification constitutes certification that construction is, or will be, complete and ready for inspection.
- C. At the start of the project, Plumbing Contractor shall schedule a coordination meeting between Owner, Engineer and sub-contractors at a minimum. Meeting shall review all piping route at site and any requirements for each piece of equipment and building. Location of each pipe, valve, gas pressure regulator, routing including trenches, pressure test and methods, equipment storage locations and other requirements including coordination between other trades. Meeting minutes of the meeting shall be recorded and forwarded to Owner, engineers and sub-contractors, whether present at the meeting or not.

1.4 SAFETY

- A. Contractors must conduct a weekly safety meeting with their employees and provide documentation as to attendance and topics of discussion. Engineer's construction support services do not constitute review or approval of Contractor's safety procedures. Contractor

shall comply with all OSHA regulations. Contractor is required to obtain and pay for insurance required to cover all activities within Contractor's Scope of Work.

1.5 BUILDING LAWS

- A. Plumbing work shall conform to all requirements prescribed by governmental bodies having jurisdiction and is to be in accordance with the California Building Code; all federal, state, and local codes and ordinances; all OSHA requirements; California Plumbing Code, California Mechanical Code, California Fire Code, and National Fire Protection Association; California State Code Title 8, Title 21, Title 24; and the Energy Conservation Standards.
- B. Should any part of the design fail to comply with such requirements, the discrepancy shall be called to the attention of the Architect prior to submitting bid.
- C. Should there be any direct conflict between the Drawings and/or Specifications and the above rules and regulations, the rules and regulations shall take precedence. However, when the indicated material, workmanship, arrangement, or construction is of a superior quality or capacity to that required by above rules and regulations, the Drawings and/or Specifications shall take precedence. Rulings and interpretations of enforcing agencies shall be considered as part of the regulations.
- D. The Contractor is responsible to coordinate and make adjustments in his/her work with the full set of Contract Drawings and Specifications.
- E. All piping shall be securely anchored to building structure as required herein and by the California Building Code.

1.6 PERMITS, FEES, AND UTILITIES

- A. The Contractor shall obtain and pay for all permits and fees. The Contractor shall arrange for all required inspections.

1.7 PAINTING

- A. Prime and paint all the pipe materials installed outside of the building if it is not protected for corrosion. Coordinate the color with owner.

PART II PRODUCTS

2.1 MATERIALS

- A. All materials used shall be new as listed in subheadings and indicated on Drawings. Inspect all materials and immediately remove defective materials from the site.
- B. Substitution:
 - 1. No substitute materials or equipment may be installed without the written approval of the Architect.
 - 2. Use of substitute materials or equipment may require changes in associated materials and equipment. Contractor shall submit detailed Shop Drawings and installation instructions of substitute materials and equipment to Architect for

approval. Such submittals shall address all changes required in other items.

3. All additional costs incurred by the substitution of material or equipment, or the installation thereof shall be borne by the Contractor who substitutes the materials or equipment in place of the items specified.

- C. Quality of Materials: Pipe fittings and equipment may be taken from stock but the Contractor will be required to submit manufacturer's certificates identifying the material and equipment furnished as conforming with these Specifications and such codes and standards as apply to the equipment specified. Any material on the site which cannot be identified by manufacturer's mark shall be removed from the site at Architect's request.

2.2 SUBMITTALS

- A. The review of submittals and approval thereof by the Architect does not relieve the Contractor from compliance with the requirements and intentions of the Drawings and Specifications to which the submittals pertain. The contractor acknowledges its responsibility to submit complete shop drawings and other required submittals. Incomplete submittals will be returned to the contractor unreviewed.
- B. No item shall be installed without having been submitted and reviewed without comment. Should the Contractor install items that have not been submitted and reviewed, the work shall be changed at Contractor's own expense when so ordered by the Architect.
- C. Material List: An itemized list of material and equipment which the Contractor proposes to use shall be submitted to the Architect with number of copies indicated and within time indicated.
- D. Shop Drawings and Product Data:
 1. Submit all required Shop Drawings, product data, etc. at one time. Submittals shall be bound, tabbed, and properly indexed by Specification Section.
 2. Each item shall be identified by manufacturer, brand, and trade name; model number, size, rating, and whatever other data is necessary to properly identify and verify the materials and equipment. The words "AS SPECIFIED" will not be considered sufficient information.
 3. Each submittal shall bear the Contractor's stamp and mark indicating the Contractor has reviewed and approved the submittal.
 4. Each submitted item shall refer to the Specification Section and paragraph in which the item is specified.
 5. Accessories, controls, finish, etc. not required to be submitted or identified with the submitted equipment shall be furnished and installed as specified.
 6. Submittals shall be all inclusive with all items requiring submittals being submitted at the same time; individual submittals will not be accepted.
 7. Place orders for all equipment in time to prevent any delay in construction schedule or completion of project. If any materials or equipment are not ordered in time, additional charges made by equipment manufacturers to complete their equipment in time to meet construction schedule, together with any special handling charges, shall

be borne by Contractor.

PART III EXECUTION

3.1 DRAWINGS

- A. The Drawings show the general arrangement and location of the piping and equipment. Work shall be installed in accordance with the Drawings, except for changes required by conflicts with the work of other trades. The Contractor shall provide for the support, expansion, and pitch of any rearranged piping in conformance with the intent of the Drawings, Specifications, and codes.
- B. Plumbing Drawings are diagrammatic and are intended to show the approximate location of equipment and piping. Dimensions shown on Drawings shall take precedence over scaled dimensions on Drawings. All dimensions shall be verified in the field by the Contractor.
- C. The exact location of apparatus, equipment, and piping shall be ascertained from the Architect or the Owner's representative in the field, and work shall be laid out accordingly. Should the Contractor fail to ascertain such locations the work shall be changed at Contractor's own expense when so ordered by the Architect. The Architect reserves the right to make minor changes in the location of piping and equipment up to the time of installation without additional cost.
- D. It is the intention of the Drawings and Specifications that, where certain plumbing items such as unions, expansion joints, and other plumbing components are not shown, but where such items are required by the nature of the work, shall be furnished and installed.
- E. The Plumbing Drawings and Specifications are intended to supplement each other. Any material or labor called for in one shall be furnished even though not specifically mentioned in the other.
- F. Pipe sizes shown are the minimum allowable and shall be increased in size if required by code or wherever necessary to meet unusual conditions.

3.2 RECORD DRAWINGS

- A. Record Drawings shall be maintained at all times showing the exact location of equipment, piping mains, branches, valves, etc. installed under all Sections. Have these Drawings readily available for reference.
- B. Record Set: When above information is complete and acceptable to the Engineer transfer this information accurately to the record set drawings and deliver markups to the Architect for final review.
- C. Upon completion of the Engineers' review of the Record Set the Contractor shall incorporate changes, as noted on the record set. Deliver one (1) set of prints to the Owner. Deliver one (1) complete set of prints to building Owner within ninety (30) days of issuance of final occupancy report.
- D. Inspector's Approval: Where a full-time inspector is employed by the Owner, the Record Drawing information shall be reviewed by the inspector during the course of construction and shall have the inspector's approval before submission to the Architect.

3.3 DAMAGE

- A. Repair any damage to the building, premises, and equipment occasioned by the work under this Section.
- B. Repair all damage to any part of the building or premises caused by leaks or breaks in pipe, or malfunctions of equipment furnished or installed under this Section until the warranty period expiration date.

3.4 COMPLETE WORKING INSTALLATION

- A. The Drawings and Specifications do not attempt to list every item that must be installed. When an item is necessary for the satisfactory operation of equipment, is required by the equipment manufacturer, or accepted as good practice, furnish without change in Contract cost.

3.5 STORAGE

- A. Provide proper protection and storage of all items and tools required for this work.

3.6 QUALITY OF WORK

- A. The quality of work shall be of a standard generally accepted in the respective trade. Use only experienced, competent, and properly equipped workers. Replace work falling below this standard as directed by the Architect.
- B. Systems shall be worked into a complete and integrated arrangement with like elements arranged to make a neat appearing and finished piece of work, with adequate head room and passageway free from obstructions. Such systems shall be installed by laborers experienced in the respective trades involved.

3.7 CUTTING AND REPAIRING

- A. No cutting shall be done except with Architect's approval. Cutting of structural members or footings is prohibited without the prior written consent of the Architect.
- B. Where cutting of paving, walls, ceilings, etc. is necessary for the installation of the plumbing work, it shall be done under the direction of this Section. Damage caused by this cutting shall be repaired to match original and adjacent surfaces without additional expense to the Owner.

3.8 SUPPORTS

- A. All equipment and piping shall be mounted on, or suspended from, foundations and supports as specified and indicated, and seismically braced to structure.
- B. Vibration isolation and seismic restraints for vibration isolated equipment per Title 24.
- C. All piping and equipment shall be securely anchored to building structure as required by the Specifications, SMACNA's "Guidelines for Seismic Restraints of Mechanical Systems", Title 24, and the California Building Code.
- D. Earthquake restraints shall be capable of resisting 100% gravity lateral loads or as required by Title 24.
- E. Supplemental Supports: Provide supplemental supports to span building structural elements as necessary for equipment foundations and supports. Provide Shop Drawings to

Mechanical Engineers for approval prior to installation.

3.9 ACCESSIBILITY

- A. General: Valves, fittings, and indicating equipment or specialties requiring reading, adjusting, inspection, repairing, removal, or replacement shall be conveniently and accessibly located with reference to finished building.
- B. Panels: No unions, flanges, valves, controls, or equipment shall be placed in a location that will be inaccessible after the system is complete. Access panels or doors shall be provided where required whether or not shown on Drawings.

3.10 TESTING

- A. Test all piping, equipment, and systems as called for in the Specifications. Notify Architect and inspection authorities prior to testing so that they may be witnessed. Protect all personnel and equipment during testing. Where Specifications do not cover specific points or methods, conform to manufacturer's specifications.

3.11 MANUFACTURER'S DIRECTIONS

- A. Materials and equipment shall be installed in accordance with manufacturer's application and recommendations, requirements, and instructions, and in accordance with Contract Documents. Where manufacturer's instructions differ from those indicated or specified, they shall be brought to Architect attention for resolution prior to equipment ordering and installation.
- B. Where requirements indicated in Contract Documents exceed manufacturer's requirements, Contract Documents shall govern.

3.12 SEISMIC RESTRAINTS

- A. General: All work, materials and methods used shall conform to the Drawings and Specifications. The following notes and SMACNA "Guidelines for Seismic Restraints of Mechanical Systems" shall be followed when specific details are not shown on the Drawings. Anchorage of equipment for which specific details are not shown on the Drawings shall be adequate to resist the forces based on the required "CP" factor. Such anchorage shall be approved by the Architect.
- B. Piping:
 - 1. Pipe bracing system shall conform to the Drawings and to Specification requirements hereinafter listed, or shall be a pre-approved manufacturer's system such as Unistrut Seismic Bracing System, OSHPD preapproval, or approved equal.
 - 2. The Contractor shall submit Shop Drawings indicating the location of all seismic braces and provide a legend giving load information and model specifications prior to installation. Such prearranged system shall conform to requirements of the Specifications.
 - 3. Brace all gas piping that is 1" nominal diameter and larger.
 - 4. Brace all pipes that are 2 1/2" nominal diameter and larger.

5. Transverse bracings at 40'-0" on center maximum (minimum of one brace per direction of run).
6. Longitudinal bracings at 80'-0" on center maximum (minimum of one brace per direction of run).
7. Transverse bracing for one pipe section may also act as longitudinal bracing for the pipe section connected perpendicular to it, if the bracing is installed within 24" of the elbow or tees and is connected to the largest pipe.
8. Do not use branch lines to brace main lines.
9. Provide flexibility in joints where pipes pass through building seismic or expansion joints or where rigidly supported pipes connect to equipment with vibration isolators.
10. At vertical pipe risers, support the weight of the riser at a point or points above the center of gravity of the riser wherever possible. Provide lateral guides at the top and bottom of the riser and at intermediate points not to exceed 30'-0" on center.
11. Provide large enough pipe sleeves through walls or floors to allow for anticipated differential movements.
12. Do not fasten one rigid piping system to two dissimilar parts of the building that may respond in a different mode during an earthquake (e.g., a wall and a roof).
13. Transverse bracing shall be 20'-0" on center maximum and longitudinal bracing at 40'-0" on center maximum for piping in mechanical equipment rooms and gas piping. 1 1/4", 1 1/2", and 2" nominal diameter pipes shall be braced the same as 2 1/2" nominal diameter pipe.
14. No bracing is required if the top of single pipe is suspended 12" or less from the connection point at the supporting structural member.
15. All trapeze hangers shall be braced.

3.13 CLEAN-UP

- A. During the course of work under this Section, all rubbish, debris, surplus materials, tools, etc. resulting from this work shall be removed from work area and shall be disposed of off-site at the end of each working day. The Owner's premises shall be left clean and, in a condition, acceptable to the Architect.
- B. Clean all work installed under this Contract to satisfaction of Owner and submit documentation that each system has been cleaned and results witnessed by the Architect representative.

3.14 FINAL INSPECTION

- A. The Contractor shall furnish the Architect with certificates of final inspection and approval from the inspection authorities having jurisdiction.

3.15 GUARANTEE

- A. The Contractor shall guarantee the quality of all work and the quality of equipment and materials in accordance with the provisions of the General Conditions and Special Conditions.
- B. Should any defects occur during this period, the Contractor shall promptly repair or replace defective items as directed by the Architect, without cost to the Owner.

3.16 SITE VISITS BY ENGINEER

- A. Engineer's responsibility is limited to normal construction support services only, consisting of office consultation, site visits, and reports to the Architect at appropriate stages of construction such as rough-in, pre-final, and final. All costs incurred by the Engineer for additional site visits or office work required to complete the project as the result of incomplete coordination or supervision by the Contractor or the Mechanical Sub-Contractor shall be paid for by the Contractor.

3.17 OPERATING AND MAINTENANCE MANUALS

- A. Three (3) complete sets of bound instructions containing the manufacturer's operating and maintenance instructions for each piece of equipment shall be furnished to the Owner within thirty (30) days of issuance of final occupancy permit. Cutsheets shall be placed before instructions covering each subject. The instruction sheets shall be approximately 8 1/2" x 11" with large sheets of Drawings folded in. The instructions shall include, but not be limited to, the following:
 - 1. System layout showing piping, valves and controls with complete valve and control identification, listing, and indexing valve charts.
 - 2. Manufacturer's bulletins, cuts, and descriptive data.
 - 3. Parts list and recommended spare parts including name and address of source of supply.
- B. Field Instructions: Upon completion of the work and at a time designated by the Owner the services of one or more competent Engineers shall be provided by the Contractor to instruct a representative of the Owner in the operation and maintenance of the systems. These field instructions shall cover all the items contained in the bound instructions and shall be of a sufficient length and detailed nature, in the Engineer's judgment, to insure safe and efficient operation.

**** END OF SECTION **

SECTION 22 05 00

PLUMBING

PART I GENERAL

1.1 GENERAL

- A. The General Conditions, any Supplementary Conditions, Section 22 00 00, Plumbing General, and Division 1 are hereby a part of this Section as fully as if repeated herein.
- B. Contractor to provide labor, material, equipment, and services to furnish and install complete plumbing and piping systems which shall include, but not necessarily be limited to equipment, fixtures, piping, valves, and supports.

1.2 SUBMITTALS

- A. Submit for review, within fifteen (15) days after signing Contract, the required number of copies of a complete list of materials proposed for use, including sizes, capacities, etc. See Division 1 and Section 22 00 00 Plumbing General for requirements. This list includes:
 - 1. Pipes and fittings including unions.
 - 2. Gas Pressure Regulators. (Indicate pressure ratings and capacities).
 - 3. Valves.
 - 4. Pipe Hangers and Supports
 - 5. Seismic shut-off valves
 - 6. Seismic pipes
 - 7. Coordination Drawings: Plans and details, drawn to scale, on which natural-gas piping is shown and coordinated with other installations, using input from installers of the items involved.
 - 8. Site Survey: Plans, drawn to scale, on which natural-gas piping is shown and coordinated with other services and utilities.
 - 9. Welding certificates.
- B. QUALITY ASSURANCE
 - 1. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.
- C. No substitute materials or equipment may be installed without the written approval of the Architect.

- D. All additional costs incurred by the substitution of material or equipment, or the installation thereof, whether architectural, structural, mechanical, electrical, or plumbing, shall be borne by Contractor who substitutes material or equipment in lieu of that specified.
- E. DELIVERY, STORAGE, AND HANDLING
 - 1. Handling Flammable Liquids: Remove and dispose of liquids from existing natural-gas piping according to requirements of authorities having jurisdiction.
 - 2. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
 - 3. Store and handle pipes and tubes having factory-applied protective coatings to avoid damaging coating, and protect from direct sunlight.
 - 4. Protect stored PE pipes and valves from direct sunlight.

PART II PRODUCTS

2.1 GAS PIPING

- A. Piping Above Ground: Standard weight steel pipe, Schedule 40, ANSI/ ASTM A53 with 150# black malleable iron fittings and threaded joints for pipe 2" and smaller; welded joints for pipe 2 1/2" and larger. Black steel inside the buildings and galvanized (hot dipped zinc coated) outside the buildings.
- B. Piping Underground: Polyethylene SDR11, 110 PSI joints, Driscopipe or equal, furnished and installed in strict accordance with manufacturer's installation Specification. Pipe fusion welder shall be certified by the manufacturer of the pipe. Plastic pipe shall have minimum 18" of cover and shall not be used for risers.
- C. Gas Pipe Risers: Risers to be metallic material, dipped and wrapped to 6" above grade. Elster Perfection anodeless double seal riser with steel pipe casing or approved equal. When a metallic riser connects to a plastic underground pipe, the metallic pipe shall extend at least 30" horizontally before connecting with approved transition to plastic.
- D. Gas Cocks: For high pressure gas service use Dezurik Series 400 lubricated gas cock with RS49 or RS51 plug seals, UL listed. On low pressure interior service lines use Milwaukee BB2 100 Butterball, NIBCO, or approved equal.
- E. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
- F. Forged-Steel Flanges and Flanged Fittings: ASME B16.5, minimum Class 150, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
 - 1. End Connections: Threaded or butt welding to match pipe.
 - 2. Lapped Face: Not permitted underground.
 - 3. Gasket Materials: ASME B16.20, metallic, flat, asbestos free, aluminum o-rings, and spiral-wound metal gaskets.

4. Bolts and Nuts: ASME B18.2.1, carbon steel aboveground and stainless steel underground.

G. Mechanical Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. GE Oil & Gas.
 - b. Smith-Blair, Inc.
2. Steel flanges and tube with epoxy finish.
3. Buna-nitrite seals.
4. Steel bolts, washers, and nuts.
5. Coupling shall be capable of joining PE pipe to PE pipe, steel pipe to PE pipe, or steel pipe to steel pipe.
6. Steel body couplings installed underground on plastic pipe shall be factory equipped with anode.

- H. Press fittings can be used as long as approved by local authorities and comply with current code.

2.2 PIPE HANGERS AND SUPPORTS

- A. Superstrut CL-710 OR C-727, UL and FM approved, solid all thread rods and rod clips. Superstrut 540 for wood construction and C-755 or C-769 for I-beam clamps. Pre-drill and secure with lag bolts.
- B. Supports and Beam Clamps: Superstrut C-769, Hubbard Holdrite, or approved equal.
- C. Riser Clamps: Superstrut, Hubbard Holdrite, or approved equal.
- D. Offset Pipe Clamps: Superstrut, Hubbard Holdrite, or approved equal.
- E. Pipe Isolation: Hubbard Holdrite Silencer System.
- F. Sway Bracing: Where hanger rods on horizontal runs of 2 1/2" pipe and larger are 12" in length or longer from support point to top of pipe, there shall be one 3/16" x 1 1/4" steel angle brace, Superstrut (A-1200 channel) bolted to every other pipe hanger clamp and anchored to the structure. Stays to ceiling or roof shall rise at a 45° angle and be anchored per the Drawings. Alternate braces shall be installed on opposite sides.
- G. Plumbers tape or sheetmetal straps shall not be used for hanging or supporting of pipes.

2.3 PIPE SIZES TO EQUIPMENT

- A. Pipe sizes indicated, including required valving, shall be carried full size to equipment served. Any change of size to match equipment connection shall be made within 1'-0" of equipment.

2.4 JOINING MATERIALS

- A. Joint Compound and Tape: Suitable for natural gas.
- B. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- C. Threaded Joints:
 - 1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
 - 2. Cut threads full and clean using sharp dies.
 - 3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
 - 4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.
 - 5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- D. Flanged Joints: Install gasket material, size, type, and thickness appropriate for natural-gas service. Install gasket concentrically positioned.
- E. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
 - 1. Plain-End Pipe and Fittings: Use butt fusion.
 - 2. Plain-End Pipe and Socket Fittings: Use socket fusion.

2.5 UNIONS AND FLANGES

- A. Unions: Provide unions as follows:
 - 1. At each threaded or soldered connection to equipment and tanks.
 - 2. At one threaded connection to each manually operated threaded valve and cock and each threaded check valve.
 - 3. Other locations as indicated.

PART III - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in for natural-gas piping system to verify actual locations of piping connections before equipment installation.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Close equipment shutoff valves before turning off natural gas to premises or piping section.
- B. Inspect natural-gas piping according to NFPA 54 to determine that natural-gas utilization devices are turned off in piping section affected.

3.3 EXCAVATING AND BACKFILLING

- A. Perform all necessary excavation and backfill required for installation of plumbing work. Any work damaged during excavation and backfilling shall be repaired at Contractor's expense.
- B. Verification of Existing Conditions:
 - 1. It shall be one of the responsibilities under this Section to examine the site of work and, after investigation, to determine the character of the materials to be encountered and the existing conditions affecting the work.
 - 2. Excavation shall be unclassified and shall include the removal of all buried obstructions within the area to be excavated.
- C. Trench for underground pipelines shall be to the required depths. Maintain excavations free of water while installing pipe and until backfilling.
- D. Tamp bottom of trenches to uniform grade and excavate bell holes where necessary to insure that pipe rests for entire length on solid ground. Should rock be encountered, excavate to 6" below bottom of pipe and rock surface with well tamped and compacted 1/2" to 1 1/2" broken stone or gravel sand before laying pipe.
- E. When piping has been installed, tested, inspected, and approved, backfill excavations with clean earth from excavation or with imported sandy soil in layers not exceeding 8"; moisten and machine tamp and restore the ground or paving to original condition.
- F. Backfill shall be compacted to a density of 95% as determined by the laboratory test procedure in ASTM D1557.
- G. During progress of work, Owner may have compaction tests made under direction of testing laboratory for all compacted fill. If found not to meet Specification, Contractor shall excavate and re-compact fill at no additional cost to Owner.
- H. Following backfilling, grade all trenches to level of surrounding sub-grade. All excess soil shall be located per Owner's instructions.
- I. After backfilling, remove from the premises all surplus earth resulting from this work and dispose of same off the site.

3.4 PIPING - GENERAL

- A. Thoroughly clean all pipe and maintain in clean condition during construction temporarily capping or plugging ends of pipe when not being worked on.

- B. Cut pipes accurately to measurements established at the site and work into place without springing or undue forcing and out of the way of openings, ductwork, and equipment; ream ends of screwed pipes and tubing to original bore before connecting together.
- C. Where changes in pipe size occur, use only reducing fittings.
- D. Unions: Provide screwed unions or flanges in locations required for disconnecting and connecting of all equipment.
- E. Pipe runs in masonry and concrete floors shall be sleeved for protection.
- F. Chase or sleeve all lines rising in footings and where running concealed through walls.
- G. Caulk space between pipes and sleeves in exterior walls and in concrete slabs with graphite packing and waterproof plastic compound; caulk with Dow Corning #3-6548 Silicone RTV Foam per manufacturer's recommendations at fire walls.
- H. Place escutcheons, stamped with #16 gauge steel and chromium plated, on pipes passing through sleeves in walls, floors or ceiling where exposed to view within a finished area. Grout in all other lines.
- I. Support piping where necessary at sufficiently close intervals (and 24" from each fitting and change of direction) to keep it in alignment and to prevent sagging.
- J. Anchor vertical risers with hooks, brackets, or clamps to make rigid.
- K. All changes of direction of piping shall be made with fittings.

3.5 PIPING INSTALLATION

- A. General: Piping installed approximately as indicated, direct as possible without unnecessary offsets or fittings, and parallel with building lines. Install vertical risers plumb. Locate valves for accessibility. Point out to Architect when there is an obstacle in the way of valve accessibility before installing valve.

3.6 PIPING JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Threaded Joints:
 - 1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
 - 2. Cut threads full and clean using sharp dies.
 - 3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
 - 4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.

5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Welded Joints:

1. Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators.
2. Bevel plain ends of steel pipe.
3. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.

E. Brazed Joints:

1. Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter.

F. Flanged Joints:

1. Install gasket material, size, type, and thickness appropriate for natural-gas service. Install gasket concentrically positioned.

G. Flared Joints:

1. Cut tubing with roll cutting tool. Flare tube end with tool to result in flare dimensions complying with SAE J513. Tighten finger tight, then use wrench. Do not overtighten.

H. PE Piping Heat-Fusion Joints:

1. Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
2. Plain-End Pipe and Fittings: Use butt fusion.
3. Plain-End Pipe and Socket Fittings: Use socket fusion.

I. HANGER AND SUPPORT INSTALLATION

1. See drawings.
2. Comply with requirements for pipe hangers and supports specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment Gas Piping System"

3.7 INSTALLATION AND FABRICATION

- A. Arrange with Owner and PG&E before turning meter off for tie-in for new installation in location shown.

- B. Make necessary connections to supply service to equipment as shown. Make installation in accordance with requirements of governing codes and the National Fire Protection Association.
- C. Cut pipe accurately to measurements established at building; work into place without springing or forcing; and clear all windows, doors, and other openings. Cutting or other weakening of building structure to facilitate piping installation not permitted. Ream all piping to remove burrs and install to permit free expansion and contraction without damage. Make all changes in direction with fittings and changes in main sizes through eccentric reducing fittings with top of pipe flat. Piping at furnaces, etc. supported independently so pipe weight is not supported by equipment. Provide the following:
 - 1. Swing joints or run-outs to equipment with swing connections, expansion loops, and/or devices at all other points for flexible piping system.
 - 2. Shut-off valves, balancing valves, and unions or flanges at each branch and in supply and return to each item of equipment. Valves and unions or flanges suitably located to isolate each unit; branch circuit or section of piping to facilitate maintenance and removal of all equipment and apparatus.
 - 3. Caps or plugs for all open ends of pipe and equipment during installation to keep out dirt and other foreign matter.
 - 4. Necessary temporary connections, valves, oversize flushing connections, pumps, etc. as required to properly clean and test system.

3.8 PAINTING

- A. Paint exposed, exterior metal piping, valves, service regulators, earthquake valves, and piping specialties, except components, with factory-applied paint or protective coating.
 - 1. Alkyd System: MPI EXT 5.1D.
 - a. Prime Coat: Alkyd anticorrosive metal primer.
 - b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - c. Topcoat: Exterior alkyd enamel (flat).
 - d. Color: Gray.
- B. Paint exposed, interior metal piping, valves, service regulators, earthquake valves, and piping specialties, except components, with factory-applied paint or protective coating.
 - 1. Latex Over Alkyd Primer System: MPI INT 5.1Q.
 - a. Prime Coat: Alkyd anticorrosive metal primer.
 - b. Intermediate Coat: Interior latex matching topcoat.
 - c. Topcoat: Interior latex (flat).
 - d. Color: Gray.
- C. Damage and Touchup: Repair marred and damaged factory-applied finishes with materials and by procedures to match original factory finish.

3.9 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

- A. Valves for pipe sizes NPS 2 and smaller at service meter shall be one of the following:
 - 1. Two-piece, full-port, bronze ball valves with bronze trim.
 - 2. Bronze plug valve.
- B. Valves for pipe sizes NPS 2-1/2 and larger at service meter shall be one of the following:
 - 1. Two-piece, full-port, bronze ball valves with bronze trim.
 - 2. Bronze plug valve.
 - 3. Cast-iron, non-lubricated plug valve.
- C. Distribution piping valves for pipe sizes NPS 2 and smaller shall be one of the following:
 - 1. Two-piece, full-port, bronze ball valves with bronze trim.
 - 2. Bronze plug valve.
- D. Distribution piping valves for pipe sizes NPS 2-1/2 and larger shall be the following:
 - 1. Cast-iron, non-lubricated plug valve.
- E. Valves in branch piping for single appliance shall be the following:
 - 1. Bronze plug valve.

3.10 TESTING, ADJUSTING, AND CLEANING

- A. Test all piping, valves, etc. per NFPA 54. The inspection authority having jurisdiction and the Engineer shall be notified at least 48 hours prior to performance of all tests so that they may be witnessed.
 - 1. All gas piping shall be tested to 60 PSIG for 1 hour without drop in pressure. Equipment and personnel shall be protected from this test pressure.
- B. Upon completion of the work, clean all equipment and piping installed under this Section.
- C. Natural-gas piping will be considered defective if it does not pass tests and inspections. Contractor shall fix the leaks and repeat the tests without any additional cost.

3.11 LABELING AND IDENTIFYING

- A. Install detectable warning tape directly above gas piping, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs

**** END OF SECTION *

SECTION 26 05 10

GENERAL ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. The work of this Section consists of providing all required labor, supervision, materials and equipment to satisfactorily complete all electrical installations that are shown on the Drawings, included in these specifications, or otherwise needed for a complete and fully operating facility.
- B. Furnish and install all required in-place equipment, conduits, conductors, cables and any miscellaneous materials for the satisfactory interconnection and operation of all associated electrical systems.

1.02 RELATED WORK

- A. This Section provides the basic Electrical Requirements which supplement the General Requirements of Division 1 and apply to all Sections of Division 26.

1.03 SUBMITTALS

- A. As specified in Division 1. Submit to the Engineer shop drawings, manufacturer's data and certificates for equipment, materials and finish, and pertinent details for each system specified. Information to be submitted includes manufacturer's descriptive literature of cataloged products, equipment, drawings, diagrams, performance and characteristic curves as applicable, test data and catalog cuts. Obtain written approval before procurement, fabrication, or delivery of the items to the job site. Partial submittals are not acceptable and will be returned without review. Furnish manufacturer's name, trade name, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and paragraph reference, applicable Federal, Industry and Technical Society Publication References, and years of satisfactory service of each item required to establish contact compliance. Photographs of existing installations and data submitted in lieu of catalog data are not acceptable and will be returned without approval.
- B. Organize submittals for equipment and items related to each specification section together as a package.
- C. Proposed substitutions of products will not be reviewed or approved prior to awarding of the Contract.
- D. Substitutions shall be proven to the Engineer to be equal or superior to the specified product. Engineer's decision is final. The Contractor shall pay all costs incurred by the Engineer in reviewing and processing any proposed substitutions whether or not a proposed substitution is accepted.
- E. If a proposed substitution is rejected, the contractor shall furnish the specified product at no increase in contract price.
- F. If a proposed substitution is accepted, the contractor shall be completely responsible for all dimensional changes, electrical changes, or changes to other work which is a result of the substitution. The accepted substitution shall be made at no additional cost to the owner or design consultants.
- G. If a proposed substitution is accepted after bid, the contractor should be required to show the credit due to the owner.

1.04 QUALITY ASSURANCE

- A. Codes: All electrical equipment and materials, including installation and testing, shall conform to the latest editions following applicable codes:
 - 1. California Electrical Code (CEC).
 - 2. Occupational Safety and Health Act (OSHA) standards.
 - 3. All applicable local codes, rules and regulations.
 - 4. Electrical Contractor shall possess a C-10 license and all other licenses as may be required. Licenses shall be in effect at start of this contract and be maintained throughout the duration of this contract.
- B. Variances: In instances where two or more codes are at variance, the most restrictive requirement shall apply.
- C. Standards: Equipment shall conform to applicable standards of American National Standards Institute (ANSI), Electronics Industries Association (EIA), Institute of Electrical and Electronics Engineers (IEEE), and National Electrical Manufacturers Association (NEMA).
- D. Underwriter Laboratories (UL) listing is required for all equipment and materials where such listing is offered by the Underwriters Laboratories. Provide service entrance labels for all equipment required by the NEC to have such labels.
- E. The electrical contractor shall guarantee all work and materials installed under this contract for a period of one (1) year from date of acceptance by owner.
- F. All work and materials covered by this specification shall be subject to inspection at any and all times by representatives of the owner. Work shall not be closed in or covered before inspection and approval by the owner or his representative. Any material found not conforming with these specifications shall, within 3 days after being notified by the owner, be removed from premises; if said material has been installed, entire expense of removing and replacing same, including any cutting and patching that may be necessary, shall be borne by the contractor.

1.05 DRAWINGS

- A. Drawings: The electrical Drawings shall govern the general layout of the completed construction.
 - 1. Locations of equipment, panels, pullboxes, conduits, stub-ups, ground connections are approximate unless dimensioned; provide and verify locations with the Engineer prior to installation.
 - 2. Review the Drawings and Specification Divisions of other trades and perform the electrical work that will be required for those installations.
 - 3. Should there be a need to deviate from the Electrical Drawings and Specifications, submit written details and reasons for all changes to the Engineer for approval.
 - 4. The general arrangement and location of existing conduits, piping, apparatus, etc., is approximate. The drawings and specifications are for the assistance and guidance of the contractor, exact locations, distances and elevations are governed by actual field conditions. Accuracy of data given herein and on the drawings is not guaranteed. Minor changes may be necessary to accommodate work. The contractor is responsible for verifying existing conditions. Should it be necessary to deviate from the design due to

interference with existing conditions or work in progress, claims for additional compensation shall be limited to those for work required by unforeseen conditions as determined by the Engineer.

5. All drawings and divisions of these specifications shall be considered as whole. This contractor shall report any apparent discrepancies to the Engineer prior to submitting bids.
6. The contractor shall be held responsible to have examined the site and compared it with the specifications and plans and to have satisfied himself as to the conditions under which the work is to be performed. He shall be held responsible for knowledge of all existing conditions whether or not accurately described. No subsequent allowance shall be made for any extra expense due to failure to make such examination.

1.06 CLOSEOUT SUBMITTALS

- A. Manuals: Furnish manuals for equipment where manuals are specified in the equipment specifications or are specified in Division 1.

1.07 COORDINATION

- A. Coordinate the electrical work with the other trades, code authorities, utilities and the Architect.
- B. Provide and install all trenching, backfilling, conduit, pull boxes, splice boxes, etc. for all Utility Company services to the locations indicated on the Drawings. All materials and construction shall be in accordance with the requirements for all the Utility Companies. The contractor shall be responsible for completing the (N) service per PG&E's Greenbook current standards and substructure package. Prior to performing any work, the Electrical Contractor shall coordinate with the various Utility Companies to verify that all such work and materials shown on the Drawings are of sufficient sizes and correctly located to provide services on the site. The contractor shall obtain, provide and coordinate all requirements noted in PG&E's substructure package to successfully complete new service. The Electrical Contractor shall verify with all the Utility Companies that additional contractor furnished and installed work is not required. If additional work, materials, or changes are required by any of the Utility Companies, the Electrical Contractor shall advise the Engineer of such changes and no further work shall then be performed until instructed to do so by the Engineer.
- C. Utility Company charges shall be paid by the Owner.
- D. Contractor shall pay all inspection and other applicable fees and procure all permits necessary for the completion of this work.
- D. Where connections must be made to existing installations, properly schedule all the required work, including the power shutdown periods.
- E. When two trades join together in an area, make certain that no electrical work is omitted.

1.08 JOB CONDITIONS

- A. Operations: Perform all work in compliance with Division 1
 1. Keep the number and duration of power shutdown periods to a minimum.
 2. Show all proposed shutdowns and their expected duration on the construction schedule. Schedule and carry out shutdowns so as to cause the least disruption to operation of the Owner's facilities.

3. Carry out shutdown only after the schedule has been approved, in writing, by the owner. Submit power interruption schedule 15 days prior to date of interruption.
- B. Construction Power: Unless otherwise noted in Division 1 of these specifications, contractor shall make all arrangements and provide all necessary facilities for temporary construction power from the owner's on site source. Energy costs shall be paid for by the Owner
- C. Storage: Provide adequate storage for all equipment and materials which will become part of the completed facility so that it is protected from weather, dust, water, or construction operations.

1.09 DAMAGED PRODUCTS

- A. Notify the Engineer in writing in the event that any equipment or material is damaged. Obtain approval from the Engineer before making repairs to damaged products.

1.10 LOCATIONS

- A. General: Use equipment, materials and wiring methods suitable for the types of locations in which they are located.
- B. Dry Locations: All those indoor areas which do not fall within the definition below for Wet Locations and which are not otherwise designated on the Drawings.
- C. Wet Locations: All locations exposed to the weather, whether under a roof or not, unless otherwise designated on the Drawings.

1.11 SAFETY AND INDEMNITY

- A. The Contractor is solely and completely responsible for conditions of the job site including safety of all persons and property during performance of the work. This requirement will apply continually and not be limited to normal working hours. The contractor shall provide and maintain throughout the work site proper safeguards including, but not limited to, enclosures, barriers, warning signs, lights, etc. to prevent accidental injury to people or damage to property.
- B. No act, service, drawing review or construction review by the Owner, the Engineer or their Consultants is intended to include reviews of the adequacy of the Contractors safety measures in or near the construction site.
- C. The Contractor performing work under this Division of the Specifications shall hold harmless, indemnify, and defend the Owner, the Engineer, their consultants, and each of their officers, agents and employees from any and all liability claims, losses, or damage arising out of or alleged to arise from bodily injury, sickness, or death of a person or persons and for all damages arising out of injury to or destruction of property arising directly or indirectly out of or in connection with the performance of the work under this Division of the Specifications, and from the Contractor's negligence in the performance of the work described in the construction contract documents, but not including liability that may be due to the sole negligence of the Owner, the Engineer, their Consultants or their officers, agents and employees.
- D. The project work area does not contain asbestos materials. However, if a work area is encountered that does contain asbestos materials, the contractor is advised to coordinate with the owner and it's asbestos abatement consultant all measures necessary to provide installation of conduit, and hangers. All asbestos containing materials related work shall conform to the directions given by the owner. Nothing herein shall be construed to create a liability for American Consulting Engineers regarding asbestos abatement measures.

1.12 ACCESS PANELS AND DOORS

- A. The Contractor shall install access panels as required where floors, walls or ceilings must be penetrated for access to electrical, control, fire alarm or other specified electrical devices. The minimum size panel shall be 14" x 14" in usable opening. Where access by a service person is required, minimum usable opening shall be 18" x 24".
- B. All access doors installed lower than 7'-0" above finished floor and exposed to public access shall have keyed locks.
- C. Where specific information or details relating to access panels differ from these specifications, shown on drawings and or details or on other Divisions of work, these requirements shall supersede these specifications.
- D. Approved Manufacturers: Subject to compliance with requirements under Architectural Specifications, Milcor, Karp, Nystrom or Cesco.
 - 1. Milcor Style K (plaster)
 - 2. Milcor Style DW (gypsum board)
 - 3. Milcor Style M (masonry)
 - 4. Milcor Style "Fire Rated" where required.

PART 2 PRODUCTS

2.01 STANDARD OF QUALITY

- A. Products that are specified by manufacturer, trade name or catalog number establish a standard of quality and do not prohibit the use of equal products of other manufacturers provided they are approved by the Engineer prior to installation.
- B. Material and Equipment: Provide materials and equipment that are new and are current products of manufacturers regularly engaged in the production of such products. The standard products shall have been in satisfactory commercial or industrial use for two years prior to bid opening. The two-year period includes use of equipment and materials of similar size under similar circumstances. For uniformity, only one manufacturer will be accepted for each type of product.
- C. Service Support: Submit a certified list of qualified permanent service organizations including their addresses and qualification for support of the equipment. These service organizations shall be convenient to the equipment installation and able to render service to the equipment on a regular and emergency basis during the warranty period of the contract.
- D. Manufacturer's Recommendations: Where installation procedures are required to be in accordance with manufacturer's recommendations, furnish printed copies of the recommendations prior to installation. Installation of the item shall not proceed until recommendations are received. Failure to furnish recommendation shall be cause for rejection of the equipment or material.

2.02 NAMEPLATES

- A. For each piece of electrical equipment, provide a manufacturer's nameplate showing his name, location, the pertinent ratings, the model designation, and shop order number.
- B. Identify each piece of equipment and related controls with a rigid laminated engraved plastic nameplate. Unless otherwise noted, nameplates shall be melamine plastic 0.125 inch thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be 0.5 by 2.5 inches unless

otherwise noted. Where not otherwise specified, lettering shall be a minimum of 0.25 inch high normal block style. Engrave nameplates with the inscriptions indicated on the Drawings and, if not so indicated, with the equipment name. Securely fasten nameplates in place using two stainless steel or brass screws.

- C. Contractor to provide rigid laminated engraved plastic nameplate for all signal terminal cabinets, fire alarm terminal cans, electrical disconnect switches (fused or non-fused) and data/voice cabinets. Provide and secure as noted above.

2.03 FASTENERS

- A. Fasteners for securing equipment to walls, floors and the like shall be either hot-dip galvanized after fabrication or stainless steel.

2.04 FINISH REQUIREMENTS

- A. Equipment: Refer to each electrical equipment section of these Specifications for painting requirements of equipment enclosures. Repair any final paint finish which has been damaged or is otherwise unsatisfactory, to the satisfaction of the Engineer.
- B. Wiring System: In finished areas, paint all exposed conduits, boxes and fittings to match the color of the surface to which they are affixed.

PART 3 EXECUTION

3.01 WORKMANSHIP

- A. Ensure that all equipment and materials fit properly in their installation.
- B. Perform any required work to correct improperly fit installation at no additional expense to the owner.
- C. All electrical equipment and materials shall be installed in a neat and workmanship manner in accordance with the NECA Standard of Installation Manual and Workmanship of the entire job shall be first class in every respect.

3.02 EQUIPMENT INSTALLATIONS

- A. Provide the required inserts, bolts and anchors, and securely attach all equipment and materials to their supports.
- B. Do all the cutting and patching necessary for the proper installation of work and repair any damage done.
- C. Earthquake restraints: all electrical equipment, including conduits over 2 inches in diameter, shall be braced or anchored to resist a horizontal force acting in any direction as per Title 24, part 2, table 16a-o, part 3.
- D. Structural work: All core drilling, bolt anchor insertion, or cutting of existing structural concrete shall be approved by a California registered structural consulting engineer prior to the execution of any construction. At all floor slabs and structural concrete walls to be drilled, cut or bolt anchors inserted, the contractor shall find and mark all reinforcing in both faces located by means of x-ray, pach-ometer, or prof-ometer. Submit sketch showing location of rebar and proposed cuts, cores, or bolt anchor locations for approval.

3.03 FIELD TESTS

- A. Test shall be in accordance with Acceptance testing specifications issued by the National Electrical Testing Association (NETA).
- B. Perform equipment field tests and adjustments. Properly calibrate, adjust and operationally check all circuits and components, and demonstrate as ready for service. Make additional calibration and adjustments if it is determined later that the initial adjustments are not satisfactory for proper performance. Perform equipment field test for equipment where equipment field tests are specified in the equipment Specifications. Give sufficient notice to the Engineer prior to any test so that the tests may be witnessed.
- C. Provide instruments, other equipment and material required for the tests. These shall be of the type designed for the type of tests to be performed. Test instrument shall be calibrated by a recognized testing laboratory within three months prior to performing tests.
- D. Operational Tests: Operationally test all circuits to demonstrate that the circuits and equipment have been properly installed and adjusted and are ready for full-time service. Demonstrate the proper functioning of circuits in all modes of operation, including alarm conditions.
- E. Re-testing will be required for all unsatisfactory tests after the equipment or system has been repaired. Re-test all related equipment and systems if required by the Engineer. Repair and re-test equipment and systems which have been satisfactorily tested but later fail, until satisfactory performance is obtained.
- F. Maintain records of each test and submit five copies to the Engineer when testing is complete. All tests shall be witnessed by the Engineer. These records shall include:
 - 1. Name of equipment tested.
 - 2. Date of report.
 - 3. Date of test.
 - 4. Description of test setup.
 - 5. Identification and rating of test equipment.
 - 6. Test results and data.
 - 7. Name of person performing test.
 - 8. Owner or Engineer's initials.
- G. Items requiring testing shall be as noted in the additional electrical sections of these specifications.

3.04 CLEANING EQUIPMENT

- A. Thoroughly clean all soiled surfaces of installed equipment and materials.

3.05 PAINTING OF EQUIPMENT

- A. Factory Applied: Electrical equipment shall have factory applied painting system which shall, as a minimum, meet the requirements of NEMA ICS 6 corrosion-resistance test and the additional requirements specified in the technical section.

- B. Field Applied: Paint electrical equipment as required to match finish of adjacent surfaces.

3.06 RECORDS

- A. Maintain one copy of the contract Drawing Sheets on the site of the work for recording the "as built" condition. After completion of the work, the Contractor shall carefully mark the work as actually constructed, revising, deleting and adding to the Drawing Sheets as required. The following requirements shall be complied with:
 - 1. Cable Size and Type: Provide the size and type of each cable installed on project.
 - 2. Substructure: Where the location of all underground conduits, pull boxes, stub ups and etc. where are found to different than shown, carefully mark the correct location on the Drawings. Work shall be dimensioned from existing improvements.
 - 3. Size of all conduit runs.
 - 4. Routes of concealed conduit runs and conduit runs below grade.
 - 5. Homerun points of all branch circuit.
 - 6. Location of all switchgear, panels, MCC, lighting control panels, pullcans, etc.
 - 7. Changes made as a result of all approved change orders, addendums, or field authorized revisions.
 - 8. As Built: At the completion of the Work the Contractor shall review, certify, correct and turn over the marked up Drawings to the Engineer for his use in preparing "as built" plans.
 - 9. As Built drawings for fire alarm, data, telephone, CATV/Video, intercom and clock shall also be recorded. Upon completion "As-built" documentation showing actual devices locations and devices identification as installed and labeled, including fire alarm, data, telephone, CATV/Video and int/clock wiring layout. "As-built" shall include; for example, fire alarm equipment location showing all monitor modules and end of line resistor locations. The contractor shall provide one set drawings documents and the other set in electronic CAD file representing actual as-builts. CAD files shall be AutoCAD 14 format. Obtaining CAD files from the Engineer/District shall require contractor to sign CAD release form.
 - 10. As built Drawings shall be delivered to the Engineer within ten (10) days of completion of construction.

3.07 CLEAN UP

- A. Upon completion of electrical work, remove all surplus materials, rubbish, and debris that accumulated during the construction work. Leave the entire area neat, clean, and acceptable to the Engineer.

3.08 MECHANICAL AND PLUMBING ELECTRICAL WORK

- A. The requirements for electrical power and/or devices for all mechanical and plumbing equipment supplied and/or installed under this Contract shall be coordinated and verified with the following:

1. Mechanical and Plumbing Drawings.
 2. Mechanical and Plumbing sections of these Specifications.
 3. Manufacturers of the Mechanical and Plumbing equipment supplied.
- B. The coordination and verification shall include the voltage, ampacity, phase, location and type of disconnect, control, and connection required. Any changes that are required as a result of this coordination and verification shall be a part of this Contract.
- C. The Electrical Contractor shall furnish and install the following for all mechanical and plumbing equipment:
1. Line voltage conduit and wiring.
 2. Disconnect switches.
 3. Manual line voltage controls.
- D. Automatic line voltage controls and magnetic starters unless otherwise noted, shall be furnished by the Mechanical and/or Plumbing Contractor and installed and connected by the Electrical Contractor. All line voltage control wiring installed by the Electrical Contractor shall be done per directions from the Mechanical and/or Plumbing Contractor.
- E. All low voltage control wiring for Mechanical and Plumbing equipment shall be installed in conduit. Furnishing, installation and connection of all low voltage conduits, boxes, wiring and controls shall be by the Mechanical and/or Plumbing Contractor.
- F. Manual motor starters, where required, shall have toggle type operators with pilot light and melting alloy type overload relays, SQUARE D COMPANY, Class 2510, Type FG-1P (surface) or Type FS-1P (flush) or ITE, WESTINGHOUSE or GENERAL ELECTRIC equal.

3.09 ACCESS DOORS

- A. The Electrical Contractor shall furnish and install access doors wherever required whether shown or not for easy maintenance of electrical systems: As an example, fire alarm devices, controls, junction boxes, etc. Access doors shall provide for complete access to equipment for both removal and replacement of equipment.

END OF SECTION

SECTION 26 05 11

ELECTRICAL DEMOLITION

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. General - Remove all material designated to be removed on the drawings and that is surplus to the needs of the system as may be designated by the Owner's Representative. Specific work shall be provided as specified below:
- B. Remove Existing Equipment - Electrical Equipment to be removed shall include but not be limited to switchboards, panel boards, concrete foundations, equipment supports, lighting fixtures, conductors, conduit, raceway and other items as shown on the drawings or specified.
- C. Clean Surface Areas - Clean all floors, streets, sidewalks, driveways, parking lots and landscaped areas of all trash and debris deposited as a result of the work. Clean daily and maintain the property free of trash and debris.

1.02 STANDARDS AND CODES

- A. Work and material shall be in compliance with and according to the requirements of the latest revision of the following standards and codes.
 - 1. California Electrical Code (CEC).

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 DISPOSAL

- A. Except where specifically noted otherwise on the drawings or elsewhere in these specifications, the contractor assumes ownership of all material removed from the project site and assumes all responsibility for its proper disposal.

3.02 CLEANUP

- A. Contractor shall maintain the work site in a neat and orderly state. Contractor shall remove demolition material from the job site daily. No demolition material shall be left on the job site after working hours without written approval from the Owner's Representative.

END OF SECTION

SECTION 26 05 19

LOW VOLTAGE WIRE AND CABLE

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. The work of this Section consists of providing all wire and cable rated 600 volts or less, including splices and terminations, as shown on the Drawings and as described herein.

1.02 RELATED WORK

- A. See the following Specification Section for work related to the work in this Section:
 - 1. Section 26 05 33 - Conduits, Raceways and Fittings.
 - 2. Section 26 05 34 - Junction and Pull Boxes.

1.03 SUBMITTALS

- A. In accordance with Specification Section 26 05 10.1.03.A.
- B. Provide single submittal of complete material list with the manufacturer's specifications and published descriptive literature for all materials proposed for use.

1.04 QUALITY ASSURANCE

- A. Field tests shall be performed as specified in paragraph 3.04 of this Section.

PART 2 PRODUCTS

2.01 CONDUCTORS

- A. Conductors shall be copper, type THHN/THWN/MTW oil and gasoline resistant, 600 volt rated insulation. Minimum power and control wire size shall be No. 12 AWG unless otherwise noted.
- B. Conductors shall be stranded except that sizes #10 and smaller for receptacle circuits shall be solid and of the sizes indicated.
- C. Minimum power and control wire size shall be No. 12 AWG unless otherwise noted.
- D. All conductors used on this Project shall be of the same type and conductor material.

2.02 CABLES

- A. All individual conductors shall be copper with type THHN/THWN, 600 volt rated insulation.
- B. Insulation Marking - All insulated conductors shall be identified with printing colored to contrast with the insulation color.
- C. Color Coding - As specified in paragraph 3.03.
- D. Special Wiring - Where special wiring is proposed by an equipment manufacturer, submit the special wiring requirements to the Owner's Representative and, if approved, provide same. Special wire shall be the type required by the equipment manufacturer.

- E. Other Wiring - Wire or cable not specifically shown on the Drawings or specified, but required, shall be of the type and size required for the application and as approved by the Owner's Representative.
- F. Manufacturer - Acceptable manufacturers including Cablec, Southwire, or equal.

2.03 TERMINATIONS

- A. Manufacturer - Terminals as manufactured by T&B, Burndy or equal.
- B. Cable Termination for Copper - Crimp style two hole NEMA spade terminals designed and rated for copper cable.
- C. Wire Terminations - Crimp on ring-tongue terminals, insulated sleeve, of proper size for the wire used.
- D. End Seals - Heat shrink plastic caps of proper size for the wire on which used.

2.04 TAPE

- A. Tape used for terminations and cable marking shall be compatible with the insulation and jacket of the cable and shall be of plastic material.

PART 3 EXECUTION

3.01 CABLE INSTALLATION

- A. Clean Raceways - Clean all raceways prior to installation of cables as specified in Section 26 05 33 - Conduits Raceway and Fittings.
- B. Cable Pulling - Exercise care in pulling wires and cables into conduit or wireways so as to avoid kinking, putting undue stress on the cables or otherwise abrading them. No grease will be permitted in pulling cables. Only soapstone, talc, or UL listed pulling compound will be permitted. The raceway construction shall be complete and protected from the weather before cable is pulled into it. Swab conduits before installing cables and exercise care in pulling, to avoid damage to conductors.
- C. Bending Radius - Cable bending radius shall be per applicable code. Install feeder cables in one continuous length.
- D. Equipment Grounding Conductors - Provide an equipment grounding conductor, whether or not it is shown on the Drawings, in all conduits or all raceways.
- E. Panelboard Wiring - In panels, bundle incoming wire and cables which are No. 6 AWG and smaller, lace at intervals not greater than 6 inches, neatly spread into trees and connect to their respective terminals. Allow sufficient slack in cables for alterations in terminal connections. Perform lacing with plastic cable ties or linen lacing twine. Where plastic panel wiring duct is provided for cable runs, lacing is not necessary when the cable is properly installed in the duct.
- F. Provide #10awg conductors for all 20 amp 120v branch circuits over 100 feet.

3.02 CABLE TERMINATIONS AND SPLICES

- A. Splices - UL Listed wirenuts.
- B. Terminations - Shall comply with the following:

1. Make up and form cable and orient terminals to minimize cable strain and stress on device being terminated on.
2. Burnish oxide from conductor prior to inserting in oxide breaking compound filled terminal.

3.03 CIRCUIT AND CONDUCTOR IDENTIFICATION

- A. Color Coding - Provide color coding for all circuit conductors. Insulation color shall be white for neutrals and green for grounding conductors. Ungrounded conductor colors shall be as follows:

<u>VOLTAGE</u>	<u>208/120V</u>	<u>480/277V</u>
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Grey
Ground	Green	Green

- B. Color coding shall be in the conductor insulation for all conductors #10 AWG and smaller; for larger conductors, color shall be either in the insulation or in colored plastic tape applied at every location where the conductor is readily accessible.
- C. Circuit Identification - All underground distribution and service circuits shall be provided with plastic identification tags in each secondary box and at each termination. Tags shall identify the source panel and transformer of the circuit and the building number(s) serviced by the circuit.

3.04 FIELD TESTS

- A. All systems shall test free from short circuits and grounds, shall be free from mechanical and electrical defects, and shall show an insulation resistance between phase conductors and ground of not less than the requirements of the CEC. All circuits shall be tested for proper neutral connections.
- B. Cables are required to have a megger testing completed with a report of results submitted to the Engineer for approval.

END OF SECTION

SECTION 26 05 26

GROUNDING

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. The work of this section consists of furnishing, installing, connection and testing of all grounding systems as specified herein and as shown on the Drawings.

1.02 RELATED WORK

- A. See the following specification sections for work related to work in this section.
 - 1. Section 26 05 10- Electrical General Requirements.
 - 2. Section 26 05 19- Low Voltage Wire and Cable

1.03 SUBMITTALS: In accordance with Section 26 05 10 Submittals.

- A. Submit manufacturer's literature for review.
- B. Provide single submittal of complete material list with the manufacturer's specifications and published descriptive literature for all materials proposed for use.

1.04 STANDARDS AND CODES

- A. American Society for Testing and Materials (ASTM) Publication:
 - 1. B8-1986, Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
 - 2. B228-1988, Copper Clad Steel Conductors Specification.
- B. The latest editions following applicable codes:
 - 1. California Electrical Code (CEC).
 - 2. Occupational Safety and Health Act (OSHA) standards.
 - 3. All applicable local codes, rules and regulations.

1.05 QUALITY ASSURANCE

- A. Each and every concealed connection must be inspected by the Owner's Representative before it is covered up by the Contractor.

PART 2 PRODUCTS

2.01 GENERAL

- A. The grounding system shall consist of the grounding conductors, ground bus, ground fittings and clamps, and bonding conductors as shown on the Drawings and as required by codes and local authorities.

2.02 SYSTEM COMPONENTS

- A. Ground Rods: Ground rods shall be cone pointed copper clad Grade 40 HS steel rods conforming to ASTM B228. The welded copper encased steel rod shall have a conductivity of not less than 27% of pure copper. Rods shall be not less than 3/4-inch in diameter and ten feet long, unless otherwise indicated. Rods longer than ten feet shall be made up of ten foot units joined together with threaded couplings. The manufacturer's trademark shall be stamped near the top.
- B. Ground Conductors: Buried conductors shall be medium-hard drawn bare copper; other conductors shall be soft drawn copper. Sizes over No. 6 AWG shall be stranded conforming to ASTM B8. In all conduit runs, a green insulated copper ground wire, sized to comply with codes, shall be installed.
- C. Ground Connections: Exposed ground connections shall be high copper alloy bolted pressure types or exothermically welded type as notes. Buried connections shall be either exothermically welded type or approved compression types for connection of copper to copper or copper to steel, as required. Lug for attachment of cables to steel enclosures shall be of the binding post type with a 1/2-13NC stud. Each post shall accommodate cables from #4 AWG to #2/0 AWG.
- D. Ground Rod Boxes: Boxes shall be nine-inch diameter precast concrete units with cast iron traffic covers. Units shall be 12 inches deep. Covers shall be embossed with the wording "Ground Rod".
- E. Ground Bus: 2" x 1/4" x (length as specified on drawings) copper busbar. Provide isolation stand off bushings. Provide drilled and tapped 3/8" diameter holes on 2 foot centers. Provide "ALCU" lugs and bronze bolts. Connect busbar to main grounding system and bond to metallic domestic cold water pipe with #8 ground conductor.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Ground all equipment, including, but not limited to, panel boards, terminal cabinets and outlet boxes, for which a ground connection is required per the NEC, even though not specifically shown on the Drawings.
- B. The ground pole of receptacles shall be connected to their outlet boxes by means of a copper ground wire connecting to a screw in the back of the box.
- C. Provide a ground rod box for each ground rod so as to permit ready access for the connection and/or removal of any pressure connectors to facilitate testing.
- D. Where ground rods must be driven to depths over ten feet, increase rod diameter used, sufficiently to prevent the rod from bending or being damaged.
- E. Make embedded or buried ground connections, taps and splices with exothermically welded connections or approved compression type connectors.
- F. Make connections of grounding conductors to equipment ground buses and enclosures using binding post type connectors.
- G. Effectively bond structural steel for buildings to the grounding system, "UFER" ground.
- H. Install a ground rod in each primary handhole. Connect the ground conductor installed for each primary duct bank to the ground rod in each handhole. Bond metal conduits to handhole ground rod.

3.02 TESTING

- A. Conduct ground resistance tests using a ground resistance tester with a scale reading of 25 ohms maximum.
- B. Test methods shall conform to IEEE Standard 81 using the three electrode method. Conduct test only after a period of not less than 48 hours of dry weather.
- C. Take resistance readings for each ground rod individually and for each system as a whole without benefit of chemical treatment or other artificial means. Ground resistance readings shall not exceed 25 ohms. If readings are not to the Contracting Officer's approval, provide lengthened or additional ground rods (maximum of two additional rods).
- D. Furnish to the Owner's Representative a test report with recorded data of each ground rod location and each system.

END OF SECTION

SECTION 26 05 33

CONDUITS, RACEWAYS AND FITTINGS

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. The work of this section consists of furnishing and installing conduits, raceways and fittings as shown on the Drawings and as described herein.

1.02 RELATED WORK

- A. See the following specification sections for work related to the work in this section:
 - 1. Section 26 05 35 - Underground Ducts.
 - 2. Section 26 05 19 - Low Voltage Wire and Cable.
 - 3. Section 26 05 34 - Junction and Pull Boxes

1.03 SUBMITTALS

- A. As specified in Division 1.
 - 1. Catalog Data: Provide manufacturer's descriptive literature.
 - 2. Single Submittal: A single complete submittal is required for all products covered by this Section.

PART 2 PRODUCTS

2.01 CONDUITS, RACEWAYS

- A. Electrical Metallic Tubing (EMT) shall be hot-dip galvanized after fabrication. Couplings shall be compression or setscrew type.
- B. Flexible Conduit: Flexible metal conduit shall be galvanized steel.
- C. Liquid Tight Flexible Metal Conduit (LFMC) shall be galvanized steel strip helically wound with nylon sealing cord with smooth surface flexible PVC covering.
- D. Galvanized Rigid Steel Conduit (GRS) shall be hot-dip galvanized after fabrication. Couplings shall be threaded type.
- E. Rigid Non-metallic Conduit: Rigid non-metallic conduit shall be PVC Schedule 40 (PVC-40) or NEMA Type EPC-40) conduit approved for underground use and for use with 90°C wires.
- F. The use of "MC Cable shall not be permitted without written approval.

2.02 CONDUIT SUPPORTS

- A. Supports for individual conduits shall be galvanized malleable iron one-hole type with conduit back spacer.
- B. Supports for multiple conduits shall be hot-dipped galvanized Unistrut or Superstrut channels, or approved equal. All associated hardware shall be hot-dip galvanized.
- C. Supports for EMT conduits shall be galvanized pressed steel single hole straps.
- D. Clamp fasteners shall be by wedge anchors. Shot in anchors shall not be allowed.

2.03 FITTINGS

- A. Provide threaded-type couplings and connectors for rigid steel conduits. Provide compression (watertight) steel type (die-cast zinc or malleable iron type fittings not allowed), or setscrew type for EMT. Provide threaded couplings and Meyers hubs for rigid steel conduit exposed to weather.

- B. Fittings for flexible conduit shall be Appleton, Chicago, IL, Type ST, O-Z Gedney Series 4Q by General Signal Corp., Terryville, CT, T & B 5300 series, or approved equal.
- C. Fittings for liquid tight flexible metal conduit shall be by Appleton, O-Z Gedney or Thomas and Betts. Fittings shall be zinc plated malleable iron or aluminum.
- D. Fittings for use with rigid steel shall be galvanized steel or galvanized cast ferrous metal; access fittings shall have gasketed cast covers and be Crouse Hinds Condulets, Syracuse, NY, Appleton Unilets, Chicago, IL, or approved equal. Provide threaded-type couplings and connectors; setscrew type and compression-type are not acceptable.
- E. Fittings for use with rigid non-metallic conduit shall be PVC and have solvent-weld-type conduit connections.
- F. Union couplings for conduits shall be the Erickson type and shall be Appleton, Chicago, IL, Type EC, O-Z Gedney 3-piece Series 4 by General Signal Corp., Terryville, CT, or approved equal. Threadless coupling shall not be used.
- G. Bushings
 - 1. Bushings shall be the insulated type.
 - 2. Bushings for rigid steel shall be insulated grounding type, O-Z Gedney Type HBLG, Appleton Type GIB, or approved equal.
- H. Conduit Sealants
 - 1. Fire Retardant Types: Fire stop material shall be reusable, non-toxic, asbestos-free, expanding, putty type material with a 3-hour rating in accordance with UL Classification 35L4 or as specified on the Drawings.

PART 3 EXECUTION

3.01 CONDUIT, RACEWAY AND FITTING INSTALLATION

- A. For conduit runs exposed to weather provide rigid metal (GRS).
- B. For conduit run underground, in concrete or masonry block walls and under concrete slabs, install minimum 3/4" size nonmetallic (PVC) with PVC elbows. Where conduits transition from underground or under slab to above grade install wrapped rigid metal (GRS) elbows and risers.
- C. For conduit runs concealed in steel or wood framed walls or in ceiling spaces or exposed in interior spaces above six feet over the finished floor, install EMT.
- D. Interior conduits installed exposed on the wall below six feet shall be galvanized rigid steel (GRS).
- E. Flexible metal conduit shall be used only for the connection of recessed lighting fixtures and motor connections unless otherwise noted on the Drawings. Liquid-tight steel flexible conduit shall be used for motor connections.
- F. The minimum size raceway shall be 3/4-inch unless indicated otherwise on the Drawings.
- G. Installation shall comply with the CEC.
- H. From pull point to pull point, the sum of the angles of all of the bends and offset shall not exceed 270 degrees.
- I. Conduit Supports: Properly support all conduits as required by the NEC. Run all conduits concealed except where otherwise shown on the drawings.
 - 1. Exposed Conduits: Support exposed conduits within three feet of any equipment or device and at intervals not exceeding NEC requirements; wherever possible, group conduits together and support on common supports. Support exposed conduits fastened to the surface of the concrete structure by one-hole clamps, or with channels. Use conduit spacers with one-hole clamps.

- a. Conduits attached to walls or columns shall be as unobtrusive as possible and shall avoid windows. Run all exposed conduits parallel or at right angles to building lines.
 - b. Group exposed conduits together. Arrange such conduits uniformly and neatly.
 2. Support all conduits within three feet of any junction box, coupling, bind or fixture.
 3. Support conduit risers in shafts with Unistrut Superstrut, or approved equal, channels and straps.
- H. Moisture Seals: Provide in accordance with NEC paragraphs 230-8 and 300-5(g).
- I. Where PVC conduit transitions from underground to above grade, provide rigid steel 90's with risers. Rigid steel shall be half-lap wrapped with 20-mil tape and extend minimum 12" above grade.
- J. Provide a nylon pull cord in each empty raceway.
- K. Provide galvanized rigid steel factory fittings for galvanized rigid steel conduit.
- L. Slope all underground raceways to provide drainage; for example, slope conduit from equipment located inside a building to the pull box or manhole located outside the building.
- M. Conduits shall be blown out and swabbed prior to pulling wires.

END OF SECTION

SECTION 26 05 34

JUNCTION AND PULL BOXES

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. The work of this Section consists of providing all required labor, supervision, materials and equipment to satisfactorily complete all electrical installations shown on the drawings, included in these Specification, or otherwise needed for a complete and fully operating facility. The work shall include but not be limited to the following:
- B. Furnish and install all required material, supports and miscellaneous material for the satisfactory interconnection of all associated electrical systems.

1.02 RELATED WORK

- A. See the following specification sections for work related to the work of this section.
 - 1. Section 26 05 10 - General Electrical Requirements.
 - 2. Section 26 05 33 - Conduits, Raceway and Fittings.
 - 3. Section 26 05 19 - Low Voltage Wire and Cable.

1.03 STANDARDS AND CODES

- A. Submit in accordance with the requirements of Section 26 05 10: General Electrical Requirements.

1.04 SUBMITTALS

- A. Provide single submittal of complete material list with the manufacturer's specifications and published descriptive literature for all materials proposed for use.

PART 2 PRODUCTS

2.01 OUTLET BOXES, JUNCTION AND PULL BOXES

- A. Standard Outlet Boxes: Galvanized, one-piece die formed or drawn steel, knock-out type of size and configuration best suited to the application indicated on the Drawings. Minimum box size shall be 4 inches square by 1-1/2 inches deep with mud rings as required.
- B. Switch boxes: Minimum box size shall be 4 inches square by 1-1/2 inches deep with mud rings as required. Install multiple switches in standard gang boxes with raised device covers suitable for the application indicated.
- C. Conduit bodies: Cadmium plated, cast iron alloy. Conduit bodies with threaded conduit hubs and neoprene gasketed, cast iron covers. Bodies shall be used to facilitate pulling of controls or to make changes in conduit direction only. Splices are not permitted in conduit bodies. Crouse-Hinds Form 8 Condulets, Appleton Form 35 Unilets or equal.
- D. Sheet Metal Boxes: Use standard outlet or concrete ring boxes wherever possible; otherwise use a minimum 16 gauge galvanized sheet metal, NEMA I box sized to Code requirements with covers

secured by cadmium plated machine screws located six inches on centers. Circle AW Products, Hoffman Engineering Company or equal.

- E. Flush Mounted Pull boxes and Junction boxes: Provide overlapping covers with flush head cover retaining screws, prime coated.

PART 3 EXECUTION

3.01 OUTLET BOXES

A. General

1. All outlet boxes shall finish flush with building walls, ceilings and floors except in mechanical and electrical rooms above accessible ceiling or where exposed work is called for on the Drawings.
2. Install raised device covers (plaster rings) on all switch and receptacle outlet boxes installed in masonry or stud walls or in furred, suspended or exposed concrete ceilings. Covers shall be of a depth to suit the wall or ceiling finish.
3. Leave no unused openings in any box. Install close-up plugs as required to seal openings.

B. Box Layout

1. Outlet boxes shall be installed at the locations and elevations shown on the drawings or specified herein. Make adjustments to locations as required by structural conditions and to suit coordination requirements of other trades.
2. Locate switch outlet boxes on the latch side of doorways.
3. Outlet boxes shall not be installed back to back nor shall through-wall boxes be permitted.
4. For outlets mounted above counters, benches or backsplashes, coordinate location and mounting heights with built-in units. Adjust mounting height to agree with required location for equipment served.

C. Supports

1. Outlet Boxes installed in metal stud walls shall be equipped with brackets designed for attaching directly to the studs or shall be mounted on specified box supports.
2. Fixture outlet boxes installed in suspended ceiling of gypsum board or lath and plaster construction shall be mounted to 16 gauge metal channel bars attached to main ceiling runners.
3. Fixture outlet boxes installed in suspended ceilings supporting acoustical tiles or panels shall be supported directly from the structure above where pendant mounted lighting fixture are to be installed on the box.
4. Fixture Boxes above tile ceilings having exposed suspension systems shall be supported directly from the structure above.
5. Outlet and / or junction boxes shall not be supported by grid or fixture hanger wires at any locations.

3.02 JUNCTION AND PULL BOXES

A. General

1. Install junction or pull boxes where required to limit bends in conduit runs to not more than 360 degrees or where pulling tension achieved would exceed the maximum allowable for the cable to be installed. Note that these boxes are not shown on the Drawings.
2. Locate pull boxes and junction boxes in concealed locations above removable ceilings or exposed in electrical rooms, utility rooms or storage areas.
3. Install raised covers (plaster rings) on boxes in stud walls or in furred, suspended or exposed concrete ceilings. Covers shall be of a depth to suit the wall or ceiling finish.
4. Leave no unused openings in any box. Install close-up plugs as required to seal openings.
5. Identify circuit numbers and panel on cover of junction box with black marker pen.

B. Box Layouts

1. Boxes above hung ceilings having concealed suspension systems shall be located adjacent to openings for removable recessed lighting fixtures.

C. Supports

1. Boxes installed in metal stud walls shall be equipped with brackets designed for attaching directly to the studs or shall be mounted on specified box supports.
2. Boxes installed in suspended ceilings of gypsum board or lath and plaster construction shall be mounted to 16 gauge metal channel bars attached to main ceiling runners.
3. Boxes installed in suspended ceilings supporting acoustical tiles or panels shall be supported directly from the structure above.
4. Boxes mounted above suspended acoustical tile ceilings having exposed suspension systems shall be supported directly from the structure above.

END OF SECTION

SECTION 26 05 35

UNDERGROUND DUCTS

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. The work of this section consists of furnishing and installing raceways, raceway spacers and encasing material with necessary excavation for underground ducts.
- B. Encasement - Encasement shall be sand for all other raceways.
- C. Where required - All raceways, where run underground in and excavation shall be installed in compliance with the requirements of this Section. Conduits run underground without encasement shall be as indicated in the Drawings.

1.02 RELATED WORK

- A. See the following specification sections for work related to the work of this section.
 - 1. Section 26 05 33 - Conduit Raceway and Fittings

1.03 STANDARDS AND CODES

- A. Work and material shall be in compliance with and according to the requirements of the latest revision of the following standards and codes.
- B. National Fire Protection Association (NFPA), National Electrical Code (NEC) - Latest Revision:
 - 1. Underground Installations NEC - Article 300
 - 2. Rigid Nonmetallic Conduit NEC - Article 347
- C. California Electrical Code (CEC).
- D. Construction of Underground Electric Supply and Communication Systems, State of California Public Utilities Commission, General Order No. 128.

1.04 SUBMITTALS

- A. As specified in Division 1 and Section 26 05 10.
- B. Catalog Data: Provide manufacturer's descriptive literature.
- C. Single Submittal: A single complete submittal is required for all products covered by this Section.

PART 2 PRODUCTS

2.01 RACEWAYS

- A. As specified in Section 26 05 33 Conduits, Raceways and Fittings.

2.02 SPACERS

- A. Molded plastic as furnished by the raceway manufacturer, to cradle and position the raceways in the excavation for placing the encasement.
- B. Shape to accurately fit the raceway, provide the correct raceway spacing, to interlock in place and stack.

PART 3 EXECUTION

3.01 RACEWAY

- A. Install raceways in spacers. Spacers installed at intervals of five feet and within one inch each side of all bends and joints.

B. Solvent weld connections.

END OF SECTION

SECTION 26 05 44

IN GRADE PULL BOXES

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. The work of this section consists of providing all labor, supervision, tools, materials, and performing all work necessary to furnish and install pre-cast concrete vaults, and pull boxes with necessary excavation.

1.02 RELATED WORK

- A. See the following specification sections for work related to the work of this section.
 - 1. 31 23 00 Excavation and Backfill.
 - 2. 32 13 13 Portland Cement Concrete.
 - 3. 26 05 43 Underground Ducts.

1.03 STANDARDS AND CODES

- A. Work and material shall be in compliance with and according to the requirements of the latest revision of the following standards and codes.
 - 1. National Fire Protection Association (NFPA), National Electrical Code (NEC) - Latest Revision.
 - 2. California Electrical Code (CEC).
 - 3. American Society for Testing and Materials (ASTM):
 - a. A 185 - Welded Steel Wire Fabric for Concrete Reinforcement.
 - b. A 615 - Deformed and Plain Billet - Steel Bars for Concrete Reinforcement.
 - c. C 33 - Concrete Aggregates.
 - d. C 478 - Pre-cast Reinforced Concrete Vault Sections, Specification for.

1.04 SUBMITTALS

- A. In accordance with Specification Section 26 05 10.1.03.A.
- B. Provide single submittal of complete material list with the manufacturer's specifications and published descriptive literature for all materials proposed for use.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. General Requirements
 - 1. Concrete vaults and pull boxes for electrical power, controls and other communication circuits shall consist of pre-cast reinforced concrete boxes, extensions' bases, and covers as specified herein and as indicated on the Drawings. Pre-cast units shall be the product of a manufacturer regularly engaged in the manufacture of pre-cast vaults and pull boxes. Acceptable manufacturers are Christy, Utility Vault, Brooks, Associated Concrete or equal.
- B. Construction
 - 1. Pre-cast concrete vaults and pull boxes for electrical power distribution and communication circuits with associated risers and tops shall conform to ASTM C478 and ACI 318. Vaults and pull boxes shall be the type noted on the Drawings and shall be constructed in accordance with the applicable details as shown. Tops, walls and bottoms shall consist of reinforced concrete. Walls and bottom shall be of monolithic concrete construction. Duct entrances and windows shall be located near the corners of structures to facilitate cable racking. Provide all

necessary lugs, rabbets, and brackets. Set pulling-in irons and other built-in items in place prior to pouring concrete. A pulling-in iron shall be installed in the wall opposite each duct entrance. All steel other than "rebar" shall be hot dipped galvanized after fabrication.

- C. Cable Racks
 - 1. Vaults shall be provided with galvanized cable racks, including rack arms and insulators, and shall be adequate to accommodate the indicated cables; porcelain insulators shall be provided for electrical vaults only.
- D. Covers
 - 1. The word "ELECTRICAL" shall be cast in the top face of all electrical power vault and cable boxes.
 - 2. The words "FIRE ALARM" shall be cast in the top face of all fire alarm vault and cable boxes.
 - 3. The word "SIGNAL" shall be cast in the top face of all telecom, intercom, CATV, data, EMS, security and/or clock vault and cable boxes.
- E. Sumps
 - 1. Where indicated on the drawings, drain sumps shall be provided.
- F. Concrete
 - 1. Aggregates used in the concrete mix, either coarse or fine, excluding light weight aggregates, shall conform to ASTM C 33. Aggregates shall be properly graded and free of deleterious substances to produce a homogeneous concrete mix when blended with cement.
- G. Cement
 - 1. The cement shall be Type II low alkali Portland cement and shall meet the requirement of ASTM C 150.
- H. Compressive Strength
 - 1. Sufficient cement content shall be used per batch to produce a minimum compressive strength of 3,000 psi at 28 days.
- I. Reinforcing Steel
 - 1. Welded wire mesh for street lighting boxes shall conform to ASTM A 185.
 - 2. Reinforcing bars for primary and secondary electrical vaults and pull boxes, and communication vaults and pull boxes shall be intermediate grade billet steel conforming to ASTM A 615.
- J. Ladders
 - 1. Ladders for vaults shall be sized as required, stationary galvanized steel.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Pre-cast vaults and pull boxes shall be installed approximately where indicated on the Drawings. The exact location of each vault or pull box shall be determined after careful consideration has been given to the location of other utilities, grading, and paving. All vaults, cable boxes and secondary pull boxes shall be installed with a minimum of 6-inch thick crushed rock or sand bedding.
- B. Paved areas
 - 1. Vaults and pull boxes located in areas to be paved shall be installed such that the top of the cover shall be flush with the finished surface of the paving.
- C. Unpaved Areas

1. In unpaved areas, the top of vaults and pull box covers shall be approximately 2 inches above finished grade.
- D. Joint Seals
1. Section joints of pre-cast vaults and pull boxes shall be sealed with compound as recommended by the manufacturer.
- E. Trenching, Backfilling, and Compaction
1. Trenching, backfilling and compaction shall be as specified in Section 02200 - Excavation and Backfill.
- F. Grounding
1. Ground rods and an associated copper ground loop shall be installed in all vaults. Ground loop shall be properly connected to the cable shielding, at each cable joint or splice by means of a minimum number 4 AWG or equivalent braided tinned copper wire. Ground rods shall be protected with a double wrapping of pressure-sensitive plastic tape for a distance of two inches above and six inches below concrete penetrations. Ground wires shall be neatly and firmly attached to vault cable support racks.

END OF SECTION

SECTION 26 22 13

ENERGY EFFICIENT TRANSFORMERS

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. The work of this section consists of providing dry-type energy efficient transformers per NEMA TP1, with primary and secondary voltages of 600V and less and capacity ratings 15kVA through 750kVA as shown on Drawings and as described in this section.

1.02 RELATED WORK

- A. See the following specification sections for work related to the work in this section.
 - 1. 26 05 19 Line Voltage Wire and Cable.
 - 2. 26 05 26 Grounding.

1.03 SUBMITTALS: In accordance with Division 1.

- A. Shop Drawings: Submit manufacturer's name and nameplate data as follows:
 - 1. KVA rating.
 - 2. Nominal primary voltage.
 - 3. Tap voltages.
 - 4. Nominal secondary voltage.
 - 5. Percent impedance.
 - 6. Weight.
 - 7. Physical dimensions and mounting requirements.
- B. Submit manufacturer's guaranteed no-load loss value for transformer.
- C. Suppliers asking consideration as an approved equal shall submit complete, warranted performance data and physical dimensions for similar transformers. Data shall be submitted for each size specified, and shall be received by the consultant engineer no less than 10 days prior to the bid due date for consideration.
- D. Operation and Maintenance Data: Submit the manufacturer's operation and maintenance data in accordance with Division 1. Copies of the factory and field test reports shall be included in this submittal.

1.04 FACTORY TESTING

- A. Tests on transformers shall include the manufacturer's standard tests, including winding resistance, ratio, polarity, phase relation, no-load loss, impedance, full load losses, and dielectric tests. Certified copies shall show compliance with all referenced standards.

PART 2 PRODUCTS

2.01 ENERGY EFFICIENT DRY TYPE TRANSFORMER

- A. All insulating materials are to exceed NEMA ST20 standards and be rated for 220°C UL component recognized insulation system.

- B. Transformers 15kVA and larger shall be 150°C temperature rise above 40°C ambient. Transformers 25kVA and larger shall have a minimum of 4 - 2.5% full capacity primary taps. Exact voltages and taps to be as designated on the plans or the transformer schedule.
- C. The maximum temperature of the top of the enclosure shall not exceed 50°C rise above a 40°C ambient.
- D. Transformers shall be low loss type with minimum efficiencies per NEMA TP1 when operated at 35% of full load capacity. Efficiency shall be tested in accord with NEMA TP2.

Single Phase		Three Phase	
kVA	Efficiency	kVA	Efficiency
15	97.7%	15	97.0%
25	98.0%	30	97.5%
37.5	98.2%	45	97.7%
50	98.3%	75	98.0%
75	98.5%	112.5	98.2%
100	98.6%	150	98.3%
167	98.7%	225	98.5%
250	98.8%	300	98.6%
333	98.9%	500	98.7%
		750	98.8%

- E. The transformer(s) shall be rated as indicated in the following schedule:
 Identification Number(s)
 kVA Rating
 Voltages
 Phase
- F. Transformer coils shall be of the continuous wound construction and shall be impregnated with nonhygroscopic, thermosetting varnish.
- G. All cores to be constructed with low hysteresis and eddy current losses. Magnetic flux densities are to be kept well below the saturation point to prevent core overheating. Cores for transformers greater than 500kVA shall be clamped utilizing insulated bolts through the core laminations to ensure proper pressure throughout the length of the core. The completed core and coil shall be bolted to the base of the enclosure but isolated by means of rubber vibration-absorbing mounts. There shall be no metal-to-metal contact between the core and coil and the enclosure except for a flexible safety ground strap. Sound isolation systems requiring the complete removal of all fastening devices will not be acceptable.
- H. The core of the transformer shall be visibly grounded to the enclosure by means of a flexible grounding conductor sized in accordance with applicable UL and NEC standards.
- I. The transformer enclosures shall be ventilated and be fabricated of heavy gauge, sheet steel construction. The entire enclosure shall be finished utilizing a continuous process consisting of degreasing, cleaning and phosphatizing, followed by electrostatic deposition of polymer polyester powder coating and baking cycle to provide uniform coating of all edges and surfaces. The coating shall be UL recognized for outdoor use. The coating color shall be ANSI 49.
- J. Sound levels shall be warranted by the manufacturer not to exceed the following:
 15 to 50KVA - 45dB;
 51 to 150kVA - 50dB;
 151 to 300kVA - 55dB;
 301 to 500kVA - 60dB;
 501 to 700kVA - 62dB;
 701 to 1000kVA - 64dB;
 1001 to 1500kVA - 65dB;

1501 to 2000kVA- 66dB

- K. Transformers installed outdoors shall be NEMA 3R, unless otherwise noted on the Drawings.
- L. Dry-type energy efficient transformer shall be as manufactured by Square D or approved equal.

PART 3 EXECUTION

3.01 TRANSFORMER INSTALLATION

- A. Transformer shall be where indicated on the Drawings. Indoor transformers shall have code and manufacturers recommended clearances from adjacent walls. In no case should this clearance be less than six inches.
- B. Transformer shall be connected with flexible liquid tight metallic conduit to prevent the transmission of sound through the conduit system. All transformers shall be installed on resilient vibration-isolating mounting pads.
- C. Transformer neutral grounding shall be sized in accordance with requirements for separately derived systems and shall be connected to the nearest cold water pipe with supplementary driven ground. Ground rod and connections shall be as detailed in Section 16060.

3.02 FIELD TESTS

- A. Insulation-Resistance Tests: 480 volt windings shall be testing with a 1000 volt megohm meter; 208 or 240 shall be test with a 500 volt megohm meter. All tests shall be applied for not less than 5 minutes and until three consecutive readings, one minute part, are obtain. Readings shall be recorded every 30 seconds for the first two minutes and every minute thereafter.
- B. Acceptance: Acceptance with be based on satisfactory completion of the insulation resistance tests.

END OF SECTION

SECTION 26 24 16

PANELBOARDS AND DISTRIBUTION PANELS

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. The work of this Section consists of providing panelboards and circuit breakers as shown on the Drawings and as described herein.

1.02 RELATED WORK

- A. See the following specification sections for work related to the work in this Section.
1. Section 26 05 10 - General Electrical Requirements
 2. Section 26 05 26 - Grounding
 3. Section 26 05 19 - Line Voltage Wire and Cable
 4. Section 26 28 13 - Circuit Breakers

1.03 SUBMITTALS

- A. Shop Drawings - As specified in Division 1 and Section 26 05 10. For each panelboard and distribution panels furnished under this Contract, submit manufacturer's name, catalog data, and the following information:
1. Panelboard / distribution panel type.
 2. Main bus and terminal connection sizes.
 3. Location of line connections.
 4. Cabinet dimension.
 5. Gutter space.
 6. Gauge of boxes and fronts.
 7. Finish data.
 8. Voltage rating.
 9. Breaker manufacturer, types, trip rating, and interrupting ratings.
 10. When information is available on the Drawings, show breaker circuit numbers and locations along with trip ratings on a panelboard layout.
- B. Single Submittal - A single complete submittal is required for all products covered by this Section.
- C. Closeout Submittals: Submit operation and maintenance data for panelboards and circuit breakers including nameplate data, parts lists, factory and field-test reports, recommended maintenance procedures and typewritten as-built panel schedules. Submit in accordance with Division 1.

1.04 WARRANTY

- A. Manufacturer shall warrant specified equipment free from defects in materials and workmanship for the lesser of one (1) year from the date of installation or eighteen (18) months from the date of purchase.

PART 2 PRODUCTS

2.01 PANELBOARDS

- A. General: Lighting and Receptacle Panelboards shall be the automatic circuit breaker type. The number and arrangement of circuits, trip ratings, spares and blank spaces for future circuit

breakers shall be as shown on the Drawings or, if not shown, 42 circuits. All circuit breakers shall be quick-make, quick-break, thermal-magnetic bolt-on type, with 1, 2 or 3 poles as shown, each with a single operating handle. Tandem or piggyback breakers shall not be used.

B. Nameplates

1. Each panelboard shall have a field mounted identifying, rigid, plastic nameplate giving the panel identification as shown on the Drawings. Nameplates shall be laminated with black characters minimum 3/16" high on a white laminated background. Nameplates shall be attached with screws.
2. Each panelboard shall have a manufacturer's nameplate showing the voltage, bus rating, number of phases, frequency and number of wires.

C. Construction

1. Door and trim shall be finished to match color of surrounding wall. Box shall be hot-dip galvanized, field finished to match the front.
2. Panelboards and enclosures shall conform to requirements of all relevant codes. Panelboards shall be suitable for use as service equipment.
3. Panelboards shall be furnished with door-in-door or hinged trim fronts with key latch, on inner door and a typed directory card and holder. Panelboard circuits shall be arranged with odd numbers on the left and even numbers on the right. Provide weatherproof, NEMA type 3R enclosures for outdoor installation.

D. Busbars: Panelboard busbars shall be phase sequence type suitable for bolt-on circuit breakers. All busbars shall be copper. Panelboard bus current ratings shall be determined by heat-rise tests conducted in accordance with UL 67.

1. Busbars shall be braced for the indicated short circuit level scheduled.
2. Busbars shall be installed completely throughout the panel for installation of both required and future breakers. Schedules indicate spaces for future breakers.
3. Busbars shall be designed so circuit breakers may be changed without machining, drilling or tapping.
4. Separate isolated Neutral and Ground busbars shall be provided. If called for on panel schedules, Neutral busbar may be oversized. Ground busbar shall be identified with green stripe and fully bonded to enclosure.

E. Circuit Breakers: Circuit breakers shall be the molded case type with trip and interrupting ratings as shown on the Drawings.

F. Series ratings shall not be allowed unless specifically noted on drawings.

G. Typed Circuit Directories: All panelboards shall have typed directories identifying all circuits installed behind plastic cover provided by the panelboard manufacturer.

H. Manufacturer

1. Panelboards shall be Square D, Siemens or approved equal.

2.02 DISTRIBUTION PANELS

A. General: Distribution panels shall be the automatic circuit breaker type. The number and arrangement of circuits, trip ratings, spares and blank spaces for future circuit breakers shall be as shown on the Drawings. All circuit breakers shall be quick-make, quick-break, thermal-magnetic bolt-on type, with 1, 2 or 3 poles as shown, each with a single operating handle. Tandem or piggyback breakers shall not be used.

B. Nameplates

1. Each distribution board shall have a field mounted identifying, rigid, plastic nameplate giving the panel identification as shown on the Drawings. Nameplates shall be laminated with black

characters minimum 3/16" high on a white laminated background. Nameplates shall be attached with screws.

2. Each distribution panel shall have a manufacturer's nameplate showing the voltage, bus rating, number of phases, frequency and number of wires.

C. Construction

1. Door and trim shall be finished to match color of surrounding wall. Box shall be hot-dip galvanized, field finished to match the front.
2. Distribution panels and enclosures shall conform to requirements of all relevant codes. Distribution panels shall be suitable for use as service.
3. Distribution panels shall have a front door with key latch and a typed directory card and permanently attached holder. Adhesive backed holders are not acceptable. Distribution panel's circuits shall be arranged with odd numbers on the left and even numbers on the right. Provide weatherproof, NEMA type 3R enclosures for outdoor installation.

D. Busbars: Distribution panel's busbars shall be phase sequence type suitable for bolt-on circuit breakers. All busbars shall be copper. Panelboard bus current ratings shall be determined by heat-rise tests conducted in accordance with UL 67.

1. Busbars shall be braced for the indicated short circuit level scheduled.
2. Busbars shall be installed completely throughout the panel for installation of both required and future breakers. Schedules indicate spaces for future breakers.
3. Busbars shall be designed so circuit breakers may be changed without machining, drilling or tapping.
4. Separate isolated Neutral and Ground busbars shall be provided. If called for on panel schedules, Neutral busbar may be oversized. Ground busbar shall be identified with green stripe and fully bonded to enclosure.

E. Circuit Breakers: Circuit breakers shall be the molded case type with trip and interrupting ratings as shown on the Drawings.

F. Series rating shall not be allowed unless specifically noted on drawings.

G. Manufacturer

1. Distribution panels shall be Square D, Siemens or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION: Panelboards and Distribution Panels shall be installed where indicated on the Drawings, and in accordance with the manufacturer's instructions.

3.02 INSTALLATION

- A. Panelboards and Distribution Panels shall be installed with the top of the box 6'-6" above the floor. Panelboards and Distribution Panels shall be plumb within 1/8-inch. The highest breaker-operating handle shall not be higher than 72 inches above the floor.
- B. Floor mounted Panelboards and Distribution Panels shall be installed on a concrete house keeping slab. The concrete slab shall be a minimum of 4" above finished floor, with minimum of 6" extension beyond equipment. The concrete slab shall have a 1/2" chamfer. See Division 3 for concrete work requirements.

3.03 FIELD TESTS

- A. Insulation Resistance Tests: Perform insulation resistance tests on circuits with #2 AWG and larger conductors to be energized with a line-to-neutral voltage of 120 volts or more. Make these tests after all equipment has been connected, except that equipment, which may be damaged by the test voltage, shall not be connected. Test the insulation with a 500Vdc insulation resistance tester

with a scale reading 100 megohms. The insulation resistance shall be 2 megohms or more. Submit results for review.

- B. Grounding: Grounding shall conform to Section 26 05 26.
- C. Continuity: Panelboard and Distribution Panel circuits shall be tested for continuity prior to energizing. Continuity tests shall be conducted using a dc device with a bell or buzzer.

END OF SECTION

SECTION 26 27 26

DEVICES WIRING

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. The work of this section consists of:
 - 1. Furnishing, installing, and connecting all duplex receptacles complete with wall plates and/or covers, as shown on the Drawings.
 - 2. Furnishing, installing and connecting all single pole and three-way switches complete with wall plates and or handle operators, as shown on the Drawings.

1.02 RELATED WORK

- A. See the following specification sections for work related to the work of this section:
 - 1. Section 26 05 33 - Conduits, Raceways and Fittings.
 - 2. Section 26 05 19 - Low Voltage Wire and Cable.
 - 3. Section 26 05 34 - Junction and Pull Boxes.

1.03 SUBMITTALS: As specified in Division 1.

- A. Submit manufacturers published descriptive literature properly marked to identify the items to be supplied.
- B. A single complete submittal is required for all products covered by this Section.

PART 2 PRODUCTS

2.01 RECEPTACLES

- A. General - Receptacles shall be heavy duty, high abuse, grounding type.
- B. Duplex Receptacles
 - 1. Receptacles shall be specification grade, rated 20 ampere, two-pole, 3-wire, 120 volt, NEMA 5-20 configuration, self-grounding with screw terminals. Color shall be ivory or as selected by the Architect.
 - 2. Devices shall have a nylon composition face, back and side wired.
 - 3. Manufacturer: Leviton #5362 Series, Hubbell #5362-I Series.
- C. GFCI Receptacles
 - 1. Device shall be Smart Lock with lockout action, rated 20 ampere, 2-pole, 3-wire, 120 volt, conforming to NEMA 5-20 configuration. Face shall be nylon composition. Unit shall have an LED type green indicator light, test and reset push buttons. Color shall be ivory unless otherwise noted.
 - 2. GFCI component shall meet UL 2003 Class A standards with a tripping time of 1/40 second at 5 milliampere current unbalance. Operating range shall extend from -31°F to 158°F. Unit shall have transient voltage protection and shall have a diagnostic indication for miswiring.
 - 3. Manufacturer: Leviton #8898-I Series.
- D. GFCI Blank Face Devices

1. Device shall be Smart Lock with lockout action, rated 20 ampere, 2-pole, 3-wire, 120 volt, blank face, dead front. Face shall be nylon composition. Unit shall have a test and reset push buttons. Color shall be ivory unless otherwise noted.
 2. GFCI component shall meet UL 2003 Class A standards with a tripping time of 1/40 second at 5 milliamperes current unbalance. Operating range shall extend from -31°F to 158°F. Unit shall have transient voltage protection and shall have a diagnostic indication for miswiring.
 3. Manufacturer: Leviton #8590-I Series.
- E. Surge Suppression Receptacles
1. Device shall be rated 20 ampere, 2-pole, 3-wire, 120 volt. Face shall be nylon composition. Unit shall have an LED type "Power-on" indication light and damage-alert audible alarm. Color shall be ivory unless otherwise noted.
 2. Surge suppression protection shall be listed to UL standard 1449 and shall instantly absorb a transient surge of 6,000 volts minimum. A minimum of four (4) Metal Oxide Varistors shall be utilized to absorb transients.
 3. Manufacturer: Leviton #8380-I Series, Hubbell #HBL8362S Series.

2.02 SWITCHES

- A. Switches shall be rated 20 amperes to 120/277 volts ac. Units shall be flush mounted, self-grounding, quiet operating toggle devices. Handle color shall be ivory or as selected by the Architect.
1. Manufacturer: Leviton #1221-2I Series, Hubbell #HBL1221 Series.
- B. Timed switches: Shall be as designed by Paragon Electric Company # ET2000f, Watt Stopper TS-100 or Leviton # 6215M rated for the voltage specified on drawings. Time out shall be adjustable from 5 minutes up to 12 hours. Unit shall be provided with warning alarm.
- C. Motion Sensor shall be dual technology as designed by Watt Stopper DT series. Use protective wire covers in restrooms, multi-use, cafeteria, etc.

2.03 PLATES

- A. General - Plates shall be of the style and color to match the wiring devices, and of the required number of gangs. Plates shall conform to NEMA WD 1, UL 514 and FS W-P-455A. Plates on finished walls shall be non-metallic or stainless steel. Plates on unfinished walls and on fittings shall be of zinc plated steel or case metal and shall have rounded corners and beveled edges.
- B. Non-Metallic: Plates shall be plain with beveled edges and shall be nylon or reinforced fiberglass.
- C. Stainless Steel: Plates shall be .040 inches thick with beveled edges and shall be manufactured from No. 430 alloy having a brushed or satin finish.
- D. Cast Metal: Plates shall be cast or malleable iron covers with gaskets so as to be moisture resistant or weatherproof.
- E. Blank Plates: Cover plates for future telephone outlets shall match adjacent device wall plates in appearance and construction.

PART 3 EXECUTION

3.01 INSTALLATION OF WIRING DEVICES

- A. Interior Locations: In finished walls, install each device in a flush mounted box with washers as required to bring the device mounting strap level with the surface of the finished wall. On unfinished walls, surface mount boxes level and plumb.
- B. Mounting Heights: Measure locations of wall outlets from the finished floor to the center of the outlet box. Adjust boxes so that the front edge of the box shall not be farther back from the

finished wall plane than 1/4-inch. Adjust boxes so that they do not project beyond the finished wall. Height above finished floor to center of device unless otherwise noted on Drawings shall be as follows:

1. Receptacles 18 Inches above finished floor
2. Toggle Switches 48 Inches above finished floor

C. Receptacles

1. Ground each receptacle using a grounding conductor, not a yoke or screw contact.
2. Install receptacles with connections spliced to the branch circuit wiring in such a way that removal of the receptacle will not disrupt neutral continuity and branch circuit power will not be lost to other receptacles in the same circuit.

3.02 INSTALLATION OF WALL PLATES

- A. General - Plates shall match the style of the device and shall be plumb within 1/16-inch of the vertical or horizontal.
- B. Interior Locations, Finished Walls: Install non-metallic plates so that all four edges are in continuous contact with the finished wall surfaces. Plaster filling will not be permitted. Do not use oversized plates or sectional plates.
- C. Interior Locations, Unfinished Walls: Install stainless steel or cast metal cover plates.
- D. Exterior Locations: Install cast metal plates with gaskets on wiring devices in such a manner as to provide a rain tight weatherproof installation. Cover type shall match box type.
- E. Future Locations: Install blanking cover plates on all unused outlets.
- F. All receptacles shall be labeled with panel and circuit number. Contractor shall provide 3/8" clear label tape on each wall plate with 1/4" black machine lettering.

3.03 TESTS

A. Receptacles

1. After installation of receptacles, energize circuits and test each receptacle to detect lack of ground continuity, reversed polarity, and open neutral condition.

END OF SECTION

SECTION 26 28 13

CIRCUIT BREAKERS

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. The work of this Section consists of providing circuit breakers as shown on the Drawings and as described herein.

1.02 RELATED WORK: See the following Specification Sections for work related to the work in this Section.

- A. 26 05 10 General Electrical Requirements
- B. 26 24 13 Switchboards
- C. 26 24 16 Panelboards and Distribution Panels

1.03 SUBMITTALS

- A. Shop Drawings - Submittals shall be in accordance with Division 1. For each circuit breaker furnished under this Contract, submit manufacturer's name, catalog data, and the following information:
 - 1. Terminal connection sizes.
 - 2. Voltage rating.
 - 3. Breaker manufacturer, types, trip ratings and interrupting ratings.
- B. Single Submittal - A single complete submittal is required for all products covered by this Section.
- C. Closeout Submittals: Submit in accordance with Division 1 and Section 16010, operation and maintenance data for circuit breakers including nameplate data, parts lists, manufacturer's circuit breaker timer, current, coordination curves, factory and field test reports and recommended maintenance procedures.

1.04 WARRANTY

- A. Manufacturer shall warrant specified equipment free from defects in materials and workmanship for the lesser of one (1) year from the date of installation of eighteen (18) months from the date of purchase.

PART 2 PRODUCTS

2.01 CIRCUIT BREAKER: Each circuit breaker shall consist of the following:

- A. A molded case breaker with an over center toggle-type mechanism, providing quick-make, quick-break action. Each circuit breaker shall have a permanent trip unit containing individual thermal and magnetic trip elements in each pole. Circuit breakers shall have variable magnetic trip elements which are set by a single adjustment to assure uniform tripping characteristics in each pole.

- B. Breaker shall be calibrated for operation in an ambient temperature of 40°C.
- C. Each circuit breaker shall have trip indication by handle position and shall be trip-free.
- D. Three pole breakers shall be common trip.
- E. The circuit breakers shall be constructed to accommodate the supply connection at either end of the circuit breaker. Circuit breaker shall be suitable for mounting and operation in any position.
- F. Breakers shall be rated as shown on Drawings.
- G. Series rating of circuit breakers shall not be allowed unless specifically noted on drawings.
- H. Breakers shall be UL listed. Circuit breakers shall have removable lugs.
- I. Lugs shall be UL listed for copper and aluminum conductors.
- J. Breakers shall be UL listed for installation of mechanical screw type lugs.
- K. Circuit breakers serving HACR rated loads shall be HACR type. Circuit breakers serving other motor loads shall be motor rated.
- L. Breakers indicated as "current limiting " (CL), shall be of the non-fused type; Square D I-Limiter, Cutler Hammer Limit-R, or ITE Sentron only.

PART 3 EXECUTION

3.01 MOUNTING

- A. The highest breaker operating handle shall not be higher than 72 inches above the floor.

END OF SECTION

SECTION 27 41 16

ATHLETIC FIELD PUBLIC ADDRESS SYSTEM

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The intent of this specification is to provide a complete and satisfactory operating system for the pickup, amplification, distribution, and reproduction of voice and/or audio program material. The system shall be of modular design to facilitate both expansion and service. All equipment and installation material required to fulfill the above shall be furnished whether or not specifically enumerated herein. The system shall meet the following requirements:
 - 1. Reproduction of speech shall be clear, high fidelity, and with all frequencies within range for the system faithfully reproduced with no detectable noise, hum, or distortion.
 - 2. Audio level of the system shall be attained at sound levels sufficient to override noise levels typical for schools, to provide a thoroughly satisfactory and serviceable system.
 - 3. Reproduction shall be attained with maximum intelligibility of speech. There shall be minimum echoing effects, which deteriorate the intelligibility of the reproduced speech.
- B. Work shall include the furnishing of all labor, material tools, and system described in these Specifications and shown in the system described in these Specifications and shown in the drawing.
- C. The work shall include, but not be limited to:
 - 1. Installation of equipment rack, cabinet.
 - 2. Internal wiring of rack.
 - 3. Installation of speakers.
 - 4. Wiring of all speakers.
 - 5. Installation of microphone jacks and wire.
 - 6. Making equipment function as intended.
 - 7. Spectrum analysis and tuning of the system
 - 8. Documentation of functions and wiring.

1.02 RELATED WORK

- A. The requirements of the General Conditions and Division 1, General Requirements, apply to the work specified in this section.
- B. Section 26 05 10 – General Electrical Requirements
Section 26 05 19 – Low Voltage Wire and Cable
Section 26 05 26 – Grounding
Section 26 05 33 – Conduits, Raceways and Fittings
Section 26 05 34 – Junction and Pull Boxes

1.03 CODES AND STANDARDS

- A. Complete installation shall meet or exceed the latest edition of following standards:
1. EIA/TIA-568: Commercial building telecommunications wiring standard.
 2. EIA/TIA-569: Commercial building standard for telecommunications pathways and spaces.
 3. EIA/TIA-606: Administration standard for telecommunications infrastructure of commercial buildings.
 4. EIA/TIA-607: Commercial building grounding and bonding requirements for telecommunications.
 5. California Building Code (CBC).
 6. California Electrical Code (CEC).
 7. ANSI, ASTM, UL, NEMA, IEEE and FCC standards as applicable.
 8. BISCI Telecommunications Distribution Methods Manual, current edition.

1.04 QUALITY ASSURANCE

- A. Work shall conform to CCR, Title 24 part 3, Basic Electrical Regulation and National Electrical Code, latest edition.
- B. Only a qualified Installer holding licenses required by legally constituted authorities having jurisdiction over the work, shall do the work.
- C. Persons skilled in trade represented by work, and in accordance with all applicable building codes, shall install system in accordance with best trade practice.
- D. Work shall be performed by an installer that has completed at least 5 school systems of equal scope to system described herein and shall have been engaged in business of supplying and installing specified type of systems for at least 5 years. Installer shall maintain a fully equipped service organization capable of furnishing repair service to equipment.
- E. The Installer shall use adequate numbers of skilled workmen who are manufacturer certified, thoroughly trained and experienced on the necessary crafts and completely familiar with the specified requirements and methods needed for the proper performance of the work.
- F. The Installer shall provide manpower and tools required to participate in Owners Quality Assurance Testing as detailed in Attachment "A" of this specification.
1. Items on check list of Attachment "A" will be examined as a minimum at the Public Address Head End, terminal cabinets, ground vaults and classrooms. Should the examination show deficiencies related to items in the checklist, Owners acceptance testing will be discontinued until corrections have been made. When the Installer has completed the corrections, a subsequent Quality Assurance test shall be initiated. This procedure is in addition to the system functionality testing required in section 3.02 below.
- G. Design analysis shall be performed by certified individual under the direct observation of the sound engineer responsible for preparation of the Shop Drawings.

- H. System startup and electro-acoustical testing with the Techron TEF20 instrumentation shall be performed under the direct observation of the sound engineer responsible for preparation of the Shop Drawings.

1.05 SUBMITTALS

- A. Submit the following in accordance with Division 01.
 - 1. Furnish catalog cuts, technical data, and descriptive literature on components. Data shall be clearly marked and noted to identify specific ranges, model numbers, sizes, and other pertinent data.
 - 2. Each submittal shall be bound and shall contain an index organized vertically by assembly and item number and horizontally by columns.
 - a. The first assembly shall be the major head end equipment.
 - b. The leftmost column shall be the item number; next shall be the description, followed by the applicable specification section number, and followed by the specified item, which is followed by the submitted item.
 - c. The rightmost column shall be for notes, which shall be used to reference the reason for submitting items other than as specified.
 - 3. Each submittal shall contain product data sheets or catalog cut sheets for each item listed in the Index. These shall be arranged in the same order as the index and if more than one item is shown, the submitted items shall be highlighted or marked with an arrow.
 - a. The product data shall be sufficiently detailed to allow the Architect to evaluate the suitability of the product and to allow other trades to provide necessary coordination.
 - 4. Provide Shop Drawings, in the same size as the Record Drawings. Shop Drawings shall be prepared in the latest version of AutoCAD with 3 CD-ROM electronic copies submitted along with full sized Shop Drawings.
 - a. Provide a complete set of scaled drawings of racks, consoles, and cabinets with designations, dimensions, color, operation controls, instrument wiring, and schematic diagrams of circuits, following Drawings as baseline.
 - b. Shop Drawings shall provide details as to interfaces of equipment of other Work, identifying numbers of wires, termination requirements, voltages, and other pertinent details. Include front elevations, cabinet dimensions, types of mounting, doors, barriers, catalog number of locks, and finishes for terminal cabinets.
 - c. Include a dimensional Shop Drawing of console nameplate. Nameplate shall contain school name, firm, address, telephone number for warranty and maintenance, and power load.
 - d. For System equipment Rack: Include a front elevation indicating cabinet dimensions, make, location and capacity of equipment, size of gutter, type of mounting, finish, and catalog number of locks. General layout of internal devices, wiring drawings with wire numbers and device connections, vendor cut sheets of devices in enclosure and bill of materials listing description, manufacturer, part number, and quantity of items shall be included.

- e. Shop drawings shall indicate equipment locations, wiring and schematics, details, panel configurations, sizes and a point-to-point wiring diagram of all circuits, Shop drawings shall indicate interfaces to equipment furnished by others, identifying numbers of wires, termination requirements, and other pertinent details. Responsibility for each end of interfaces shall be noted on shop drawings.
 - f. Submit Drawings prepared, signed, and sealed by structural engineer licensed in the State of California. Details shall be provided indication the proposed means of support and attachment of speakers and all wall and floor mounted racks. Calculations shall be based on the maximum load rating of the cabinet by the manufacturer in a Zone 4 seismic environment, not the weight of occupancy.
- 5. Permits and Inspections: Obtain and pay for required permits and inspections; deliver certificates of inspection to the IOR.
 - 6. Installer shall have completed at least 5 projects of equal scope to systems described herein and shall have been in the business of supplying and installing specified type of systems for at least 5 years. Installer shall include the telephone number of the customer's client contact for each project.
 - 7. Installer shall include in the Material List Submission copies of the manufacturers' certifications that the Installer is an authorized distributor and service provider of the submitted manufacturers' products and Installer's staff has been adequately trained and certified in the installation of those products.
 - 8. Installer shall provide a letter from the Manufacturer warranting the availability of spare parts common to proposed system for a period no less than 5 years on all components.
 - 9. Calculations: Power load of PS system shall be calculated by the Installer on a separate sheet and shall be included in submittal.

1.06 Documentation

- A. Upon completion of the work, the contractor shall submit all as built drawings, including system single line block diagrams and wiring diagrams including all speaker line, microphone, rack interconnection, cabling, relay wiring and function and adjustment settings.
- B. Sound Contractor shall also provide a complete set of manufacturer's specification sheets on all major items of equipment, including operating instructions, where relevant.
- C. Additionally, the Sound Contractor shall dedicate no less than four working hours, upon completion of system to thoroughly familiarize owner's representative with all aspects of the system operation.

1.07 WARRANTY

- B. Contractor shall warranty that all work executed and materials furnished shall be free from defects of material and workmanship for a period of 3 years from substantial completion, excluding specific items of work that require a warranty of a greater period as set forth in this specification. Immediately upon receipt of written notice from the owner, the contractor shall repair or replace at no expense to the owner, any defective material or work that may be discovered before final acceptance of work or within warranty period; any material or work damaged thereby; and adjacent material or work that may be displaced in repair or replacement. Examination of or failure to examine work by the owner shall not relieve installer from these obligations.

PART 2 PRODUCTS

2.01 Paging/Sound System

- A. All materials specified herein shall be new and shall be the manufacturer's latest design, permanently labeled with the model number and serial number. The products specified are distributed through: Bogen Communications Engineered Systems Distributor Sound and Signal, Inc. Please contact them at 925-455-1778 or www.soundandsignal.com
- B. Provide intelligible, permanent identification on or adjacent to all controls; fuses and/or circuit breakers, connectors, receptacles, terminal blocks; amplifiers, equalizers, mixers, etc. The identification shall clearly indicate the function of the item and be numbered or lettered to correspond with the function, circuit, and/or locations, consistent with the field and shop drawings.
- C. All devices connected to the electrical system and all auxiliary equipment necessary for the operation of the equipment associated with systems specified, herein shall be designed to operate from 105 to 130 volts, 60 Hz alternating current service, with stable performance, fully in accordance with these Specifications, and shall have integral fuse or circuit breaker protection. "
- D. Pre-Amplifier: Shall be Bogen CAM8PRO or approved equal. Qty 1.
- E. Power Amplifiers: Shall be Bogen M450 Dual Channel. Or approved equal. Qty. 1 (for shade structure column)
- F. CD/MP3 Player: Shall be Tascam CD-200BT or approved equal. Qty. 1.
- G. Aquatics Pool Speaker system: Shall be New Atlas Sound #AH94-12T-BSG 12" 2-Way Stadium Horn Loudspeaker System 90deg x 40deg or approved equal. Qty. 2. Speaker Cable West Penn AQ296.
- H. Pole Mounts for Atlas Sound speakers shall be Atlas Sound Products AH Series:
 - **Single Speaker Adapter: AH Single Model Configuration. Qty. as required, contractor to confirm.**
 - **Band Strap: Band Strap to Mount on Shade structure column, sound contractor to confirm and provide as required for a 12" model speaker.**
 - **Pole Mount: Provide Support arms and extension allow for speaker flexibility and Yoke Bracket to prevent the speaker from rotating in high winds.**
- I. Power Strip: Shall be Middle Atlantic PD915R. Qty 1.
- J. Loud Speaker Management: Shall be DBX Drive Rack-PA2 or approved equal. Qty. 1.
- K. Equipment Portable Rack: Shall be Odyssey FZAR16W or approved equal. Qty 1.
- L. Desk Microphone: Shall be a Bogen DDU250 or approved equal, with 25' mic cables. Qty 1.
- M. Wireless Microphone System: Shall be ElectroVoice or approved equal:
 - RE-2PRO Receivers Qty 1/
 - RE-2PRO Handheld Qty 2/
- N. Assisted Listening: Shall be Williams Sound PPA-457 PRO or approved equal: Qty 1.
 - PPA-T45 transmitter Qty. 1/
 - ANT-029 remote antenna Qty. 1/
 - TFP-048 power supply Qty. 1/
 - WLC-004 power chord Qty. 1/
 - PPA-R37 HD receivers Qty. 50/
 - EAR-013 earbuds Qty. 50 with (10) neckloops/
 - RPK-005 rack mounting kit Qty. 1
- O. Miscellaneous Equipment:

1. The following connection devices equals are acceptable as required herein:
 - a. General purpose multi-pin (over 3) panel mounting connector: Amphenol MS-Series
 - b. General Purpose multi-pin (over 3) cord connector: Amphenol MS- Series
 - c. Microphone Level or Circuit Connectors:
 - 1) Cannon Model XLR-3-31 (panel)
 - 2) Cannon Model XLR-3-11 (cord)
 - d. Line Level or circuit connectors:
 - 1) Cannon Model XLR-3-32 (panel)
 - 2) Cannon Model XLR-3-1 2,11 (cord)
 - e. Microphone outlets will be Atlas Soundolier S501-14C.
 - f. Speaker outlets will be speakON series.

- P. The following cable termination devices, or approved equals shall be acceptable as required.
 1. Screw Type Barrier Blocks: TRW-Cinch 140,141,142
 2. Line Control and Loudspeaker Level Circuits in equipment rack: Buchanan Terminal Blocks with Type SC terminals.
 3. Quick Connect Terminal (Punch) Blocks:
 4. Siemens Model S66M450 with Model D I O Designation strip.

- Q. Provide a complete block line drawing of the sound system with submittals of all equipment for review. Submit seven copies of shop drawings for review and approval.

PART 3 EXECUTION

3.01 General

- A. Maintain a competent supervisor and supporting technical personnel during the entire installation. Change of supervision during the project is not acceptable without prior approval from the owner.

- B. Furnish and install all materials, devices, components, and equipment required for complete, operational systems.

- C. Rack Equipment installation:
 1. Wire each rack as a unit to self-contained terminal strips.

 2. Install all rack mounted equipment, devices, and materials in equipment rack in a logical, functional manner, demonstrative of signal flow within the respective system arranged for easy accessibility and convenient maintenance.

 3. Utilize Equipment Racks including retaining devices and protective covers for run sheets, elevation and single-line drawing.

 4. Run all microphone and line level wiring in the equipment racks on the equipment input side of the rack and all AC control, and speaker wiring on the output side of the rack.

 5. Install a full height outlet strip with not less than ten outlets ready to be served by its own branch circuit via a fourplex receptacle box at the base of the equipment rack.

 6. Provide a separate ground lead from each amplifier chassis and from each of the other items of equipment normally requiring grounding to the rack ground bus.

 7. Connect rack ground bus to isolated grounding buss by a single, green 12 TW stranded wire.

8. Shielded cables shall be, grounded exclusively to isolated grounding bus. Ground cable shields is a single path, tie to isolated grounding buss.
9. Signal Ground provisions shall realize less than 0.15 ohms to the primary ground connection.

D. Cluster Installation Procedures:

1. Provide and install positioning and support elements for loudspeaker assemblies where required. All such provisions shall be attached to and be wholly contained within the areas designated.
 - a. Arrange all cluster positioning and support devices so that the positioning of each loudspeaker assembly is independently adjustable in both the horizontal and vertical planes. Support elements for each of the loudspeaker cluster components shall be independent and designed with a live load safety factor of at least five (5).
 - b. Verify that no cluster component or other loudspeaker assembly is subjected to stress, abrasion, or loading effects which could contribute to extraordinary failure.
 - c. Eliminate all conditions causing noise, rattle, or other extraneous sounds resulting from the operation of a loudspeaker assembly under any operation condition.
 - d. Provide protective, capacitors in series with each directly driven high frequency loudspeaker component.

E. System Checking and Equalization

1. Preliminary checks and testing shall be conducted by the Sound Contractor prior to performance testing. Such procedures shall verify and insure proper operation of all components, devices, or equipment, nominal signal levels within the system, and the absence of extraneous or degraded signals. Preliminary checks shall include verification of the following:
 - a. Proper grounding of devices and equipment. Proper provision of power to devices and equipment.
 - b. Integrity of all insulation, shield terminations and connections.
 - c. Integrity of soldered connections.
 - d. Absence of solder splatter, solder bridges, debris of any kind, tools, etc...
 - e. Integrity of signal and electrical system ground connections.
 - f. "Wire Checking" of all circuitry, including phase and continuity of all audio system distribution lines, with reference to running sheets, cable designation and submittal drawings.
2. Sound contractor shall determine the proper sequence of energizing the system to minimize risk of damage to any components.
3. After successfully energizing the system, the Sound Contractor shall make all preliminary adjustments, documenting the setting of all controls, parameters of all corrective networks, voltages at key system interconnection points, and device gains and losses, as applicable.

3.02 OWNERS QUALITY ASSURANCE CERTIFICATION AND TESTING

- A. Provide instruments for testing, and demonstrate in the presence of the Owner that the circuits and wiring test free of shorts and grounds.
- B. Furnish labor, instruments, appliances, equipment and materials necessary to demonstrate to the Owner the installation performs as required.
- C. Owner has the right to perform independent tests of equipment furnished, to determine whether or not equipment complies with requirements specified, and to proceed based on results obtained.

- D. The system shall be fully tested and operational before final inspection. Test results shall be provided to the Owner before final inspection.
- E. System startup and electro-acoustical testing with the Techron TEF20 instrumentation shall be performed under the direct observation of the engineer responsible for preparation of the Shop Drawings.
- F. Reproduction of speech shall be clear, high fidelity, and with all frequencies within range of system faithfully reproduced without detectable noise, hum and distortion.
- G. With a 0 dB sine wave test signal applied at a line input of the Biamp mixer, and with the gain adjusted so that the output has a 0 dB output, and with the equalizer bypassed, demonstrate that each channel of the Biamp Amps can deliver 650 watts RMS or greater into an 8 ohm resistive load from 250 to 12.55 kHz. Record measurements at 250 Hz, 630 Hz, 2.5 KHz and 12.5 KHz for each amplifier.
- H. With setup and gain adjusted, as described above, short the balanced line input with a 620 ohm resistor. 20 KHz band limited noise at any speaker amp channel output shall be 70 dB below the level required to reproduce 650 watts RMS. Record the measured noise level for each line input to a given amplifier output.
- I. With setup and gain adjusted as described above and with a 500 Hz test signal, measure the total harmonic generation and noise (THG&N) through the audio chain. THG&N shall be 0.25 percent or less. Record the THG&N for each line input to a given amplifier channel. Record the THG&N from a given line input to each amplifier channel.
- J. With a 1 KHz, 1 mV sine wave signal applied to a microphone input to the mixer, with the gain adjusted so that the sum of stereo electronically balanced output has a 0 Db output, with the equalizer bypassed, adjust the level of a given amplifier to deliver 650 RMS into an 8 ohm resistive load. Record the THG&N for each microphone input to a given amplifier channel output. THG&N shall be 0.25 percent or less.
- K. With setup as described above, short the input with a 120 ohm resistor and measure the 20 KHz band limited noise at the output; 20 KHz band limited noise shall be 70 Db below the level required to deliver 650 watts RMS into an 8 ohm resistive load. Record the noise level for each microphone input to the given high-frequency cluster amplifier channel output.
- L. Perform measurement of first arrival sound pressure levels to verify compliance with the reviewed design analysis. System shall be capable of producing first arrival levels of 90 dB SPL Cwt. With band limited pink noise from the 400 Hz 1/3 level band to the 12.5 KHz 1/3 octave band in the center of the last row of fixed seating and in more than 80 percent of the gymnasium when measured with the Techron TEF-20 electro-acoustical testing equipment. One third octave smoothed first arrival levels as measured with the TEF-20 shall demonstrate that the system frequency response is plus and minus 4 dB over the 400 Hz to 12.5 KHz spectrum and in more than 80 percent of the gymnasium. First arrival requirements do not apply to areas in the acoustical shadow of columns, etc. Provide full TEF contours at 6 locations to provide the Architect with information on which to base recommendations for acoustical treatment.

3.03 PROJECT RECORD DOCUMENTS

- A. As-Built Documentation
 - 1. Provide 3 Blue line copies size E (30" x 42") of Project site and building plans, indicating location of equipment, conduit, cable routing, ground vaults, terminal cabinets, pull boxes and other installation information.

2. Provide two copies of the record Drawings in .DWG format prepared using the most recent version of AutoCAD on a labeled CD-ROM for use on a Windows platform.
 - a. Utilize layers as a key tool in controlling visibility of drawing elements and to provide consistent information between drawings, yet provide control over what is seen on each sheet. Public Address wiring shall be shown on a separate layer, labeled as "Public Address" that uses both building floor plans and conduit supporting structure layers below. The use of any version control blocks or company logos shall be on a layer separate from the premise wiring as-built drawings.
 3. Floor plans indicating all devices, terminal cabinets and cross connect locations, conduit runs, ground vaults, wire types, cable routing of all cables, both underground and in each building with conduit fill and count, and as-built coding used on each cable.
 - a. Drawings shall include block diagrams indicating all items and their point-to-point connections in a manner following floor and site plan layout. Drawings shall also include as-built single line diagram, cable site plot plan and floor plans indicating all cables, both underground and in each building with conduit, and as-built coding used on each cable.
 - b. Floor plans shall indicate all devices, terminal cabinets and cross connect locations, conduit runs, ground vaults, wire types, cable routing of all cables, both underground and in each building with conduit fill and count, and as-built coding used on each cable.
- B. Operating and Servicing Manuals, Record Drawings:
1. Deliver three copies of operating and servicing manuals. Each complete manual shall be bound in three ring binders and all data shall be typewritten or drafted.
 - a. Each manual shall include a page with Project site and Project name, date of Substantial Completion, Contractor name, address, telephone, and fax numbers.
 - b. Each manual shall contain a letter, signed by an officer of the company indicating the beginning and ending date of any warranties described in subsection 1.07 of the specification and shall describe the companies' commitment to service the warranty during the terms specified.
 - c. Each manual shall include as-built single line diagram, cable site plot plan and floor plans indicating all cables, both underground and in each building with conduit, and as-built coding used on each cable. Drawings Size A (8 1/2 x 11 inches) and size B (11 x 17 inches) shall be bound into the manual. Larger drawings shall be folded and inserted into transparent envelopes bound into the manual. Programming forms of each system shall be submitted with complete information.
 - d. Each manual shall include all instructions necessary for proper operation and servicing of system and shall include:
 - (1) A single line diagram of the system indicating all items and their point-to-point connections in a manner following floor and site plan layout.
 - (2) A complete 2 wire diagram of all connections made between components inside the system console.
 - (3) A wiring destination schedule for each circuit leaving console and each rack.

(4) All custom fabricated circuits, components and connections not detailed in the manufacturer's manuals shall have wiring diagrams detailing to component level, the manner in which the circuits are connected.

(5) A schematic diagram of each amplifier and other components, transistor complements and replacement part numbers.

3.04 PROTECTION

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

3.05 CLEANUP

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

3.06 OWNER ORIENTATION

A. Before Substantial Completion, provide a four hour Owner instruction period to designated Owner personnel. This training may be combined with instruction provided for the public address system.

B. Instruction shall be based on manufacturers written operating instructions covering those features of interest to the Owner and applicable to the Work.

C. After Substantial Completion, and before Final Completion, provide two additional one hour 'refresher' instruction sessions at times agreed upon by the Owner.

END OF SECTION

SECTION 31 01 90

LANDSCAPE AND SITE MAINTENANCE

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Landscape maintenance and related work as shown on the Drawings and specified herein including, but not necessarily limited to, the following:
 - 1. Tree planting areas.
 - 2. Irrigation systems.
 - 3. General site clean-up.
- B. Related Requirements:
 - 1. Section 32 80 00 - Irrigation
 - 2. Section 32 90 00 - Planting

1.02 REFERENCES AND REGULATORY REQUIREMENTS

- A. State of California, Business and Transportation Agency, Department of Transportation (Caltrans) "Standard Specifications."

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Submittal Procedures: Action Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.

1.04 ACTION SUBMITTALS

- A. Product Data: Manufacturer's product information on pesticides and herbicides to be used for approval prior to use.

1.05 QUALITY ASSURANCE

- A. Control of Work: Comply with Section 5 of the Standard Specifications.
- B. Control of Materials: Comply with Section 6 of the Standard Specifications.
- C. The Maintenance Contractor shall be experienced in horticulture and landscape maintenance, practices and techniques, and shall provide sufficient number of workers with adequate equipment to perform the work during the Landscape Maintenance Period.

1.06 LANDSCAPE MAINTENANCE PERIOD

- A. Landscape Maintenance Period shall be 90 calendar days.
- B. Continuously maintain the entire project area during the progress of the work, during the specified Landscape Maintenance Period or until Final Acceptance of the project by the District's Representative.
- C. Landscape Maintenance Period shall not start until all elements of construction, planting and irrigation for the entire project are completed in accordance with Contract Documents. A prime requirement is that landscape areas shall be planted satisfactorily. If such criteria are met to the satisfaction of the District's Representative, a written notification shall be issued to establish the effective beginning date of

Landscape Maintenance Period. Additionally, elements included in the Pre-maintenance Punch-list shall have been completed to the satisfaction of the District's Representative. The Landscape Maintenance period shall, at the discretion of the District's Representative, be allowed to start and finish at different times in different areas as applicable.

- D. A day of improper maintenance, as determined by the District's Representative, shall not be credited as an acceptable Landscape Maintenance Period day. The Landscape Maintenance Period shall be extended on a day-for-day basis should this occur until proper maintenance, as determined by the District's Representative, is being performed.
- E. Contractor shall secure the project site against trespass, vandalism and theft during the Landscape Maintenance Period. Security procedures shall be coordinated with the District's Representative.

1.07 GUARANTEE

- A. All work executed under this section shall be guaranteed against any and all poor, inadequate or inferior materials and/or workmanship, as determined by the District's Representative, for the entire Landscape Maintenance Period and for a period of one year after Final Acceptance of project.
- B. The Contractor shall install all replacement material in conformance with the Contract Documents.

1.08 FINAL ACCEPTANCE

- A. Upon completion of all project work, including Landscape Maintenance Period, the District's Representative will, upon written request from the Contractor (2 working day minimum notice), make an observation to determine conformance with the Contract Documents.
- B. If, at the final project observation, work is found at variance with the Contract Documents, or is otherwise unacceptable, the District's Representative shall issue a punch-list of items requiring attention to the Contractor. The Contractor shall repair, replace or otherwise correct all non-compliant work, continue Landscape Maintenance Period, and make another written request to the District's Representative to verify punch-list completion. If punch-list is found to be incomplete, or if site is still found to be unacceptable, the Contractor shall be back-charged as necessary for all additional observations required to issue Final Acceptance. All replacement materials and installations shall be in accordance with the Contract Documents. Remove rejected work and materials immediately from project. Prior to Final Acceptance, Contractor shall provide the District's Representative with all Record Drawings and written Guaranty Statements in accordance with the Contract Documents.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials used shall either conform to Specifications in other Sections or shall otherwise be acceptable to the District's Representative. The District's Representative shall be given a monthly record of all herbicides, insecticides and disease control chemicals used.
- B. Maintenance Fertilizer: "Gro-Power High Nitrogen" as available through Gro-Power, Inc., 800-473-1307, or accepted equal, and shall contain the following chemical analysis:

<u>Percent</u>	<u>Chemical</u>
14%	nitrogen
4%	phosphoric acid
9%	potash

- C. Humus: Inactive, decomposed organic material approved by District's Representative.

PART 3 - EXECUTION

3.01 MAINTENANCE

- A. General: Proper maintenance, including watering, weeding, mowing, edging, fertilization, repairing and protection is required until Final Acceptance of the entire project but not less than the specified Landscape Maintenance Period.
- B. Watering: Water appropriately for each plant type to insure vigorous and healthy growth until work is accepted. Water or irrigate in a manner to prevent runoff or erosion. When hand watering, use a "water wand" to break the water force.
- C. Weeding: Entire project site shall be kept free of weeds at all times. Control new weed growth with pre-emergent herbicides. If weeds develop, use legally approved herbicides.
 - 1. No herbicide shall be used without the District's Representative prior consent. Use herbicides in accordance with manufacturer's recommendations. If selective herbicides are used, extreme caution shall be observed so as not to damage other plants. Spraying shall only be done under windless conditions.
 - 2. Disease and Pest Control: Disease and insect damage shall be controlled by the use of fungicides and insecticides, subject to the prior consent of the District's Representative. Mole and gopher mitigation shall be accomplished using legal means other than poison baits.
- D. Pruning:
 - 1. Trees: Prune trees to select and develop permanent scaffold branches; to eliminate narrow v-shaped branch forks that lack strength; to reduce potential toppling and wind damage by thinning out crowns; to maintain a natural appearance; and to balance crown with roots. Prune only as directed by the District's Representative.
 - 2. Shrubs: The objectives of shrub pruning are the same as for trees. Shrubs shall not be clipped into balled or boxed forms unless such is required by the design.
 - 3. All pruning cuts shall be made to lateral branches, buds or near flush with the trunk. "Stubbing" or heading cuts is not permitted.
 - 4. Only skilled workers shall perform pruning work in accordance with standard horticultural pruning practices. Remove from the project all pruned branches and material. Remove and replace plant material excessively pruned or malformed resulting from improper pruning practices at no additional cost to the District.
- E. Anchoring: Tree anchoring shall remain in place through the maintenance and guaranty periods and shall be periodically inspected and adjusted by the Contractor to prevent rubbing that causes bark wounds, loosen for proper growth or other appropriate reasons.
- F. Protection: The Contractor shall maintain protection of planting areas until Final Acceptance. Damaged areas shall be repaired or replaced at the Contractor's expense. Install a temporary maintenance fence using 4-foot blaze orange with steel driven stakes, or acceptable equal, around all planting areas for the entire length of Landscape Maintenance Period.
- G. Trash: Remove trash in all project areas plus adjacent pedestrian walkways and parking areas.
- H. Replacement: Refer to the Article "Guarantee" in Part 1.

3.02 IRRIGATION SYSTEM

- A. System Observation: The Contractor shall visually check all systems for proper operation on a weekly basis and make necessary repairs. Equipment shall be adjusted as necessary for proper coverage and function.

- B. **Controllers:** Program automatic controllers for appropriate seasonal water requirements. Perform a full instruction session in the presence of the District's designated maintenance personnel demonstrating programming, system testing, and trouble shooting. Include instructions on how to turn off system in case of emergency.
- C. **Repairs:** Repairs made to the irrigation system shall be at the Contractor's expense. Repairs, when required, shall be made within 24 hours of discovery by either District or Contractor.

3.03 FIELD QUALITY CONTROL

- A. **Final Review:**
 - 1. At, or near the end of specified Landscape Maintenance Period, the Contractor shall make a written request for a final review and the work shall be reviewed for conformance with the Construction Documents.
 - 2. If the work is not accepted at time of review, a punch-list of items requiring attention will be prepared by the District's Representative and issued to the Contractor for correction.
 - 3. The Landscape Maintenance Period shall be extended at Contractors sole cost as necessary.
 - 4. Upon completion of the punch-list, the Contractor shall again make written request for review. If, upon re-visiting the site, it is found that the punch-list has not been completed, the review shall end and a subsequent visit not scheduled until the Contractor can assure the District the work is complete. Further visits and reviews, and re-inspections required due to Contractor not being prepared or non-conformance with the Construction Documents shall be back charged to the Contractor.
- B. **Final Acceptance:** When work is found to be in conformance with the Contract Documents, subject to the discretion of the District's Representative, a statement of Final Acceptance shall be issued to the Contractor.

END OF SECTION

SECTION 31 20 00

EARTH MOVING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Site excavation and backfilling as shown on the Drawings including, but is not necessarily limited to, the following:
 - 1. Topsoil stripping, stockpiling, and replacement into planting areas.
 - 2. Rough grading.
 - 3. Filling and backfilling to attain required grades.
 - 4. Excavating for paving, footings and foundations.

- B. Related Requirements:
 - 1. Section 01 33 00 - Submittal Procedures
 - 2. Section 01 71 23 - Field Engineering
 - 3. Section 01 78 39 - Project Record Drawings
 - 4. Section 02 41 13 - Site Clearing and Demolition
 - 5. Section 31 23 00 - Excavation and Fill
 - 6. Section 32 01 90 - Existing Tree Protection and Maintenance
 - 7. Section 32 11 00 - Base Courses
 - 8. Section 32 90 00 - Planting

1.02 REFERENCES

- A. California Building Code (CBC).

- B. American Society for Testing and Materials (ASTM):
 - 1. D 1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.

- C. California Occupational Safety and Health Standards (OSHA):
 - 1. Article 6 - Excavations and Shoring.

- D. State of California, Business and Transportation Agency, Department of Transportation (Caltrans) "Standard Specifications."

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Submittal Procedures: Action and Informational Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.

1.04 CLOSEOUT SUBMITTALS

- A. Project Record Drawings:
 - 1. Conform to requirements specified in Section 01 78 39 - Project Record Documents.
 - 2. Accurately record locations of utilities remaining, re-routed utilities, new utilities, and newly discovered utilities by horizontal dimensions, elevations, inverts, and slope gradients.

1.05 ACTION SUBMITTALS

- A. Import Topsoil:

1. It is the Contractor's responsibility to determine if import topsoil is required on the Project.
2. If required, Contractor shall submit four 1/2 pound samples in nominal 1 quart-sized "zip-lock" plastic bags for each proposed import topsoil. Each sample shall include current accompanying fertility and structure analyses prepared by a recognized soil and plant laboratory.
3. Contractor shall submit four 1/2 pound samples in nominal 1 quart-sized "zip-lock" plastic bags for proposed lime-treated subgrade product. Each sample shall include current accompanying chemical and physical analyses prepared by a recognized testing laboratory.

1.06 QUALITY ASSURANCE

- A. Adhere to requirements, recommendations and Best Management Practices (BMPs) for storm water management as may be outlined in the Project Storm Water Pollution Prevention Plan (SWPPP) prepared for this project, or as required by governing agencies.
- B. Geotechnical Investigation:
 1. A Geotechnical Report has been prepared for use on this Project. The recommendations contained therein have been incorporated into the Contract Documents.
 2. Accuracy, sufficiency, and competency of Geotechnical Report are not ratified by the District or its design consultants and remain the sole responsibility of Geotechnical Engineer.
 3. The Geotechnical Report is available from the District.
 4. Unless otherwise specified or indicated on the Drawings, it is intended that all work shall be done in accordance with applicable provisions of the Geotechnical Report.
- C. The District may retain the services of the Geotechnical Engineer to make recommendations based on the soil conditions encountered the results of field and laboratory tests, and observations of the activities performed under this Section.
 1. If, in opinion of the Geotechnical Engineer, work performed does not meet technical or design requirements stipulated, the Contractor shall make necessary readjustments to the approval of the Geotechnical Engineer.
 2. No deviations from the Contract Documents shall be made without specific and written acceptance of the District's Representative.
 3. In event of conflict between the Specifications and recommendations contained in Geotechnical Report, the District's Representative and Geotechnical Engineer shall be notified.
 - a. Contractor shall follow clarification and interpretation issued through the District's Representative at no extra cost to the District.
 - b. If clarification or interpretation should change scope of work, there will be mutually agreed-to adjustment in the Contract price by written Change Order.
 4. The Geotechnical Engineer will not inspect the Contractor's safety measures.
- D. Compaction densities specified for structural fills under footings, slabs, or pavements shall be determined in accordance the Geotechnical Engineer's written recommendations.
- E. Certification:
 1. The Contractor shall certify source and type of backfill and topsoil proposed to be incorporated into the work, at the request of the District's Representative.
 2. The Contractor shall certify elevations of excavations, footings, subgrades and finish grades with the use of a Licensed Surveyor, at Contractor's expense, at the request of the District's Representative.
- F. Control of Work: Conform to Section 5 of the Standard Specifications.
- G. Control of Materials: Conform to Section 6 of the Standard Specifications.

1.07 PROTECTION

- A. Protect all existing structures, fences, roads, sidewalks, paving, curbs, and other items as necessary from earthwork activity.

- B. Protect above or below grade utilities which are to remain.
- C. Protect trees to remain in accordance with Section 32 01 90 - Existing Tree Protection and Maintenance as applicable.
- D. Repair damage to any existing site features which are to remain. Repair and restoration shall be equal to quality and appearance of prior condition and to the satisfaction of the District's Representative.

1.08 FIELD CONDITIONS

- A. Underground Utilities: Unknown buried utility lines may exist. If encountered, notify District's Representative immediately for direction and re-direct work to avoid delay.
 - 1. Cooperate and coordinate with District's Representative and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility District.
 - 2. Do not interrupt existing utilities serving occupied facilities without proper notification to, and written direction from, District's Representative.
- B. Wet Conditions: No grading operations shall be conducted when excessively wet conditions exist as determined by the District's Representative.
- C. Contractor shall provide de-watering equipment as required to continue scheduled operations and provide optimum working conditions at no additional cost to District.
- D. Dry Conditions: Contractor shall apply sufficient water to materials during construction to properly compact materials and control dust. Contractor shall provide dust control in conformance with Section 10 of Standard Specifications and shall provide water to subgrades as necessary to achieve compaction goals.

1.09 GRADE STAKES AND LINES

- A. Grading and subgrading shall be controlled by Contractor-installed intermediate grade stakes and lines necessary to obtain the finished grade elevations shown or implied in the Drawings. Subgrade and finish grade surfaces shall conform to the control planes established by these grade stakes and lines.
- B. Protect and maintain all existing bench marks, monuments and other reference points. If disturbed or destroyed, they shall be replaced at the Contractor's expense.
- C. Contractor shall set temporary bench marks as necessary to properly complete construction operations.

1.10 SURVEYING

- A. Contractor shall be responsible for hiring a licensed professional surveyor to perform all surveying, layout and staking in accordance with requirements specified in Section 01 71 23 - Field Engineering. Contractor shall be responsible for informing District's Representative a minimum 2 working days' notice when staking and layout is scheduled so that a review of completed chalk lines and staking can take place.

1.11 TOLERANCES

- A. Refer to related specification sections for grading tolerances of specified improvements.

PART 2 - PRODUCTS

2.01 PERFORMANCE CRITERIA

- A. Excavations shall not exceed plus or minus 1/10-foot variation from dimensions and elevations shown or noted, unless otherwise accepted by District's Representative.
- B. Grading Tolerance: Refer to related specification sections for grading tolerances of specified improvements.

2.02 MATERIALS

- A. Fill Material: Soil excavated from the site or imported conforming to requirements for fill material contained in applicable portions of Division III Grading, Section 19 - Earthwork of the Standard Specifications, unless modified by recommendations for fill material contained in the Geotechnical Report. Imported fill shall be approved by the Geotechnical Engineer before importation to the site.
- B. Topsoil: Excavated material from top 6 inches maximum of existing grade at unpaved areas and/or import material graded free of roots and rocks larger than two inches, subsoil, debris, weeds, large mats of grass, and other deleterious material. Topsoil shall be approved by the District's Representative and comply with the additional requirements specified in Section 32 90 00 - Planting.
- C. Subsoil: Excavated material below top 6 inches of existing grade, graded free of clay clods larger than 6 inches, rocks larger than 3 inches, and debris.
- D. Permeable Fills: As specified in Section 32 11 00 - Base Courses and conforming to recommendations for granular fill in the Geotechnical Report.
- E. Water: Clean and free from deleterious amounts of acids, alkalis, salts, and organic matter.
- F. Additional Materials: Refer to Lime-Treated Subgrade as noted in the Geotechnical Engineering Report.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Identify all required lines, levels, contours, datum, control points and property lines required to properly establish limits of work.
- B. Verify elevations of critical existing grades as noted on Drawings and as directed by District's Representative. Notify District's Representative of discrepancies prior to start of work and re-direct work to avoid delay.
- C. Identify all known below grade utilities. Stake and flag locations.
- D. Identify and flag surface grades and utilities.
- E. Contact Underground Service Alert (USA), 800-642-2444, and local utility companies to verify locations of existing utilities a minimum of 5 working days prior to excavation.

3.02 PROTECTION

- A. Maintain and protect existing utilities remaining which pass through work area.

- B. Perform excavation work near utilities by hand. Provide necessary protection as the work progresses.
- C. Provide and maintain protection for walks, curbs, drains, trees, corners of structures, and other improvement, as necessary to prevent damage.
- D. Barricade and/or cover open excavations occurring as part of this work and post with warning lights to the satisfaction of the District's Representative. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
- E. Keep adjacent properties, streets and drives clean of any dirt, dust, or stains caused by earthwork operations.
- F. Upon discovery of unknown utility or concealed conditions, notify the District's Representative immediately and re-direct work to avoid delay.
- G. Control dust on and near the work, and on and near off-site borrow areas.
 - 1. Thoroughly moisten surfaces as required to prevent dust from being a nuisance to the public, neighbors, and concurrent performance of any other activities that may occur on the site.
 - 2. Non-compliance with proper dust control measures will be cause for issuance of a "stop work" order by the District until such time as satisfactory measures can be implemented.

3.03 TOPSOIL EXCAVATION

- A. Excavate topsoil from areas scheduled for paving or rough grading and stockpile material in neat wind-row(s) and in location(s) previously established and accepted in coordination with the District's Representative and which will cause least interference to construction operations.
- B. Do not excavate topsoil that has become wetted to, or beyond, the saturation point that would be required for optimum compaction.
- C. Stockpile topsoil in wind-row(s) of a height not to exceed 8 feet, protect from erosion, and cover as necessary to prevent formation of dust.
- D. Topsoil excavation shall occur for the entire area or each field. No topsoil excavation shall occur for partial field areas without approval.
- E. Topsoil staging areas shall be clearly defined and protected from other grading and utility operations.

3.04 ROUGH GRADING

- A. Grade site subsoil to establish proper subgrade elevations and site contouring as described or implied in the Drawings:
- B. Contouring:
 - 1. Construct landforms depicted in the Drawings to the satisfaction of the District's Representative.
 - 2. "Round-off" tops of slopes.
 - 3. "Feather" toes of slopes.
- C. Compaction:
 - 1. Compact subgrade and engineered fill in accordance with the procedures and to relative compaction percent indicated in the Geotechnical Report.
 - 2. Compact by power tamping, rolling, or combinations thereof as accepted by Geotechnical Engineer.
 - a. Where impractical to use rollers in close proximity to adjacent construction, compact by mechanical tamping.
 - b. Scarify, moisture condition, and recompact any layer not attaining compaction until required density is obtained.

3. Repeat compaction procedure until proper grade is attained.
 4. In planting areas, fill in maximum 8 inch loose lifts compacted to between 85 percent and 88 percent relative compaction.
- D. Remove all excess subsoil material from site and dispose of in a legal manner. Refer to “Material Storage” below.
- E. Entire project or individual field area shall be rough graded at one time. No earthwork operation shall occur for partial field areas without receiving direction from the District or prior written approval from the District.

3.05 EXCAVATION

- A. Remove and dispose of all miscellaneous materials encountered when establishing required grade elevations:
1. Miscellaneous materials can include but are not limited to: pavements and other obstructions, underground structures, utilities, abandoned irrigation materials, and other materials encountered per the discretion of the District’s Representative.
- B. Stability of Excavations:
1. Comply with any applicable recommendations contained within the Project Geotechnical Report and requirements of agencies having jurisdiction.
 2. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.
- C. De-watering: Provide and maintain, at all times during construction, ample means and devices with which to promptly remove and properly dispose of water from any source entering structural excavation, pipe trenches, or other excavations. All costs incurred from de-watering activities shall be paid for by the Contractor.
- D. Excavation for Structures: Conform to elevations and dimensions shown in the drawings within a tolerance of plus-or-minus 1/10 (0.10) of a foot, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete form-work, installation of services, and quality review.
- E. Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations, and grades as shown in the Drawings.
- F. Material Storage:
1. Stockpile satisfactory excavated materials where appropriate, until required for use.
 2. Stockpile topsoil and subgrade soil in separate piles.
 3. Place, grade and shape stockpiles for proper drainage.
 4. Locate and retain stockpiles away from edge of excavations.
 5. Dispose of excess soil material in a legal fashion after it has become evident that the material is no longer needed on the project and is of no value to the District.

3.06 TOPSOIL PLACEMENT

- A. Thoroughly cross-rip all subgrade soil to a depth of 12 inches prior to placing the specified thickness of topsoil back into all applicable planting areas. Secure review and acceptance of ripping depth prior to placement of topsoil. Refer to Section 32 90 00 - Planting for this process.
- B. Topsoil placement requirements for planting areas shall be as follows:
1. Planting Areas: A minimum of 6 inches of clean, acceptable topsoil.
 2. Topsoil shall not be placed until all earthwork and utility operations are complete.
 3. Topsoil shall be installed at one time for entire project or entire field area. No partial placements shall occur.

- C. Compact topsoil to 85 percent to 88 percent relative density.
- D. Maintain slopes and gradients established during subgrade operations and shape landforms to satisfaction of the District's Representative.
- E. Refer to Section 32 90 00 - Planting for finish grading information and finish grades at edge of planting areas and hardscape.

3.07 FIELD QUALITY CONTROL

- A. Tolerances: Conform to Section 19 of the Standard Specifications, unless more stringent requirements in these Contract Documents are provided, in which place the more stringent tolerances shall govern. Refer to Section 01 71 23 - Field Engineering for additional project requirements.
- B. The District Representative shall review and accept work at the following stages:
 - 1. Topsoil removal and stockpile.
 - 2. Grading plan for project. Plan shall provide strategy for grading sequence for entire site at one time or by field. Limits and sequence shall be reviewed and coordinated.
 - 3. Cross ripping of subgrade shall be reviewed and observed.

END OF SECTION

SECTION 31 23 00

EXCAVATION AND FILL

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Trenching, backfilling, and compaction required for, but not necessarily limited to, the following:
 - 1. Sanitary sewer line installation.
 - 2. Storm drainage system installation.
 - 3. Potable water line installation.
 - 4. Irrigation system installation.
 - 5. Electrical conduit installation.

- B. Related Requirements:
 - 1. Section 01 33 00 – Submittal Procedures
 - 2. Section 01 71 23 - Field Engineering
 - 3. Section 01 78 39 - Project Record Drawings
 - 4. Section 02 41 13 - Site Clearing and Demolition
 - 5. Section 31 20 00 - Earth Moving
 - 6. Section 32 01 90 - Existing Tree Protection and Maintenance
 - 7. Section 32 11 00 - Base Courses
 - 8. Section 32 90 00 - Planting
 - 9. Section 33 11 00 - Domestic Water Utilities
 - 10. Section 33 40 00 - Storm Drainage Utilities

1.02 REFERENCES

- A. State of California, Business and Transportation Agency, Department of Transportation (Caltrans) "Standard Specifications."

1.03 SEQUENCING AND SCHEDULING

- A. Refer to all other Contract Documents, determine the extent and character of related work, and properly coordinate work specified herein with that described elsewhere to produce a complete, operational installation.

1.04 CLOSEOUT SUBMITTALS

- A. Project Record Drawings:
 - 1. Conform to requirements specified in Section 01 78 39 - Project Record Documents.
 - 2. Accurately record locations of utilities remaining, re-routed utilities, new utilities, and newly discovered utilities by horizontal dimensions, elevations, inverts and slope gradients as practical.

1.05 QUALITY ASSURANCE

- A. Control of Work: Comply with Section 5 of the Standard Specifications.
- B. Control of Materials: Comply with Section 6 of the Standard Specifications.
- C. Trench Safety: Comply with applicable portions of Sections 5 and 7 of the Standard Specifications and requirements of OSHA and other agencies having jurisdiction).

1.06 FIELD CONDITIONS

- A. Wet Conditions: No trenching shall occur when excessively wet conditions exist in the opinion of the District's Representative.
- B. Dry Conditions: Contractor shall provide dust control in conformance with Section 10 of Standard Specifications and shall provide water to work as necessary to achieve compaction goals.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General: Materials shall be free of debris, roots, wood, scrap material, vegetative matter, refuse, soft unsound particles, or other deleterious and objectionable materials.
- B. Bedding for Utility Piping: Sand conforming to Section 19-3.02F(2) of the Standard Specifications.
- C. Native Backfill: Native backfill shall be acceptable soil material excavated from the project site. This material will be considered unclassified and no testing other than for compaction will be required. Additional material required for backfill shall be acceptable to the District's Representative.
- D. Permeable Material: Permeable material shall be Caltrans Class II permeable rock material.
- E. Slurry Fill: Controlled low-strength fluid material (CLSM) conforming to Section 19-3.02E of the Standard Specifications, consisting of water, portland cement, aggregate, and fly ash with slump of 10 inches or more and an unconfined compressive strength of 200 psi or less.
- F. Aggregate Base: As specified in Section 32 11 00 - Base Courses.

PART 3 - EXECUTION

3.01 PREPARATION

- A. General:
 - 1. Prior to trenching, the Contractor shall pothole existing utilities at locations indicated or implied on the Drawings, where new piping or utilities will cross existing utilities of uncertain depth to determine the elevation of the utility in question and ensure that the new line will clear the potential obstruction.
 - 2. The Contractor shall mark out construction areas in white with non-permanent paint and contact Underground Service Alert (U.S.A.), 800-642-2444, to locate all known utilities a minimum 48 working hours prior to any excavation.
 - 3. Should an existing crossing utility present an obstruction, the proposed line shall be adjusted as acceptable to the District's Representative to clear the existing utility.

3.02 TRENCH EXCAVATION

- A. General:
 - 1. Excavation shall include removal of water and materials that interfere with construction. Remove water which may be encountered in the trench by pumping or other methods prior to pipe laying, bedding and backfill operations. Trenches shall be sufficiently dry to permit proper jointing and compaction.
 - 2. Contractor is responsible for directing vehicular and pedestrian traffic safely through or around the work area at all times.

3. The Contractor shall relocate, replace, reconstruct or repair, to an “as-was” or better condition, surface or subsurface improvements which are in the line of construction or which may be damaged, removed, disrupted or otherwise disturbed by the construction activities. Except as specified in other Sections or shown in the Drawings, this provision applies to all surface improvements of whatever nature such as walls, fences, above-grade utilities, landscaping, paving, structures, or other physical features whether shown in the Drawings or not and to all subsurface improvements such as utilities which may be indicated in the Drawings or marked in the field. The Contractor shall connect modified utilities to existing systems and leave work in an operating condition. The cost of this work shall be considered as included in other items of work and no additional compensation will be allowed.
 4. The maximum allowable trench width at the top of pipe shall be 18 inches greater than the pipe diameter.
 5. New utility trenches extending deeper than 2 feet below finish grade should be located a minimum of 5 feet away from footings and foundations.
- B. Existing Paving Areas:
1. Existing asphalt paving over new trenches shall be sawcut, removed, and legally disposed. Existing asphalt paving shall be neatly sawcut 1 foot greater on each side than the trench width. If a longitudinal pavement joint or edge of pavement is located within 3 feet of the limit of excavation, intervening pavement shall be removed and replaced after completion of backfilling. If curb, gutter, or similar concrete improvement are to be replaced, the adjacent existing asphalt paving shall be sawcut 2 feet from the edge of concrete.
 2. Existing portland cement concrete paving over new trenches shall be sawcut to a minimum depth of 1-1/2 inches in straight lines either parallel to the curb or at 90 degree angles to the alignment of the sidewalk prior to being broken out. No section to be replaced shall be smaller than 30 inches in either length or width. If the sawcut would fall within 30 inches of a construction joint, expansion joint, or edge, or within 12 inches of a score mark, the concrete shall be removed to the joint, edge, or mark.
- C. Walkway Areas:
1. Backfill for trenches or other excavations within walkway areas should be compacted in 6 inch maximum layers, unless otherwise noted, with hand-held tampers to assure adequate subgrade support.
- D. Compacted Fill Areas:
1. Where trenches are to be excavated in compacted fill, these trenches shall be backfilled with the fill materials excavated and re-compacted in the layers and to the density specified for the particular area.
- E. Open Trench:
1. No trench shall be left in an open un-protected condition at the end of the day. At the end of the day, open trenches shall be protected in a manner acceptable to the District’s Representative.
 2. Provisions for trench crossings and access shall be made at all street crossings, driveways, water gate valves, and fire hydrants unless otherwise acceptable to the District’s Representative.
- F. Excavated Material:
1. Excavated material not required for backfill or of value to the District shall be removed and legally disposed of by the Contractor at no additional cost.
 2. Material excavated in streets and roadways shall be laid alongside the trench no closer than 2 feet from the trench edge and kept trimmed to minimize inconvenience to public traffic.
 3. Provisions shall be made whereby all storm and waste water can flow uninterrupted in gutters or drainage channels to drainage structures.
 4. Excavated material shall not be stored on existing landscaping or paving without provisions being made to protect the surface below from being stained or otherwise adversely affected.
- G. Shoring

1. Should excavations extend more than 4 feet below existing ground surface, shoring will be required.
2. For trenching greater than 4 feet deep side slopes are not to exceed 1-1/2 : 1 with a depth of 20' max.
3. When trenching greater than 4 feet deep, provide a trench box or shield approved by a PE or designed with accompanying tabulated data approved by a PE.
4. Provide shoring, bracing, or underpinning when trenching next to adjoining walls, sidewalks, or pavements. There shall be no trenching below the base or footing of a foundation that can reasonably be expected to pose a hazard to workers unless one of the mentioned support systems is used.
5. Follow OSHA standards for maintaining, installing, and removing support systems.
6. Utility trenches shall be excavated according to accepted engineering practices following OSHA.

3.03 PIPE BEDDING

A. Stabilization of Trench Bottom:

1. When the trench bottom is unstable due to wet or spongy foundation, trench bottom shall be de-watered as necessary. The District's Representative will determine the suitability of the trench bottom and the amount of sand, gravel, or crushed rock needed to stabilize the soft foundation.

3.04 TRENCH BACKFILL AND COMPACTION

A. General:

1. Construct backfill in two operations, initial and final.
2. Do not backfill where the foundation material in trench is already saturated, except as acceptable to the District's Representative. Provide a minimum cover as shown or specified.
3. Where settling greater than the tolerance allowed for grading occurs in trenches and pits due to unstable subgrade material, excavate to the depth necessary to rectify the problem, then backfill and compact the excavation as specified herein and restore the surface to the required elevation.
4. Place final backfill in 6-inch maximum loose lifts for utilities under roads, streets, concrete slabs, or other areas to be paved and synthetic turf subgrade areas.
5. Compact backfill surrounding ducts, conduits, pipes, and other structures, including the top 12-inches of subgrade to 95 percent maximum density in accordance with ASTM D1557.
6. Backfill to permit the rolling and compacting of the completed excavation with the adjoining material providing the specified density necessary to enable rock placement of paving of the area immediately after backfilling has been completed.
7. Where trenching occurs at chemically treated subgrade, backfill using a controlled low-strength material (CLSM) slurry as specified.
8. Where excavation for valves and utility boxes occurs at chemically treated subgrade, backfill using a controlled low-strength material (CLSM) slurry as specified.

B. Initial Backfill:

1. Prior to trench backfill, the condition of the trench and laying of pipe shall be acceptable to the District's Representative.
2. Select backfill material shall be used as initial backfill for all utilities except irrigation piping, except as otherwise noted and/or specified.
 - a. After the pipe has been properly laid and accepted by the District's Representative, selected backfill material shall be placed on both sides of the pipe and compacted to the depth shown in the Drawings.
 - b. Compaction: The initial backfill material shall be hand tamped in layers not exceeding 4 inches in uncompacted depth and shall be brought up uniformly on both sides of the pipe to avoid bending or distortional stress. After handtamping, the relative compaction of the initial backfill material shall be at least 95 percent relative compaction.
3. Where trenching occurs at chemically treated subgrade, backfill using specified controlled low-strength material (CLSM) slurry.
 - a. The mixture shall be placed using chutes, conveyors, buckets, or pumps depending upon t accessibility.

- b. Placed in lifts to prevent piping from floating.
 - c. Do not vibrate.
- C. Final Backfill:
- 1. Native backfill material shall be used for final backfill, unless otherwise noted.
 - 2. Compaction: Final backfill compaction shall be by mechanical means with backfill material placed in layers not exceeding 6 inches in loose depth. Each layer shall be thoroughly compacted before succeeding layers are placed. The use of machine tampers, except manually held types, shall not be permitted. Final backfill shall be compacted to a relative compaction of 95 percent for paving areas and synthetic turf subgrade areas. In planting areas, provide acceptable topsoil to required depth compacted to 85 percent to 89 percent maximum relative compaction.
- D. Jetting: No jetting will be allowed.

3.05 TRENCH SURFACING

- A. General:
- 1. In unimproved areas, the trench surface shall be restored to its original condition. No mounds of earth shall be left along the trench.
 - 2. Backfill shall be flush with adjoining grade in a firm, unyielding position with no visible settling for a period of one year after Final Acceptance.
- B. Paved Areas:
- 1. Temporary surfacing acceptable to the District's Representative shall be laid within 1 day after backfilling, except where the Contractor elects to place permanent surfacing within this time period, until permanent paving is installed.

END OF SECTION

SECTION 32 01 90

EXISTING TREE PROTECTION AND MAINTENANCE

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Protection of trees and other plants that are scheduled to remain.
 - 2. Work necessary to ensure that trees, and landscaping in general, designated on the Drawings to remain receive all due protection, care, and maintenance necessary to ensure their survival.
 - 3. Irrigation as directed or as required to maintain the health of trees and other plants to remain, where existing irrigation of such plants is shut down for the work of this Contract.

- B. Work specifically includes the following:
 - 1. Erection of barriers and other general protective measures.
 - 2. Placement of wood shavings.
 - 3. Care of roots during grading.
 - 4. Inspection and recommendations.
 - 5. Repair and/or replacement of trees and other plants damaged during the construction operations.
 - 6. Repair and/or replacement of any irrigation systems damaged or removed during construction operations.

- C. Related Requirements:
 - 1. Section 02 41 13 - Site Clearing and Demolition
 - 2. Section 31 01 90 - Landscape and Site Maintenance
 - 3. Section 31 20 00 - Earth Moving
 - 4. Section 31 23 00 - Excavation and Fill
 - 5. Section 32 80 00 - Irrigation
 - 6. Section 32 90 00 - Planting
 - 7. Section 33 11 00 - Domestic Water Utilities
 - 8. Section 33 30 00 - Sanitary Sewerage Utilities
 - 9. Section 33 40 00 - Storm Drainage Utilities

1.02 REFERENCES AND REGULATORY REQUIREMENTS

- A. American Joint Committee on Horticultural Nomenclature (AJCHN), Standardized Plant Names.

- B. American Association of Nurserymen, Inc. (AAN), American Standard for Nursery Stock.

- C. Sunset Western Garden Book, Lane Publishing Company.

- D. Agricultural Code of California.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Submittal Procedures: Action and Informational Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.

- B. Contractor shall avoid injury or damage resulting from the Contractor's operations, including:
 - 1. Cutting, breaking, or skinning of roots, trunks, or branches.
 - 2. Smothering or soil compaction by stockpiled materials, excavated materials, foot or vehicular traffic within the dripline.
 - 3. Desiccation due to interruption of existing irrigation schedule.

- C. Pre-Construction Meetings:
 - 1. The Tree Work Contractor: Prior to commencing installation of Tree Protection Measures (TPM's), or performing any tree work or tree removal work, arrange and have the tree work contractor attend a pre-construction meeting with the District's Representative to review tree protection requirements, TPM's, tree work and work procedures prior to commencing such on-site work.
 - 2. Other Contractors: Unless specifically agreed to in advance by the District's Representative, schedule all other contractors so as to be present on site to attend a single pre-construction meeting with the District's Representative to review project specific tree protection requirements and review work procedures prior to commencing on-site activities. Schedule meeting after TPM's have been installed and accepted by the District's Representative.

1.04 ACTION SUBMITTALS

- A. Product Data: Manufacturer's descriptive literature or "cut-sheets" for all products proposed for use.

1.05 EXAMINATION

- A. At the outset of construction the Contractor shall have all trees to remain inspected by a qualified and experienced arborist, and the recommendations of the arborist shall be submitted in writing to the District's Representative.
- B. The Contractor shall be notified by the Architect of any changes or additions to the procedures herein specified.

1.06 GUARANTEE

- A. If a tree to remain is destroyed, or damaged so that in the judgment of the District's Representative it should be replaced, it shall be removed at Contractor's expense. Except as provided below, liquidated damages will be assessed at the rate of \$350.00 per inch of circumference at 12 inches above grade for trees with a diameter of 8 inches or less and at D.B.H. (Diameter at Breast Height) for diameters greater than 8 inches. For a tree designated as of special significance, the amount of liquidated damages may be increased to a maximum of \$50,000 at the discretion of the District.
- B. If a shrub designated to remain is destroyed or damaged so that in the judgment of the District's Representative it should be replaced, it shall be removed at the Contractor's expense. Liquidated damages will be assessed at the rate of \$200.00 per shrub.
- C. If irrigated turf or groundcover to remain is destroyed or damaged so that in the judgment of the District's Representative it should be replaced, it shall be removed at the Contractor's expense. Unless shown or specified otherwise, liquidated damages will be assessed at the rate of \$15.00 per square foot of turf or groundcover area.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Protective Fencing:
 - 1. Protective fencing shall consist of 4 foot to 6 foot high "blaze orange" plastic fencing material installed with metal posts and wire ties. Fence fabric shall be accepted by District's Representative.
 - 2. Metal posts shall be accepted by District's Representative.
- B. Protective Fencing: 6 foot high, self-supporting, chain link. Materials and installation shall conform to the requirements of the Chain Link Fence Manufacturers Institute (CLFMI) "Product Manual." Driven support posts are not acceptable.

PART 3 - EXECUTION

3.01 GENERAL

- A. Protect, prune, irrigate and maintain all existing trees and other vegetation not designated for removal.
- B. At a minimum, protect existing trees and other vegetation not designated for removal from the following:
 - 1. Breaking, cutting and skinning of branches, bark and roots.
 - 2. Stockpiling of building materials, soil or trash within dripline.
 - 3. Vehicular traffic and parking.
- C. Trees and other vegetation not designated for removal that become damaged during the life of the project shall be repaired or replaced by the contractor at no cost to the District subject to the discretion of the District's Representative.

3.02 TREE PROTECTION

- A. Tree Protection Zones (TPZ): Unless otherwise expressly permitted by the District's Representative in writing, establish a 20 foot TPZ as measured horizontally and radially from the edge of the root flare at the ground surface at all trees to be preserved.
- B. TPZ Access and Uses:
 - 1. TPZ's are intended to control access and limit physical damage to canopy and root system, and to prevent harmful changes to growing conditions such as altered drainage, or soil compaction.
 - 2. No ground disturbing construction such as clearing and grubbing, trenching, grading or excavation, nor other construction activities such as demolition, long or short term debris, spoils, soils and materials stockpiling or storage, washout or dumping of wastes and contaminants, equipment staging, equipment access, or worker access, shall be permitted within TPZ's unless specifically enumerated in the District's Representative accepted tree protection documents, or as may be otherwise specifically established by written agreement between the District's Representative.
- C. Ground Disturbance Controls:
 - 1. Relocate from and/or limit ground disturbing activities within TPZ's.
 - 2. Obtain District's Representative acceptance of all ground disturbing work and contractor means and methods proposed within the TPZ's prior to commencing such work.
 - 3. Perform all such District's Representative accepted ground disturbing work in a manner that minimizes root disturbance and soil compaction.
 - 4. As may be requested by the District's Representative, employ alternative means and methods including but not limited to clearing and grubbing by hand tools and/or hand operated equipment, demolition using a "lifting" technique, and excavation and trenching by hand digging, soil vacuuming, air spading or hydraulic jetting, or by boring in lieu of trenching, employing cellular confinement backfilled with class ii permeable material in lieu of subgrade excavation, scarification and/or compaction.
 - 5. Reflect District's Representative accepted ground disturbance control measures in tree protection documents and/or Construction Plan as appropriate.
- D. Equipment Access Controls:
 - 1. Where mechanized equipment access within TPZ's is accepted by the District's Representative, but prior to accessing equipment, protect tree trunks and limbs to a minimum height of 8 feet above the soil line.
 - 2. Wrap the tree trunk and/or limbs with burlap wrap fiber rolls, place vertical 2 x 4 wood slats set 8 inches on center over the netting and secure with orange safety fencing and nylon or metal banding, or continuously spiral wrap trunk and limbs with burlap covered rice straw wattles.
 - 3. Do not attach fasteners into the tree.
 - 4. Prior to accessing equipment within TPZ's, protect soil from compaction by placing and then maintaining wood chips to a depth of 6 inches in all areas of the TPZ subject to equipment traffic.

5. Based upon equipment to be used and access frequencies planned, provide additional protection measures such as steel plating or cellular confinement filled with class ii permeable material as may be directed by the District's Representative.
 6. Throughout the project duration, the District's Representative reserves the right to require the Contractor to reposition equipment or utilize alternative construction methods to avoid damage to trees to be preserved.
 7. Reflect District's Representative accepted equipment access control measures in tree protection documents and/or Construction Plan as appropriate.
- E. Aerial Equipment Controls:
1. When Construction Plan utilizes aerial equipment such as cranes or boom trucks, such equipment staging and maneuvering shall be subject to District's Representative acceptance.
 2. Aerial movements of boom or suspended loads shall avoid passing over or in close proximity to canopies of trees to be preserved.
 3. The District's Representative reserves the right to require spotters and/or to require the repositioning of equipment or utilization of alternative equipment to avoid movements in close proximity to canopies of trees to be preserved.
 4. Reflect District's Representative accepted aerial equipment control measures in tree protection documents and/or Construction Plan as appropriate.
- F. Tree Protection Fencing (TPF) :
1. Install a 6 foot tall self-supporting chain link type TPF at perimeter of TPZ of all trees to be preserved. Space protective fencing posts at 6'-0" centers maximum and securely attach fabric.
 2. Where site constraints and safety considerations prevent placement of the TPF at the limits of the TPZ, obtain direction from the District's representative and locate fence as directed.
 3. Caution: District's Representative accepted adjustments in TPF locations do not alter the extents of the actual TPZ's or the requirements related thereto.
 4. Mount District-furnished tree protection signs on TPF in a manner and in locations as may be directed by the District's Representative.
 5. Where District's Representative accepted work within TPZ's requires temporary relocation of TPF, obtain District's Representative acceptance for proposed fence relocation prior to relocation.
 6. Promptly relocate TPF to the original alignment whenever not actively engaged in working within a specific TPZ.
 7. Maintain protection fencing until Final Acceptance of project.
- G. Work Monitoring:
1. When required by the District's Representative, all work performed within TPZ's shall be continuously monitored by the District's Representative and/or Project Arborist, if retained.
 2. Coordinate scheduling of work with availability of the designated monito.
- H. Tree Roots:
1. Severing roots greater than 1 inch in diameter within the TPZ requires prior written authorization by the District's Representative.
 2. Where roots in excess of 1 inch in diameter are encountered within the TPZ, avoid damaging the roots as set forth above in ground disturbance controls.
 3. If damage is unavoidable, suspend work prior to damaging the roots, protect exposed roots, and request a change assessment as set forth above in assessments. Do not resume work or damage roots until District's Representative has provided written instructions.
 4. Roots damaged during construction shall be exposed to sound tissue and cut cleanly.
 - a. Sever roots cleanly by cutting with a sharp hand saw.
 - b. Severed roots greater than 1 inch in diameter are subject to field review by the District's Representative prior to backfilling.
- I. Canopy Pruning:
1. Pruning of tree canopies for clearance during construction shall be allowed only with prior acceptance by the District's Representative. Notify the District's Representative of proposed canopy pruning and request a change assessment as set forth above in assessments.

2. Where practical, the District's Representative may require that tree limbs be temporarily tied back in lieu of pruning.
3. When pruning is not permitted, perform work by alternate means that does not require pruning of canopies.
4. Tying and pruning work shall be performed by a tree care contractor, or under the supervision of a licensed arborist.

3.03 PROTECTIVE FENCING

- A. Prior to site clearing, demolition, or grading, install acceptable protective fencing around all existing trees and other vegetation not designated for removal at the dripline or perimeter or as directed by District's Representative.
- B. Locate structural roots by hand probing and set posts with care to preclude root damage.
- C. Maintain protection until Final Acceptance of project.
- D. When work is required within the fenced protection area, submit a written request to the District's Representative stating work to be performed and approximate time of completion. No work shall be allowed within the protected fenced area without the prior acceptance by the District's Representative. Fencing shall be replaced promptly following completion of work within fenced areas.

3.04 GRADING AND TRENCHING

- A. The earth surface within protective fencing shall not be altered except as acceptable to the District's Representative. Grading and trenching necessary within the dripline shall be done by hand at the discretion of the District's Representative.

3.05 IRRIGATION

- A. Provide and maintain irrigation for existing trees and other vegetation not designated for removal as necessary to promote healthy, vigorous growth. Weekly watering shall occur with a 20 minute soak equivalent to 100 gallons per tree.

3.06 CANOPY PRUNING

- A. Pruning shall be completed by a tree care contractor or under supervision of a licensed arborist.
- B. Prune existing trees to remain in accordance with the following guidelines:
 1. Proper removal of dead branches and live "stubs" 3 inches and over in diameter.
 2. Removal of broken or loose branches and other debris lodged in trees and shrubs.
 3. Removal of live branches which interfere with tree structural strength and healthful development. These include:
 - a. Limbs which rub and abrade a more "important" or dominant branch, and as directed by the District's Representative.
 - b. Limbs of weak structure.
 - c. Limbs with twigs and foliage obstructing the development of more "important" branches, as directed by the District's Representative.
 - d. Branches near the end of a limb which may produce more weight than the limb is likely to support.
 - e. Branches conflicting with building or vehicular roadways.
 4. Removal of branches located between grade level and 10 feet above grade over pedestrian walkways.
- C. Selectively prune branches as deemed necessary by the District's Representative.

3.07 PRUNING REPAIRS

- A. Prune and treat damaged area as directed by the District's Representative.

3.08 CLEAN-UP

- A. Branches, trimmings and debris remaining upon completion of each operation shall become property of the Contractor and shall be promptly removed from the site.

END OF SECTION

SECTION 32 11 00

BASE COURSES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Grading and compaction of subgrade soil for areas to receive pavement, structures, and base material.
 - 2. Furnishing and placing of aggregate base material.
- B. Related Requirements:
 - 1. Section 01 71 23 - Field Engineering
 - 2. Section 31 20 00 - Earth Moving
 - 3. Section 32 12 16 - Asphalt Paving
 - 4. Section 32 13 13 - Concrete Paving

1.02 REFERENCES

- A. State of California, Business and Transportation Agency, Department of Transportation (Caltrans) "Standard Specifications."

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Submittal Procedures: Action Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.
- B. Sequencing and Scheduling
 - 1. Work of this Section shall not proceed until all underground utilities and irrigation sleeving have been installed and accepted.
 - 2. Contractor shall schedule work so that installation of paving and surfacing occurs no later than 5 working days after placement and proper compaction of base materials. Base materials left unpaved longer than this time period shall be subject to testing and re-compaction at the contractor's expense.

1.04 ACTION SUBMITTALS

- A. Certificates of compliance, including sieve analyses, for products and materials proposed to be used in work covered by this Section.

1.05 QUALITY ASSURANCE

- A. Control of Work: Conform to Section 5 of the Standard Specifications.
- B. Control of Materials: Conform to Section 6 of the Standard Specifications.

1.06 FIELD CONDITIONS

- A. Wet Conditions: Do not prepare subgrade or place base material when excessively wet conditions exist as determined by the District's Representative.

- B. Dry Conditions: Contractor shall provide dust control in conformance with Section 10 of Standard Specifications and shall provide water to subgrades and base courses as necessary to achieve compaction goals.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Materials shall be stockpiled on site in locations that, in the opinion of the contractor, cause least interference with construction operations and as acceptable to the District's Representative.
- B. Materials shall not be stockpiled in proposed planting areas.
- C. Protect materials from segregation, contamination and wind and water erosion.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Aggregate Base: Class 2, 3/4 inch maximum material conforming to Section 26-1.02A of the Standard Specifications. No recycled materials will be accepted for synthetic turf, pool, or building pad areas. All other paving and surfacing using aggregate base can use recycled materials.

PART 3 - EXECUTION

3.01 SUBGRADE PREPARATION

- A. Preparation of subgrade shall conform to Section 6 of the Standard Specifications and as specified in Section 31 20 00 - Earth Moving.
- B. Remove unsuitable subgrade material as necessary and replace with suitable material or aggregate base per the discretion of the District's Representative.

3.02 BASE MATERIAL PLACEMENT

- A. Conform to Section 26 of the Standard Specifications.
- B. Obtain acceptance of subgrade preparation work prior to placing base material thereon.
- C. Place and compact base material in 6 inch maximum lifts unless otherwise noted. Compaction shall be at least 95 percent relative compaction.
- D. Base material shall be moisture conditioned to between optimum and 3 percent above optimum prior to placement and compaction.

3.03 TOLERANCES

- A. Conform to Section 26 of the Standard Specifications, unless more stringent requirements in these Contract Documents are provided, in which place the more stringent tolerances shall govern.

3.04 CLEAN-UP OF WORK AREA

- A. The Contractor shall remove and legally dispose of excess materials, spoils, and debris from the job site on a daily basis.

3.05 PROTECTION OF FINISHED PRODUCT

- A. The Contractor shall provide lighted barricades, signs and other devices as necessary to prevent damage to finished base courses.

END OF SECTION

SECTION 32 12 16

ASPHALT PAVING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Asphalt paving is shown on the Drawings including, but is not necessarily limited to, the following:
 - 1. Plant-mixed asphalt and other asphalt items.
 - 2. Header boards.

- B. Related Requirements:
 - 1. Section 01 33 00 - Submittal Procedures
 - 2. Section 31 20 00 - Earth Moving
 - 3. Section 32 11 00 - Base Courses
 - 4. Section 32 13 13 - Concrete Paving
 - 5. Section 32 33 00 - Site Furnishings
 - 6. Section 33 40 00 - Storm Drainage Utilities

1.02 REFERENCES

- A. State of California, Business and Transportation Agency, Department of Transportation (Caltrans) "Standard Specifications."

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Submittal Procedures: Informational Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.

- B. Sequencing and Scheduling:
 - 1. Time delay between placement and compaction of base material and installation of asphaltic shall not be more than 5 calendar days. Base material left unpaved longer than this time period shall be subject to testing and re-compaction at the expense of the contractor.

1.04 ACTION SUBMITTALS

- A. Product Data: Descriptive literature for primer and other materials proposed for use if requested by the District's Representative.

- B. Certificates, signed by asphaltic producer and Contractor, stating that materials comply with specification requirements. Minimum information submitted shall include a manufacturer's certification for asphalt products and an asphalt mix design by an independent, qualified laboratory.

- C. The Contractor shall furnish vendor's certified test reports for each carload, or equivalent of bituminous material shipped to the project, signed by asphaltic producer and Contractor stating that materials comply with specification requirements.
 - 1. Minimum information submitted shall include a manufacturer's certification for asphalt products and an asphalt mix design by an independent, qualified laboratory.
 - 2. The report shall be submitted and approved before material is used on the Project. The furnishing of the vendor's certified test report for the bituminous material shall not be interpreted as basis for final acceptance.
 - 3. Test reports shall be subject to verification by testing samples of materials received for use on the project.

1.05 CLOSEOUT SUBMITTALS

- A. Warranty as specified.

1.06 QUALITY ASSURANCE

- A. Work shall conform to the appropriate portion of the referenced "Standard Specifications" except references to "measurement" and "payment" are not applicable.
- B. Control of Work: Conform to Section 5 of Standard Specifications.
- C. Control of Materials: Conform to Section 6 of Standard Specifications.
- D. Asphalt paving surfaces shall have positive drainage as indicated on the Drawings.

1.07 PROTECTION OF WORK

- A. Curbs and other work shall be covered with suitable material and protected from staining or injury by equipment and contact with oil, emulsion, and asphalt.
- B. Manholes, catch basins, and other gratings shall be covered with suitable material so that no asphalt or emulsion will come in contact with the inside walls or floors of the structures.
- C. Damage to adjacent improvements shall be repaired or replaced at the Contractor's expense and to satisfaction of the District's Representative.

1.08 FIELD CONDITIONS

- A. Grade Control:
 - 1. Establish and maintain required lines and grades, including crown and cross slope.
 - 2. The final grades and elevations of the ground paving shall be a consistent depth below adjacent concrete work.
- B. Ambient Conditions:
 - 1. Apply bituminous prime and tack coats only when ambient temperature in shade is at least 50 degrees F and when temperature has not been below 35 degrees F for 12 hours immediately prior to application.
 - 2. Do not apply when substrate surface is wet or contains an excess of moisture.
 - 3. Construct asphaltic surface course only when atmospheric temperature is above 40 degrees F and underlying base is thoroughly dry.

1.09 WARRANTY

- A. Contractor: Provide an extended 2-year warranty for asphalt paving.
 - 1. Warranty shall be limited to ordinary wear and tear by weather or defects due to faulty materials and workmanship.
 - 2. Make repairs at no expense to District.

PART 2 - PRODUCTS

2.01 DESIGN AND PERFORMANCE REQUIREMENTS

- A. At no point shall paved surface fail to drain. Provide drainage as indicated on the Drawings.

- B. Asphalt paving shall be free from excessive segregation defined as gaps between aggregate visible at 3/16 inch or larger, cracking, potholes, raveling, slippage, depressions, corrugations, or other defects at the date of completion and acceptance of the project.
- C. Aggregates in asphalt mix to be virgin material.

2.02 ASPHALT PAVING

- A. Paving Asphalt Binder: Shall be PG 64-10, conforming to Section 92 of the Standard Specifications.
- B. Prime Coat: Liquid asphalt to conform to the requirements for SC-70 liquid asphalt as per Section 93 of the Standard Specifications and approved by the District's Representative.
- C. Tack Coat: Asphaltic emulsion to be penetration type conforming to the RS-1/SS-1 requirements of Section 94 of the Standard Specifications.
- D. Aggregates:
 - 1. Traffic Areas: 1/2 inch medium in accordance with the gradation requirements of Section 39 of the Standard Specifications, unless otherwise specified or noted. Traffic area aggregate shall be used in parking and street areas.
 - 2. Pedestrian and Non-Vehicular Areas: 3/8 inch maximum or No. 4 maximum aggregate in accordance with the gradation requirements of Section 39 of the Standard Specifications, unless otherwise specified or noted.

2.03 HEADERS

- A. Refer to details on the Drawings.

2.04 AGGREGATE BASE

- A. Aggregate base shall conform to Section 32 11 00 - Base Courses.

2.05 EQUIPMENT

- A. Spreading and rolling equipment shall be in accordance with Section 39-5 of the Standard Specifications and additional requirements specified.
- B. Spreading and compaction shall be in accordance with Section 39-6 of the Standard Specifications and additional requirements specified.
- C. Pavers that leave ridges, indentations or other marks in the surface that cannot be eliminated by rolling or prevented by adjustment in operation shall not be used.

PART 3 - EXECUTION

3.01 EDGE BAND AND WOOD HEADER INSTALLATION

- A. Install to conform to shapes, lines, dimensions and grades shown on the Drawings.
- B. Radii shall be smooth and constant with properly aligned tangent points.

3.02 PAVING INSTALLATION - GENERAL

- A. Conform to requirements of Sections 37 and 39 of the Standard Specifications.

- B. Place plastic materials under asphaltic paving equipment while not in use, to catch and/or contain drips and leaks.
- C. Areas shall be paved in sequence and direction to avoid driving loaded trucks on the new asphalt surface.

3.03 PREPARATION – PRIME COAT

- A. Apply primer in accordance with Standard Specifications Section 39 on aggregate base.
- B. Immediately before applying the prime coat, loose dirt and other objectionable material shall be removed from the full width of the surface to be primed.
- C. The bituminous material including solvent shall be uniformly applied with a bituminous distributor at the rate of 0.25 to 0.50 gallon per square yard depending on the base course surface texture. The type of bituminous material and application rate shall be approved by the District's Representative prior to application.
- D. Following the application, the primed surface shall be allowed to dry not less than 24 hours without being disturbed or for such additional time as may be necessary to permit the drying out of the prime coat until it will not be picked up by traffic or equipment. This period shall be determined by the District's Representative. The surface shall then be maintained by the Contractor until the surfacing has been placed.
- E. Suitable precautions shall be taken by the Contractor to protect the primed surface against damage during this interval, including supplying and spreading sand necessary to absorb excess bituminous material.

3.04 PREPARATION – TACK COAT

- A. General: Apply tack coat to contact surfaces of adjacent pavement and concrete curbs.
- B. Immediately before applying the tack coat, the full width of surface to be treated shall be swept with a power broom and/or air blast to remove all loose dirt and other objectionable material.
 - 1. Vegetation shall be removed and an approved herbicide applied to those areas before cleaning.
 - 2. Emulsified asphalt shall be diluted by the addition of water when directed by the District's Representative and shall be applied a sufficient time in advance of the paver to ensure that all water has evaporated before the overlying mixture is placed on the tacked surface.
 - 3. The bituminous material including vehicle or solvent shall be uniformly applied with a bituminous distributor at the rate of 0.05 to 0.07 gallons per square yard. The type of bituminous material and application rate shall be approved by the District's Representative prior to application.
- C. Following the application, the surface shall be allowed to cure without being disturbed. The curing period shall be not less than 24 hours, unless otherwise approved by the District's Representative, and shall be sufficient to permit drying out and setting of the tack coat.
- D. After tack coat has cured, suitable precautions shall be taken by the Contractor to protect the surface against damage prior to placement of next course.

3.05 PLACING ASPHALT PAVEMENT

- A. General:
 - 1. Place asphalt within 48 hours of applying primer or tack coat and after required curing time for emulsions.
 - 2. Each course of asphalt concrete shall be installed or constructed in accordance with the Standard Specifications Section 39.

3. All layers, except as otherwise provided in these Specifications, shall be spread with mechanical spreading and finishing equipment as provided for in the Standard Specifications Section 39-5.01.
- B. Tack and Levelling Course:
1. After completion of the base course a tack coat shall be applied and a leveling course of minimum 1-inch thickness shall be placed and compacted over entire vehicular paving/parking lot area.
 2. After compacting, the surface of the leveling course shall be check for compliance with the specified tolerances.
 3. Where required, depressions shall be filled with asphalt concrete fines prior to proceeding with subsequent pavement construction and final vehicular paving/parking lot surfacing.
- C. Paver Equipment Requirements:
1. Asphalt pavers shall be self-propelled mechanical spreading and finishing equipment provided with a screed or strike-off assembly capable of distributing the material to not less than the full width of a traffic lane.
 - a. Screed action shall include cutting, crowding, and other practical action which is effective on the mixture without tearing, shoving or gouging, and which produces a surface texture of uniform appearance.
 - b. The screed shall be adjustable to the required section and thickness. The paver shall be provided with a full width roller or tamper or other suitable compacting devices.
 2. Asphalt pavers shall be operated to insure continuous and uniform movement of the paver.
 3. The asphalt paver shall operate independently of the vehicle being unloaded or shall be capable of propelling the vehicle being unloaded in a satisfactory manner and, if necessary, the load of the haul vehicle shall be limited to that which will insure satisfactory spreading.
 4. While being unloaded, the haul vehicle shall be in contact with the machine at all times, and the brakes on the haul vehicle shall not be depended upon to maintain contact between the vehicle and the machine.
- D. Placing Hot-Mix Asphalt:
1. The completed mixture shall be deposited at a uniform quantity per linear foot to provide the required compacted thickness without resorting to spotting, picking-up or otherwise shifting the mixture.
 - a. Segregation shall be avoided, and the surfacing shall be free from pockets of coarse or fine material.
 - b. Asphalt containing hardened lumps shall not be used.
 2. Unless lower temperatures are directed by the District's Representative, mixtures shall be spread, and the first coverage of initial or breakdown compaction shall be performed, when the temperature of the mixture is not less than 275 degrees F. Breakdown compaction shall be completed before the temperature of the mixture drops below 250 degrees F.
 - a. A layer shall not be placed over another layer that exceeds 2 inches in compacted thickness until the temperature of the layer that exceeds 2 inches in compacted thickness is less than 150 degrees F at mid depth.
 - b. Layer thickness shall not be less than 1.25 inches or exceed 2 inches unless approved in advance and in writing by District's Representative.
- E. Construction Joints: Before placing the top layer adjacent to cold transverse construction joints, the cold transverse construction joints shall be trimmed to a vertical face and to neat line.
1. Transverse joints shall be tested with a 16-foot straightedge and shall be cut back to conform to meet the specified tolerances.
 2. Connections to existing surfacing shall be feathered to conform to the requirements for smoothness.
 3. Longitudinal joints shall be trimmed to a vertical face and to a neat line if the edges of the previously laid surfacing are, in the opinion of the District's Representative, in such condition that the quality of the completed joint will be affected.
- F. Rollers and Roller Equipment: The Contractor shall furnish a sufficient number of rollers to achieve the compaction and surface finish required by these Specifications.
1. Each roller shall have a separate operator.

2. Rolling equipment shall be self-propelled and reversible.
 3. Rollers shall be equipped with pads and water systems that prevent sticking of asphalt mixtures to the pneumatic- or steel-tired wheels.
 4. A parting agent that will not damage the asphalt mixture, as determined by the District's Representative, may be used to aid in preventing the sticking of the mixture to the wheels.
- G. Compaction:
1. Compact pavement by rolling to specified relative compaction but not less than 96 percent of laboratory-compacted maximum unit weight tested in accordance with the Hveem Stabilometer Test method.
 - a. Do not displace or extrude pavement from position.
 - b. Hand compact in areas inaccessible to rolling equipment.
 - c. A "pass" shall be one movement of a roller in either direction.
 - d. A "coverage" shall be as many passes as are necessary to cover the entire width being paved.
 - e. Overlap between passes during a coverage, made to ensure compaction without displacement of material in accordance with good rolling practice, shall be considered to be part of the coverage being made and not part of a subsequent coverage.
 - f. Each coverage shall be completed before subsequent coverages are started.
 - g. Rolling shall commence at the lower edge and shall progress toward the highest portion.
 - h. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.
 2. Asphalt concrete shall be compacted to a relative compaction of not less than 96 percent and shall be finished to the lines, grades, and section shown on the Drawings
 - a. In-place density of asphalt concrete will be determined prior to opening the pavement to public use.
 - b. Relative compaction will be determined by California Test 375.
 - c. Laboratory specimens will be compacted in conformance with California Test 304.
- H. The completed surfacing shall be thoroughly compacted, smooth, and free from routes, humps, depressions, or irregularities. Ridges, indentations or other objectionable marks left in the surface of the asphalt paving by blading or other equipment shall be eliminated by rolling or other means. The use of any equipment that leaves ridges, indentations, or other objectionable marks in the asphalt paving shall be discontinued, and other acceptable equipment shall be furnished by the Contractor.

3.06 TOLERANCES

- A. Surface Tolerance:
1. The Contractor shall have on site a 12-foot straightedge for testing the asphalt paving surface when said straightedge is laid on the finished surface and parallel with the center line, the surface shall not vary more than 0.01-foot from the lower edge of the straightedge.
 2. The transverse slope of the finished surface shall be uniform to a degree that no depressions greater than 0.02-foot are present when tested with a straightedge 12 feet long.
 3. Skin patching will not be allowed to correct depressions.
- B. Thickness Tolerance:
1. The pavement thickness shall be determined by measuring the average thickness of core samples taken from the pavement for density determination.
 2. Thickness will be determined from the cores and shall be based upon the average of the cores.
 3. The asphalt thickness indicated on the cross sections shall be maintained.
 4. Thickness deficiencies in excess of 3/8-inch shall be corrected by removal and replacement of overlay at the discretion of the District's Representative.
 5. Skin patches and overlays less than 1-1/2 inches will not be allowed.
- C. Adjustments to Contract Sum:
1. The Contract will be reduced for thickness deficiencies equal to or less than 3/8-inch in proportion to 2 times the percent of thickness deficiencies to the specified pavement thickness (i.e., a 1/4-inch

- thickness deficiency in a pavement with a 2-inch specified thickness would result in a reduction of the unit price of $(2 \times 0.25)/2.0 = 25$ percent) for the lot containing a thickness deficiency.
2. No Contract Sum adjustment will be made for thickness in excess of those specified or shown.

3.07 FIELD QUALITY CONTROL

- A. Take samples and perform tests in accordance with Caltrans Test Methods.
- B. Upon completion of the work, Contractor shall provide a water drainage test for paved areas.
 1. Areas that fail to drain properly, as determined by the District's Representative, shall be corrected and repaired at no additional cost.
 2. If repaired, the entire surface shall have a seal coat applied at Contractor's cost.
 - a. Type of seal coat will be determined by the District's Representative.
 - b. Repairs shall be made within 15 calendar days of notification at the expense of the Contractor.

3.08 PROTECTION

- A. After final rolling, do not permit vehicular traffic on pavement until it has cooled to not less than temperature noted in the "Standard Specifications" and hardened and in no case sooner than 6 hours.
- B. Contractor shall be responsible for erecting barricades to protect paving from traffic until mixture has cooled and attained its maximum degree of hardness.
- C. Ample time shall be allowed for drying before traffic, vehicular and pedestrian, is allowed on the pavement.

END OF SECTION

SECTION 32 13 13

CONCRETE PAVING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Concrete flatwork as shown on the Drawings including, but is not necessarily limited to, the following
 1. Curbs and gutters.
 2. Valley gutters and concrete swales.
 3. Mowbands and edge bands.
 4. Accessible ramps.
 5. Driveway aprons.
 6. Walkways.
 7. Expansion and control joints.
 8. Reinforcement.
 9. Finishing.
 10. Surface retarder.

- B. Related Requirements:
 1. Section 01 33 00 - Submittal Procedures
 2. Section 01 71 23 - Field Engineering
 3. Section 32 12 16 - Asphalt Paving
 4. Section 31 20 00 - Earth Moving
 5. Section 32 11 00 - Base Courses
 6. Section 32 32 15 - Landscape Concrete; foundations and formed concrete for planters, seat walls, and other site improvements as shown.

- C. NOTE: This section does not apply to structural concrete. For structural concrete specifications, refer to plan sheet S1.1 – Athletics Structural Notes & Material Grades

- D. NOTE: This section does not apply to Swimming Pool Concrete. For Swimming Pool Concrete specifications, refer to Section 13 11 02

1.02 REFERENCES

- A. State of California, Business and Transportation Agency, Department of Transportation (Caltrans) "Standard Specifications."

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Submittal Procedures: Informational Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.

- B. Pre-Installation Meeting: Conduct meeting at Project site to review scope of concrete paving work and expectations.
 1. Meeting shall be scheduled after approval of mockups and sufficiently in advance of commencement of concrete paving.
 2. Attendees shall include:
 - a. Contractor.
 - b. Concrete subcontractor.
 - c. District's Representatives.

1.04 ACTION SUBMITTALS

- A. Product Data: Manufacturers' current catalog cuts and specifications for the following:
 - 1. Expansion joint filler materials.
 - 2. Color admixtures.
 - 3. Curing compounds.
 - 4. Other items as requested by District's Representative.

- B. Samples:
 - 1. Concrete materials as required for testing and inspection.
 - 2. Expansion Joint Sealant: Manufacturer's standard bead samples showing full range of colors available.
 - 3. Concrete Panels: Not less than 12 inches by 12 inches for each selected color and finish texture using concrete mix proposed for this Project.
 - a. Indicate materials and methods used to produce each color and texture.
 - b. Mockup work shall not commence until a concrete sample panels have been approved.

- C. Concrete Mix Design: Submit mix designs and certified compressive strength test reports for each concrete strength, type, additives, and maximum aggregate size required, prepared and certified by the ready-mix concrete supplier.

1.05 INFORMATIONAL SUBMITTALS

- A. Statement of installer/finisher qualifications if requested by District's Representative.

- B. Mill Certificates and Certifications for reinforcing bars, if used.

- C. Delivery tickets for each load of concrete delivered to the site.

- D. Results of slip-resistance testing.

1.06 QUALITY ASSURANCE

- A. Construction of concrete flatwork, including curbs and gutters, shall conform to Section 73 of the Standard Specifications.

- B. Codes and Standards: Comply with the applicable provisions of the following codes, specifications and standards, except where more stringent requirements are shown or specified:
 - 1. California Building Code, Title 24, Part 2, Chapter 19A - Concrete
 - 2. ACI 301 Specifications for Structural Concrete for Buildings
 - 3. ACI 318 Building Code Requirements for Reinforced Concrete
 - 4. ACI 614 Recommended Practice for Measuring, Mixing, and Placing Concrete
 - 5. Concrete Reinforcing Steel Institute, Manual of Standard Practice

- C. Contractor shall be responsible for quality of concrete in place and shall bear burden of proof that concrete as placed meets minimum requirements.

- D. Slip Resistance: Floor tile shall provide a value equal to or greater than 0.42 when tested in accordance under dry conditions with DCOF AcuTest procedure contained in ANSI A137.1:2012, Section 9.6, and under wet conditions with DCOF AcuTest procedure of ANSI B101.3.

- E. Concrete Testing:
 - 1. The District may retain, at its expense, a testing laboratory to perform material evaluation tests in accordance with Section 01 45 00 - Quality Control.

2. Testing may include slump tests and securing samples of concrete, cement, aggregates or other materials for testing. Applicable materials shall be provided by the Contractor at no additional cost to the District.
- F. When review or observation is required of the District's Representative of the concrete work, Contractor shall notify the District's Representative not less than 2 working days prior to date when the review or observation is required.
- G. Pre-Pouring Review:
1. Formwork, joint patterns, base material, reinforcement, "dobies," ties, and other installation accessories shall be reviewed and accepted by the District's Representative prior to pouring concrete.
 2. Forms, reinforcing, and accessories shall be in place and Contractor shall give a minimum of 5 working day lead-time notice to District's Representative when scheduling the review request.
 3. Contractor shall allow a minimum of 2 working days after pre-pour review in Construction Schedule for possible modifications to concrete preparation work, at no cost or delay to the project.
- H. The District's Representative shall have access to any off-site batch plant or quarry supplying materials at all times for subject project and trucks in route to the project site.
- I. Mockups:
1. General:
 - a. Mix design shall match that used on accepted sample panels and proposed for use in final construction including cement and color additive.
 - b. Prepare at least one month before start of final concrete work to allow concrete to cure before observation.
 - c. Concrete color and finish for mockup appearance shall match color and finish of accepted sample.
 - d. Build mockups at the location indicated or, if not indicated, as selected by the District's Representative
 - e. Notify District's Representative 5 working days in advance of dates and times when mockups will be constructed and layouts will be ready for review.
 - f. Color and texture shall be approved before starting construction.
 - g. Perform specified slip-resistance testing on mockups.
 - h. Maintain final accepted mockups in an undisturbed condition as a standard for judging the completed Work.
 - i. Retain samples of sands, aggregates, and color additive used in the mockups for comparison with materials used in final work.
 - j. Demolish and remove mockups when directed if not incorporated into the final work.
 2. Flat Paving Mockups:
 - a. 4-feet x 4-feet sample panels of colored concrete flatwork and concrete darkening agent for each required color and texture shall be poured by the Contractor at the site for review and acceptance by the District's Representative.
 - b. Quantity:
 - 1) Contractor shall allow for preparation of up to 2 flat paving mockups for evaluation and final approval of each concrete.
 - 2) For mockups demonstrating appearance using specified surface retarder, Contractor shall prepare a mockup using specified retardant level plus additional samples one level higher and one level lower, of applicable, for review by District's Representative.
 - c. Samples shall include each type and profile of joint, surface texture, and tooled conditions for approval. Contractor shall schedule review well in advance of concrete operations to allow for modifications and preparing an additional mockup panel if necessary.

1.07 DELIVERY AND STORAGE

- A. Deliver concrete reinforcement to job site properly tagged and ready to set. Store above ground surface on platforms, skids, or other supports. Coordinate delivery and storage of all other materials as appropriate.
- B. Coordinate delivery so that mixes may be immediately poured upon arrival at site.

1.08 FIELD CONDITIONS

- A. Maintain control of concrete dust and water. Do not permit adjacent areas to be contaminated.

PART 2 - PRODUCTS

2.01 BASE MATERIALS

- A. Aggregate: As specified in Section 32 11 00 - Base Courses.

2.02 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
 - 1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less.
 - 2. Do not use notched and bent forms.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.03 REINFORCING

- A. General:
 - 1. Reinforcing steel shall be cut and bent cold to exact lengths and shapes to comply with Drawings, reviewed shop drawings, and referenced codes and standards.
 - 2. Comply with the additional requirement shown on the Drawings.
- B. Reinforcing Steel: Deformed billet steel bars complying with Section 52-1.02B of Standard Specifications, Section 1907 of CBC and ASTM A615.
 - 1. Provide Grade 60 for No. 4 and larger, Grade 40 for No. 3 and smaller.
 - 2. Bars shall be in a new, "first-class" condition.
- C. Smooth Dowel Steel Bars for Expansion Joints: ASTM A29, Grade 40, No. 3 smooth.
 - 1. Dowels shall be shop painted with iron-oxide zinc-chromate primer.
 - 2. Where shown, provide metal dowel sleeve or other approved break-bond method at one end of dowel to permit lateral movement at dowel within concrete section.
 - 3. Provide for movement which equals joint width plus 1/2 inch.
 - 4. Bars shall be in a new, "first-class" condition.
- D. Dowel Insert System: Single component dowel sleeve with self-locking design; Greenstreak "Speed Dowel" by Sika, or equal selected for dowel profile and diameter indicated on the Drawings.
- E. Tie Wire: ASTM A82, black annealed, minimum 16 gage.
- F. Supports for Reinforcement: Provide bolsters, chairs, spacers and other devices for spacing, support and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI specifications, unless otherwise acceptable.

2.04 CONCRETE MATERIALS

- A. Cement: ASTM C150, Type II, and shall be provided by one manufacturer.
- B. Pozzolan: Class F Fly Ash per ASTM C618 comprising 15-20% of total cementitious materials. Fly Ash may be added to a maximum ratio of 35% of total cementitious materials where testing reports are provided for the mix design review.
- C. Coarse Aggregates: Coarse aggregates shall conform to ASTM C33, sizes 57, 67 or 7. Pea gravel aggregate shall not be used.
- D. Fine aggregates: Fine Aggregates shall conform to ASTM C33.
- E. Water: Clean and not detrimental to concrete.
- F. Surface Retarder at Concrete Paving: Water-based, top-surface retarder and etch; "Grace Top-Cast" by Grace Construction Products. Contractor shall verify compatibility with concrete mix to achieve desired sandblast finish.
 - 1. Grade: 05 Light Blue, unless otherwise required to achieve a median sand blasted texture.

2.05 CONCRETE ADDITIVES

- A. Pigment for Concrete: Synthetic mineral-oxide pigments or colored water-reducing admixtures, color stable, nonfading, and resistant to lime and other alkalis, and complying with ASTM C979; Davis Colors Inc., 800-800-6856, as specified and noted on the Drawings, or equal.
 - 1. If added to mix at Project site, additive shall be furnished in manufacturer's "Mix-Ready" disintegrating bags.
 - 2. Dosage Rate: As required to achieve color of approved sample but not exceeding 10 percent of weight of cementitious materials in mix.
 - 3. Colors:
 - a. Darkening Agent: Davis Colors Inc. colorant #8084 Black, or acceptable equal.
 - 1) Dosage: 1/4-pound per sack of concrete.
 - b. Other Colors: As noted on the Drawings.
- B. No admixtures shall be allowed without written acceptance by the Engineer of Record. Admixtures that have a negative impact on concrete finish shall not be used. When more than one admixture is used, admixtures shall be compatible.

2.06 ACCESSORIES

- A. Non-Shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days. SIKAGROUT 212 or equal.
- B. Curing Materials:
 - 1. Liquid Curing Compounds: ASTM C309, Type 1.
 - 2. Sheet Material: Waterproofed Kraft paper, ASTM C17, regular type.
- C. Joint primer: One component, solvent based; Sonneborn horizontal paving joint primer No. 733, or No. 766, or equal.
- D. Fiber Expansion Joint Material: Preformed cellular fiber complying with ASTM D1751; 1/2 inch thick unless otherwise indicated.
 - 1. Expansion joint material shall be variety with "zip-strip" H-channel joint sealant receptacles. If proposed joint material is not installed with sealant receptacles then, the expansion joint material

- shall be completely covered with a Sonneborn "Sonofoam" closed cell backer rod or acceptable equal prior to application of joint sealant.
2. Provide 3/8 inch tooled edges each side of joint material. Refer to Drawings for additional information.
- E. Paving Expansion Joint Sealant: One-part, self-leveling polyurethane conforming to ASTM C920, Class 25, Type S, Grade P; Sonneborn "Sonolastic SL 2," or equal.
1. Color: As selected by District's Representative.
- F. Cold Joint Form: "Key Kold" by MeadowBurke, or equal.

2.07 CONCRETE MIXING

- A. General:
1. Mix and deliver concrete in accordance with ASTM C94.
 2. Addition of water to the mix after leaving the plant is not permitted.
 3. No admixtures will be allowed without prior acceptance by the District's Representative. If accepted, use admixtures according to manufacturer's written instructions.
 4. Ensure equipment and plant will afford accurate weighing, minimize segregation, and will efficiently handle materials.
 5. Deposit concrete into final position within 90 minutes of introduction of cement.
- B. Pigments:
1. Darkening Agent: Add 1/4 pound of specified black colorant per 94 lb. sack of cement to all concrete which will be exposed to view when cured except for drain rims and concrete receiving other colorants.
 2. Other Colors: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.
- C. Minimum ultimate compression strength of concrete at 28 days is as follows:

Item	Strength	Maximum slump	Size of aggregate	Cement (# of 94 lb. sacks per yard)	W/C Ratio
Slab-On-Grade	3,000	4"	Normal Weight	5	0.50

- D. Drying Shrinkage Limit at 21 Days: 0.40 percent.
- E. Adjustment to Concrete Mixes:
1. Mix design adjustments may be requested by Contractor when job conditions, weather, test results warrant, or to meet appearance of accepted samples or mockup.
 2. Test data for revised mix design shall be submitted to and accepted by District's Representative before using in work.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify requirements for concrete cover over reinforcement.
- B. 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.

3.02 PREPARATION

- A. Prepare joints in previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
- B. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

3.03 EXCAVATION

- A. In addition to the general grading excavation required, the Contractor shall excavate to the required depths in the locations shown for flatwork and curbs. Excess excavation shall be replaced with concrete poured monolithically with the wall or pavement, at no additional cost to the District.

3.04 INSTALLATION OF FORMWORK

- A. Formwork shall conform to Section 51 of the Standard Specifications and as follows:
 - 1. The Contractor shall build forms with a high degree of care and shall select from materials of adequate strength and smoothness to produce smooth, even surfaces of uniform texture and appearance, free of bulges, depressions, or other imperfections per the discretion of the District's Representative. Remove any residue remaining on concrete after forms are removed.
 - 2. Transition of curves to straight lines and of curves to curves shall be formed as smooth, continuous, and uninterrupted with typical 90 degree radius alignment at the points of tangency.

3.05 PLACING REINFORCEMENT

- A. General:
 - 1. When there has been a delay in placing concrete, reinforcement shall be inspected and, if necessary, cleaned, relocated, and tied at no additional cost to District.
 - 2. Wherever conduits, piping, inserts, sleeves, and similar item interfere with placing of reinforcing steel, obtain approval of District's Representative of method of procedure before concrete is placed.
- B. Reinforcement installation shall conform to the provisions of the Standard Specifications as follows:
 - 1. Cleaning Section 52-1.03B
 - 2. Bending Section 52-1.03C
 - 3. Placing Section 52-1.03D
 - 4. Splicing Section 52-6
 - 5. Lapped Splices Section 52-6.03B

3.06 PLACING CONCRETE

- A. Place concrete in accordance with ACI 301.
- B. Notify Engineer of Record and Special Inspector minimum 48 hours prior to commencement of operations. Do not place concrete until forms and reinforcement as well as other required inspections have occurred and the Special Inspector is present to perform observations and testing during placement.
- C. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints are not disturbed during concrete placement.
- D. Separate slabs on grade from vertical surfaces with 1/2 inch thick joint filler. Place joint filler to required elevations. Secure to resist movement by wet concrete.
- E. Extend joint filler from bottom of slab to within 1/8 inch of finished slab surface.

- F. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- G. Place concrete continuously between predetermined contraction joints.
- H. Do not interrupt successive placement; do not permit cold joints to occur.
- I. Screed slabs on grades shown, maintaining surface to tolerance of 1/4 inch maximum in 10 feet.

3.07 CONCRETE JOINTS

- A. General:
 - 1. Joints shall be constructed as detailed in the Drawings.
 - 2. Refer to layouts on the Drawings for location of each joint type.
- B. Expansion Joints: Install to full depth of slab.
 - 1. Cold Joints: Install specified cold joint forms in accordance with manufacturer's recommendations. Joints shall not be covered with concrete. Tool joint to remove concrete from edge of metal.
 - 2. Fiber Expansion Joints: After allowing concrete to fully cure, remove zip strips and install expansion joint sealant as shown and in accordance with manufacturer's instructions.
 - 3. Install specified dowel sleeves in accordance with manufacturer's instructions and as shown.
- C. Score Joints: Tool to a 3/8 inch radius and to a 1 inch depth.
- D. Form contraction joints as detailed on plans. Joints shall be formed immediately after final finishing with an approved concrete-sawing machine; "SOFF-Cut" as manufactured by SOFF-Cut International: Corona, California (909) 272-2330, or equal.
 - 1. Avoid dislodging aggregates.
 - 2. Unless otherwise indicated or directed, the joints shall be 1/8 inch wide and 1-inch deep. Do not use zip-strips.
 - 3. Saw contraction joints to true alignment with "SOFF-Cut" concrete-sawing machines adequate in number and power and with sufficient replacement blades to complete the sawing at the required rate.
 - 4. Joints shall be cut as the concrete has hardened sufficiently to permit walking on the slab, and as recommended by the saw manufacturer.
 - 5. Unless otherwise approved, saw joints in the sequence of concrete placement. Remove cutting debris.
 - 6. Saw cuts shall be made in accordance with manufacturer's instructions.
- E. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
 - 1. Cut depth shall be 25 percent of slab depth unless otherwise shown or required to comply with accepted mockup.
 - 2. Layout: As shown on the Drawings.
- F. Curb and Edge Band Joint: Locate as follows, unless otherwise noted on the Drawings.
 - 1. Every 5 feet for score joints.
 - 2. Install fiber expansion joints maximum 15 feet on center.
 - 3. Install fiber expansion joints at corners, and beginnings and endings of radii.

3.08 EDGING

- A. Edges of slabs, curbs, and other paving shall be tooled with a 1/2 inch radius edging tool, unless otherwise indicated or specified in the Drawings.

- B. Trowel marks resulting from tooling of edges shall be carefully trowelled out.

3.09 PLACING OF CONCRETE

- A. Notify District's Representative minimum 5 working days prior to pour.
- B. Preparation:
 - 1. Protect finished surfaces adjacent to areas to receive concrete.
 - 2. Valve boxes, electric boxes, drainage inlet structures, manholes, lids and other similar items shall be covered and protected prior to and during concrete pour. Concrete staining to these items will not be accepted.
 - 3. Verify that the District's Representative, if required, has inspected reinforcement.
 - 4. Notify the District's testing laboratory at least 2 working days before placing concrete.
- C. Placing:
 - 1. Concrete placement shall conform to Section 40-103H of the Standard Specifications.
 - 2. Moisten earth, and spray forms and reinforcement with water before placing concrete.
 - 3. Place concrete in continuous operation to permit proper and thorough integration and to complete scheduled placement.
- D. Concrete shall not be dropped freely where reinforcing bars will cause segregation, nor shall it be dropped freely more than six feet. Spouts, elephant trunks, or other acceptable means shall be used to prevent segregation.

3.10 CONCRETE FINISHING - GENERAL

- A. Provide formed concrete surfaces to be left exposed with a medium sand-blast finish. Coordinate with Landscape Architect prior to placing concrete.
- B. Finish concrete floor surfaces in accordance with ACI 301. Provide non-slip surface where concrete floor surfaces are left exposed, unless noted otherwise.
- C. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains as indicated on drawings.

3.11 FLATWORK FINISHING

- A. General:
 - 1. Provide each concrete finish where shown in the Drawings.
 - 2. Provide samples and mockups as specified of all concrete finishes for review and acceptance prior to pouring concrete.
- B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats.
- C. Trowel Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighthen until surface is free of trowel marks and uniform in texture and appearance.
- D. Broom Finish:
 - 1. Broom with medium bristled broom to a uniformly roughened surface. Finished surface shall be clean with uniform and straight lines.
 - 2. Paving with a slope greater than 6 percent shall be heavy broom finish and paving less than 6 percent shall be a medium broom finish.
- E. Areas to Receive Surface Retarder:

1. Apply specified surface retarder uniformly to wet concrete after the initial bleed water rises to the surface using low pressure spray equipment in accordance with manufacturer's recommendations.
2. Remove retarded cement matrix with water.
3. Exercise care, and install protective procedures, to prevent rinse water from damaging adjacent materials or entering adjacent soil and planting areas. Should rinse water contaminate soil of planting areas, affected soil shall be removed and replaced with new soil complying with Section 32 90 00 - Planting at no additional cost to District.

3.12 FIELD QUALITY CONTROL

- A. Provide free access to Work and cooperate with District's Representatives.
- B. Tests of cement and aggregates may be performed to ensure conformance with specified requirements.
- C. One additional test cylinder will be taken during cold weather concreting, cured on job site under same conditions as concrete it represents.
- D. At a minimum one slump test will be taken for each set of test cylinders taken.
- E. Tolerances:
 1. Vertical deviation from specified grades shall not exceed 0.04 foot.
 2. Surface smoothness deviations shall not exceed 1/8 inch in 8 feet, in any direction.
 3. Thickness shall not be more than 0.01 foot less than planned thickness at any point.

3.13 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 relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Cure floor surfaces in accordance with ACI 308.
- D. Spraying: Spray water over floor slab areas and maintain wet for 7 days.
- E. Provide necessary security to protect the concrete from vandalism. Concrete which is defaced or damaged during the course of this Contract shall be replaced by the Contractor at no additional cost to the District.

3.14 PATCHING

- A. Allow Engineer to inspect concrete surfaces immediately upon removal of forms.
- B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Engineer upon discovery.
- C. Patch imperfections in accordance with ACI 301.

3.15 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements; concrete with excessive honeycombs or other surface or finish defects.
- B. Repair or replacement of defective concrete will be determined by the Engineer of Record.

- C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Engineer for each individual area.
- D. No additional compensation will be allowed for repair of defective concrete.

3.16 CLEANING

- A. Remove excess base material, concrete spills, cement stains and all other excess materials from all project areas prior to Final Acceptance.

END OF SECTION

SECTION 32 18 13

SYNTHETIC TURF

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Included: Synthetic grass field system consisting of, but not necessarily be limited to, the following:
 - 1. Synthetic grass system consisting of 1-5/8 inch tall rigid monofilament polyethylene fiber with texturized monofilament thatch layer.
 - 2. A resilient infill system consisting of graded sand infill.
- B. Related Requirements:
 - 1. Section 32 18 14 - Synthetic Turf Base

1.02 REFERENCES

- A. ASTM Standard Test Methods:
 - 1. D1335: "Standard Test Method for Tuft Bind of Pile Yarn Floor Coverings."
 - 2. D5848: "Standard Test Method for Mass Per Unit Area of Pile Yarn Floor Covering."

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Submittal Procedures: Action and Informational Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.

1.04 ACTION SUBMITTALS

- A. Submit Drawings: Prepare and submit the following.
 - 1. Seaming plan.
 - 2. Installation details; edge detail, utility box detail, and other conditions of the installation.
 - 3. Final electronic versions of artwork.
- B. Samples:
 - 1. Turf, 4" x 4" in size, illustrating details of finished product.
 - 2. Loose samples, 1 foot square, of the turf backing and tufted fibers.
 - 3. One quart samples of the following:
 - a. Specified sand infill.

1.05 INFORMATIONAL SUBMITTALS

- A. Manufacturer's installation instructions.
- B. Certifications:
 - 1. Project specific letter from turf manufacturer on the company letterhead certifying that the products to be provided meet or exceed all specified requirements, and state that the installer meets the specified qualifications above and is certified by the manufacturer to install the synthetic turf specified and to be provided.
- C. Certified copies from an independent third-party laboratory reports for results of the following tests:
 - 1. Pile Height, face width & total fabric weight, ASTM D5848.

2. Primary and secondary backing weights, ASTM D5848.
 3. Tuft bind, ASTM D1335.
 4. Grab tear strength, ASTM D5034.
 5. Water permeability, ASTM D1551.
 6. Flame resistance, ASTM F1551.
 7. Tuft yarn tensile strength and elongation, ASTM D2256.
- D. Copy of the manufacturers' minimum 8-year, prepaid, non-prorated, third-party insured warranty and insurance policy information.
- E. Qualifications: A list providing project name, date the field installation was approved, contact names and telephone numbers for each project that meets the experience and qualification requirements specified.

1.06 CLOSEOUT SUBMITTALS

- A. The Contractor shall provide the following prior to Final Acceptance and the District filing the Project Notice of Completion:
1. Written warranty as specified with forms completed in District's name and registered with manufacturer and insurance carrier.
 2. Information confirming that the third party insurance policy, non-cancelable and pre-paid, is in effect covering this installation, and underwritten by a Best "A" Rated Insurance Carrier. Insurance carrier shall confirm that the policy is in force and premiums paid.
 3. Three copies of Maintenance Manuals, which will include all necessary instructions for the proper care and preventive maintenance of the turf system, including painting and markings.
 4. Project Record Documents, in accordance with Section 01 78 39 – Project Record Documents with plans showing actual locations of seams and other pertinent information.

1.07 QUALITY ASSURANCE

- A. The manufacturer shall have a representative on site to certify the installation and warranty compliance.
- B. Quality Assurance Testing: Prior to shipment of the synthetic turf and components to the job site, the synthetic turf rolls should be randomly sampled and tested by the manufacturer who will certify that they meet the specification.
1. Testing shall be conducted and may include pile composition, pile weight, total weight, pile height, tuft bind, and grab/tear strength.
 2. Test results of the relevant characteristics and certification turf meets or exceeds the specified requirements shall be submitted as specified.

1.08 MANUFACTURER AND INSTALLER QUALIFICATIONS

- A. Manufacturer: Experienced in both the manufacturing and installation of the specified type of synthetic infilled turf system for at least 5 years and have at least 50 outdoor installations in the United States of the specified material of 50,000 square feet or greater. One of these fields shall be in play for at least 8 years and has surpassed manufacturer's warranty period.
1. Use of outside, independent contractors for the installation is to be reviewed by the District's Representative prior to the Bid of Contract.
 2. The Turf Company shall identify and provide the name of a single point of contact for their company for this project beginning with the bid process through construction administration and project close-out.
 3. Turf Contractor shall coordinate all bid documents, submittals, shop drawings, schedules, warranty and close-out efforts internally and shall not rely on District's Representative to coordinate with multiple parties. Failure to do so could result in a time and materials charge from the District or District's Representative for additional coordination.

- B. Installer:
1. Capable of providing competent workers skilled in this specific type of in-filled synthetic grass installation.
 2. Designated supervisory personnel on the project shall be certified as competent in the installation of this material including sewing seams and proper installation of the infill mixture.
 3. The foreman for the installation shall have installed at least 20 fields in the last 3 years of the specified material.
 4. Possess an active California D-12 Synthetic Products license in good standing, and have never had a license revoked.
 5. Shall not have had a Surety or Bonding Company finish work on any contract within the last 5 years.
 6. Shall not have been disqualified or barred from performing work for any public District or other contracting entity in the U.S.
 7. For the purpose of meeting these qualifications, the type of sand is not a determining factor in meeting these installation qualifications.

1.09 FIELD CONDITIONS

- A. Contractor shall be responsible for reviewing the base and ensuring it conforms to the project requirements prior to placement of the synthetic turf.
- B. Field subgrade preparation shall be completed and accepted by the District Representative prior to commencement of Work under this Section.
- C. Ambient Conditions: Care should be taken during installation to account for rapid fluctuations in temperature to avoid expansion and contraction which can affect the final installation. Temperature extremes shall be carefully monitored. The carpet should never be rolled or unrolled when frozen, which can cause cracking and irreparable damage to the secondary backing.

1.10 WARRANTY

- A. Manufacturer: Provide District with turf manufacturer's warranty which guarantees the usability and playability of the synthetic turf system for its intended uses for a minimum 8 year period. The warranty coverage shall not be prorated nor limited to the amount of the usage. The warranty submitted must have the following characteristics:
1. A non-prorated, non-cancellable up-front pre-paid, third-party insured warranty. Warranty shall be covered by a third party insurance policy, non-cancelable and pre-paid, and is in effect covering this installation, and underwritten by a Best "A" Rated (or better) Insurance Carrier listed in the A.M. Best Key Rating Guide.
 2. Insurance carrier shall confirm that the policy is in force and premiums prepaid for entire warranty duration in full.
 3. The policy shall include a minimum annual aggregate of \$5,000,000 per year and be based on claims arising from fields installed and completed only during the policy year.
 4. The policy shall provide full coverage for a minimum of 8 years from the date of Notice of Completion.
 5. The policy shall cover all costs associated with full field replacement with new equal or better turf material, including labor, materials and any other costs to repair or replace the field.
 6. District shall not be responsible for any deductible.
 7. Warranty shall have no restrictions on amount of use provided type of use is in accordance with the approved warranty language.
 8. Shall warrant materials and workmanship, and that the materials installed meet or exceed the product specifications, including general wear and damage caused from UV degradation.
 9. Shall have a provision to either make a cash refund or repair or replace such portions of the installed materials that are no longer serviceable to maintain a serviceable and playable surface.
 10. Shall be a warranty from a single source covering workmanship and all self-manufactured or procured materials.

11. Guarantee the availability of replacement material for the synthetic turf system installed for the full warranty period.
12. The name on the warranty shall be made out to Stockton Unified School District
13. Turf contractor shall include in the warranty the cost to replace high use areas such as but not limited to seating areas and plaza areas, etc. Replacement shall be one time for each area during the warranty period at a time of the warranty holder's discretion. The replacement area shall include the required square footage needed to replace the damaged areas up to the closest field line or change in turf color. Contractor shall provide replacement panels for each high use area to be determined by District's representative.

PART 2 - PRODUCTS

2.01 DESIGN AND PERFORMANCE CRITERIA

A. General:

1. Synthetic turf construction and components shall be non-toxic and not cause commonly known allergic reactions. Each synthetic turf system should be constructed to provide dimensional stability and resist damage from wear and tear during athletic and recreational usage.
2. System shall be permeable by design with adequate perforations through all of the backing coatings.
3. The bonding or fastening of system material components shall provide a permanent, tight, secure, and hazard-free athletic playing surface.
4. Seams shall be sewn with high strength sewing thread. Gluing of rolls is not acceptable.

B. Synthetic grass surfacing system shall consist of the following:

- a. Synthetic grass surfacing made with a combination of ridged monofilament polyethylene fibers and texturized Nutmeg Colored monofilament fibers, tufted into a fibrous, non-perforated, porous backing.
- b. Infill: Graded dust-free silica sand that partially covers the synthetic grass.
- c. Glue, thread, seaming fabric and other materials used to install and mark the synthetic grass.

2. Synthetic grass surfacing system shall have the following properties:

STANDARD	PROPERTY	SPECIFICATION
ASTM D1577	Fiber Denier	10800
ASTM D1577	Secondary Fiber Denier	5600
ASTM D5823	Pile Height	1.625"
ASTM D5793	Stitch Gauge	3/8"
ASTM D5848	Pile Weight	65 oz/square yard
ASTM D5848	Primary Backing	7oz/square yard
ASTM D5848	Secondary Backing	20 oz/square yard
ASTM D5848	Total Weight	92 oz/square yard
ASTM D1338	Tuft Bind (Without Infill)	9 lbs
ASTM D4491	Turf Permeability	250 inches/hour
N/A	Infill Component	2.75 lbs/square foot

C. Synthetic grass surfacing product shall consist of soft spined monofilament fibers and texturized monofilament fibers tufted into a primary backing with a secondary backing.

D. Backing:

1. Primary backing shall be a double-layered polypropylene fabric treated with UV inhibitors.
2. Secondary backing shall consist of an application of porous urethane to permanently lock the fiber tufts in place.
3. Perforated (with punched holes), backed turf is unacceptable.

- 4. Turf with attached scrim in lieu of porous urethane is unacceptable.
- E. Primary fiber shall be 10,800 denier, low friction, and UV-resistant fiber measuring not less than 1.625 inches high. Secondary fiber shall be 5,600 denier.
- F. Infill materials shall be approved by the manufacturer.
 - 1. Infill shall consist of graded dust-free sand.
- G. Glue and seaming fabric, for seaming of synthetic grass shall be as recommended by the synthetic grass manufacturer.
- H. The synthetic turf shall be delivered in 15-foot wide rolls and of sufficient length to extend from turf edge to turf edge. Head seams, between the edges, will not be acceptable.
- I. Markings:
 - 1. Not applicable

2.02 INFILL SYNTHETIC TURF (MONOFILAMENT FIBERS)

- A. Manufacturer and System: FieldTurf Commercial Elite Line, Nutmeg Premium as specified and the basis of design has been pre-approved by the District.

2.03 MATERIALS

- A. Infill:
 - 1. Infill shall consist of a controlled mixture of graded sand as specified.
 - 2. Sand shall be rounded silica sand and dust free. Coarse jagged sand will not be accepted. Sand shall consist of 100 percent of the total infill material as defined by weight. The sand shall have the following gradation:

Sieves (US Mesh Size)	% Retained
16	0
25	10-30
30	30-50
35	15-35
40	5-15
50	<5
70	<1

- 3. The infill shall be applied at a rate of 2.75 pounds per square foot.
- 4. The infill shall be not less than a uniform 3/4 inch depth below the top of fibers.
- B. Thread for sewing seams of turf shall be as recommended by the synthetic turf manufacturer.
- C. Glue for inlaying lines and markings shall be as recommended by the synthetic turf manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify the base, as specified in Section 32 18 14 - Synthetic Turf Base has been installed, and approved by District's Representative and turf manufacturer.
- B. Use a 2-5 ton static roller or other acceptable compactor to repair and properly compact any disturbed areas of the prepared base.
- C. Do not proceed with installation of turf until unacceptable base conditions have been corrected.

3.02 INSTALLING THE SYNTHETIC TURF

- A. The installation shall be performed in full compliance with the reviewed and accepted product submittal.
- B. Only trained technicians, skilled in the installation of athletic caliber synthetic turf systems working under the direct supervision of the approved installer's supervisor, shall undertake cutting, sewing, gluing, shearing, topdressing or brushing operations.
- C. Strictly adhere to the installation procedures specified. Variance from these requirements shall be submitted to and accepted in writing, by the manufacturer's onsite representative, and submitted to the District, verifying that the changes do not, in any way, affect the warranty.
- D. The turf manufacturer and installation subcontractor shall inspect and accept the field base, and provide documentation to that effect, prior to the installation of the synthetic grass system. The surface must be perfectly clean as installation commences and shall be maintained in that condition throughout the process.
- E. Cutouts in the synthetic turf shall be in accordance with the Drawings and approved submittals. Coordinate cutouts in turf with District's Representative before cutting turf for utility boxes and other structures.
- F. The turf rolls shall be installed directly over the properly prepared base. Extreme care shall be taken to avoid disturbing the base, both in regard to compaction and planarity.
- G. The full width rolls shall be laid out across the width of the turf area.
- H. Utilizing standard state of the art sewing procedures each roll shall be attached to the next.
- I. The synthetic turf field shall utilize sewn seams. Minimum gluing will only be permitted to repair problem areas, or corner completions, as required by the Specifications.
 - 1. Seams between turf panels shall be sewn. Seams shall be sewn using double bagger stitches and polyester thread. Seams shall be flat, tight, and permanent with no separation or fraying.
- J. Connections of the perimeter synthetic turf edges shall be completed by one of the following two methods and as shown on the Drawings:
 - 1. Connection to perimeter concrete edges (with recessed edge) with the manufacturer-approved adhesive.
 - 2. Connection to the recycled plastic header boards shall be done with industrial staples. Minimum embedment depth of fasteners shall be 1 inch with spacing a maximum 2 inches on center.
- K. The infill materials shall be installed to fill the voids between the fibers and allow the fibers to remain vertical and non-directional.
 - 1. Apply in thin lifts to depth specified. The turf shall be brushed as the mixture is applied.
 - 2. The mix shall be uniform and even in thickness to assure proper playing characteristics.

3. The infill shall be placed with a void of 3/4 inch to the top of the fibers.

3.03 FIELD QUALITY CONTROL

- A. The Contractor shall provide the following prior to Final Acceptance and the District filing the Project Notice of Completion:
 1. Written warranty as specified with forms completed in District's name and registered with manufacturer and insurance carrier.
 2. Information confirming that the third party insurance policy, non-cancelable and pre-paid, is in effect covering this installation, and underwritten by a Best "A" Rated Insurance Carrier. Insurance carrier shall confirm that the policy is in force and premiums paid.
 3. Three copies of Maintenance Manuals, which will include all necessary instructions for the proper care and preventive maintenance of the turf system, including painting and markings.
 4. Project Record Documents, in accordance with Section 01 78 39 with plans showing actual locations of seams and other pertinent information.

3.04 DEMONSTRATION AND TRAINING:

- A. Upon completion of the field installation, Contractor shall have a supervisory person provide a minimum 3-hour field training seminar with the District's personnel on how to care for the field.
- B. At a minimum, seminar shall include a demonstration of how use of the sweeper and groomer, how to care for the field with the groomer and sweeper, review the entire provided maintenance manual including the proper procedure for removal of gum and other debris, and answer any questions.

3.05 MAINTENANCE (NOT USED)

END OF SECTION

SECTION 32 18 14

SYNTHETIC TURF BASE

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Base for the synthetic turf consisting of, but is necessarily limited to, the following:
 - 1. Vertical draining, porous stone aggregate base consisting of a uniform single stone base.
 - 2. Stone aggregate base for stability and leveling purposes
- B. Related Requirements:
 - 1. Section 01 78 29 – Conformance Survey
 - 2. Section 31 20 00 – Earth Moving
 - 3. Section 31 23 00 – Excavation and Fill
 - 4. Section 32 18 13 – Synthetic Turf

1.02 REFERENCES

- A. California Building Code (CBC):
 - 1. Chapter 33 – Site Work, Demolition, and Construction.
- B. American Society for Testing and Materials (ASTM):
 - 1. D 1557: “Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.”
 - 2. ASTM F2898-11: “Standard Test Method for Permeability of Synthetic Turf Sports Field Base Stone and Surface System by Non-confined Area Flood Test Method”
 - 3. ASTM D2434: “Standard Test Method for Permeability of Granular Soils (Constant Head).”
 - 4. ASTM C88: “Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.”
- C. California Occupational Safety and Health Standards (OSHA):
 - 1. Article 6 - Excavations and Shoring.
- D. State of California, Business and Transportation Agency, Department of Transportation (Caltrans) "Standard Specifications."

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Submittal Procedures:
 - 1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.
 - 2. Closeout Submittals shall be submitted in accordance with Section 01 78 39 - Project Record Documents.

1.04 ACTION SUBMITTALS

- A. Product Data: Manufacturer’s descriptive literature for pipe accessories, and filter fabric, as applicable.
- B. Samples: Two 1-quart samples of each rock material and additional samples of each rock material to the District’s testing agent as specified under Article “Material Testing.”

1.05 INFORMATIONAL SUBMITTALS

- A. Manufacturer's installation instructions.
- B. Certification: Certification signed by Contractor and drainage system Installer that installed materials conform to specified requirements and system was successfully checked and tested prior to covering with drainage sand or gravel aggregate.

1.06 CLOSEOUT SUBMITTALS

- A. Project Record Drawings.

1.07 QUALITY ASSURANCE

- A. Control of Work: Conform to Section 5 of the Standard Specifications.
- B. Control of Materials: Conform to Section 6 of the Standard Specifications.
- C. Single-Source Responsibility: Crushed stone shall come from only one supplier.
- D. Material delivered to the site not meeting the Specifications will be rejected by the District. Material rejected by the District shall be removed from the site at the Contractor's expense.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Prior to trucking of material to project sites, crushed rock shall be washed so it is clean of impurities and fines created during rock crushing operations.
- B. Store products to be installed as part of the field base neatly and orderly, stacked and blocked to prevent damage and contamination.

1.09 FIELD CONDITIONS

- A. Protection of Project Site: Make provisions, and take the necessary precautions, for protect existing and completed work from damage during turf installation.
- B. Contractor shall be responsible for stabilizing top of subgrade elevations for the synthetic turf areas prior to receiving the stone aggregate base and for executing fine grading as may be necessary or incidental to placement of the synthetic turf.
- C. Contractor shall prevent surface water and subsurface or groundwater from flowing into excavations and flooding area to receive turf base. Contractor shall not allow water to accumulate in excavations. Contractor shall remove water to prevent softening of sub grades.

1.10 MATERIAL TESTING

- A. General:
 - 1. The District will employ and pay for the services of an Independent Testing Agency as specified in Section 01 45 00 - Quality Control.
 - 2. Payment for initial material testing is the responsibility of the District.
 - 3. Employment by the District of the Testing Agency shall in no way relieve Contractor's obligations to perform the Work of the Contract.
 - 4. The District reserves the right to change its testing laboratory if the need arises.
 - 5. Cost of testing which are repeated on materials that have failed to meet specifications or are as a result of shortages shall be borne by the Contractor.

6. The Contractor shall include the following with its sample submittals:
 - a. Identification of proposed source and supplier.
 - b. Current lab mechanical analysis of the proposed stone using ASTM standards for sieve analysis.
 - c. Sample sizes as specified.
 - d. Certification that the supplier can deliver the total quantity of material needed to complete the project in a timely manner.

- B. Pre-Construction Testing Procedures: The following tests will be performed by the District's Testing Agent prior to acceptance of rock provided under this Section. Testing of proposed Engineered Permeable Base Rock and Subgrade Trench Drain Rock will be performed in the following steps:
 1. Engineered Permeable Base Rock and Subgrade Trench Drain Rock:
 - a. Contractor shall submit a 5-gallon separate composite to the District's Testing Agency, unless the District's Testing Agent elects to pull the sample directly at the quarry and/or requests test samples of varying quantities based on the testing labs' needs, for each porous base rock material. The District's testing agent will evaluate these materials as specified using ASTM C136 and ASTM D75 testing protocol as a guideline.
 - b. The submitted samples will be used for comparison with all subsequent samples submitted for acceptance during construction.
 - c. Material shall not be delivered to the project site until tests show it complies with the accepted material.
 - d. All rock to be provided for an Engineered Permeable Rock Base is required to pass the following qualifications:

Restrictions:

To ensure structural stability: $D_{60}/D_{10} > 5$ and $1 < \frac{D_{2.30}^2}{D_{10} * D_{60}} < 3$
 Fragmentation shall be 100%.

"x" is the size of the sieve (in millimeters) that lets pass "x" percent of the stone. For example, D₆₀ is the size of the sieve that lets 60 percent of the stone pass. For calculation purposes, these sizes may be obtained by interpolation on a semi-log graph of the sieve analysis.

To ensure proper drainage: Porosity of Engineered Permeable Rock Base > 25%
 (when stone is saturated and compacted to 92% Modified Proctor)

Permeability of stone base > 30 in/hr (Tested thru ASTM D2434 with rock saturated and compacted to 92% Modified Proctor)

Depending on the type of rock present in the crushed stone mix, other mechanical characteristics might be necessary for approval.

- e. Engineered Permeable Rock Base and Subdrain Trench Drain Rock shall be tested to show that both materials meet the following stability requirements:

Test Method	Criteria
LA Abrasion (California Test 211)	Not to exceed 35
Durability Index (California Test 229)	Not less than 40
Sulfate Soundness (ASTM C-88)	Not to exceed 12% loss for coarse aggregate, 10% for fine aggregate (based on a sulfate solution)

- C. Testing During Construction:
 1. During construction, samples will be taken and analyzed periodically by the District's representative/Testing Agent to assure strict compliance with the Specifications. The District may

sample and test the rock material either at the source or at the project site upon delivery from incoming transfer trucks. Frequency of sampling for gradation testing would be to sample every 500 tons of Engineered Permeable Base Rock delivered to the site. Rock not meeting Specifications will be rejected by the District's representative. Materials rejected by the District's representative shall be removed from the site at the Contractor's expense. It is the Contractor's responsibility to ensure that all permeable stone for the synthetic turf base meet the above requirements throughout the installation process, including transfer and delivery to the site, placement, spreading, compaction, and installation of synthetic turf material. Proper investigation into rock sources may be required by the Contractor to ensure that the rock that was bid will meet the project specifications.

2. Subdrain Trench Leveling Rock: The leveling rock shall comply with section 2.04 A, and be submitted to the District's Testing Agent for gradation testing. No additional tests are required for the leveling stone.
- D. Permeability of placed engineered permeable rock base shall not be less than 10 in/hr (Tested per ASTM F2898-11)
 - E. If rock stability to water and vehicles is in question, the District has the option to perform additional testing to ensure material shall adhere to requirements of Caltrans Section 68.

1.11 PROJECT RECORD DOCUMENTS

- A. Accurately record location of pipe runs, connections, cleanouts and invert elevations. Include locations of utilities remaining, re-routed utilities, new utilities, and newly discovered utilities as applicable by horizontal dimensions, elevations, inverts, and slope gradients.

PART 2 - MATERIALS

2.01 DESIGN AND PERFORMANCE CRITERIA

- A. The finished crushed stone or aggregate base supplied shall be stable, unyielding, and permeable.

2.02 ENGINEERED PERMEABLE ROCK BASE

- A. Engineered Permeable Rock Base: Virgin, un-recycled, crushed stone meeting the gradation criteria for the California Department of Transportation 3/4-inch Permeable Class II (Section 68) and the following gradation.

Mesh size	Percent Passing
1"	100
3/4"	90-100
3/8"	40-100
#4	25-40
#8	18-33
#30	5-15
#50	0-7
#200	0-3

- B. The above rock gradation range is a general recipe for the Contractor to use in order to meet the product performance requirements of the built stone base. The Contractor is responsible for ensuring the type of rock and blend they submit and install will meet all the specified requirements.
- C. Soft rock materials, including sandstone, limestone, and shale, are not suitable. Rock supplier shall certify that all supplied rock will be void of this type of rock.

2.03 SUBDRAIN TRENCH DRAIN ROCK

- A. Shall be 3/4-inch x 1/2-inch crushed virgin, un-recycled, washed rock, meeting the following general gradation requirements:

Sieve Size	Percent Passing
1"	100
3/4"	90-100
1/2"	10-40
3/8"	0-15
#4	0-5

- B. The rock profile will extend from the bottom of the trench to the top of both sides of the subdrain trench, and to the top of rock elevation. The permeable base rock (or leveling rock) shall not be installed over the subdrain trench drain rock.
- A. The Contractor is responsible for ensuring the type of rock and blend they submit and install will meet all the specified requirements, including those outlined in item 1.10 of this specification section.
- B. Soft rock materials, including sandstone, limestone, and shale, are not suitable. Rock supplier shall certify that all supplied rock will be void of this type of rock.

2.04 SUBDRAIN TRENCH LEVELING ROCK

- A. For planarity purposes, a clean uniform 3/8 inch crushed stone material, of the same source as the subdrain trench drain rock or Engineered Permeable Rock Base may be installed over the subdrain trench profile upon approval of District's representative. Maximum thickness for this stone layer is 1 inch.

2.05 GEOTEXTILE FILTER FABRIC

- A. Geotextile Filter Fabric: Mirafi 140 N, or accepted equal, conforming to the following minimum specifications, unless otherwise recommended by the Geotechnical Engineer:

Property	Test Method	Typical Values
Grab Strength	ASTM D 4632	80 lb.
Puncture Strength	ASTM D 4833	25 lb.
Burst Strength	ASTM D 3786	130 lb.
Trapezoid Tear	ASTM D 4533	25 lb.
Permeability	ASTM D 4491	0.1 cm/sec
Apparent Opening Size	ASTM D 4751	#50 Sieve size

Property	Test Method	Typical Values
Permittivity	ASTM D 4491	

2.06 DRAINAGE ELEMENTS

- A. Refer to Storm Drainage Specification Section for in-field drainage elements.

PART 3 - EXECUTION

3.01 SUBGRADE PREPARATION

- A. Contractor shall verify that subgrade has been prepared according to specification Section 31 20 00 – Earth Moving with regard to compaction, grade tolerances in accordance with Section 01 71 23 – Field Engineering and is free of debris, non-compactable material, topsoil, or organics prior to beginning work.
- B. Top of subgrade elevations shall be verified using laser-operation survey instruments. Refer to Conformance Surveying specifications for requirements.
- C. Once the subgrade conformance has been accepted and compaction has been properly achieved, the geotextile filter fabric shall be installed over the compacted and prepared subgrade, as shown on the plans, without disturbing grades.
- D. Geotextile fabric shall be installed with 6” overlap and stapled 6’ on-center along seams. Staples to be 6” staples.

3.02 INSTALLATION OF THE SUBDRAIN TRENCH AND IN-FIELD DRAINAGE

- A. Contractor to install drain rock and piping in strict compliance with the manufacturer’s written instructions and as indicated in the Drawings. Contractor to exercise caution and the appropriate sequencing of work, so as not to damage any drainage piping during the base rock installation.
- B. Contractor to protect drain trenches to ensure that pipe is not damaged in any way by construction operations and that the rock is not contaminated with native soils, unintended construction material, or deleterious materials during subsequent construction operations.

3.03 PLACING THE ENGINEERED PERMEABLE ROCK BASE

- A. The stone shall be laid without damaging the soil subgrade and the in-field drainage system. Do not create depressions in subgrade with heavy equipment. If damage to subgrade occurs, correct as specified for subgrade preparation.
- B. The crushed stone shall be carefully and evenly spread over the subgrade and up both sides of the subdrain trenches to the depth shown on the Drawings.
- C. Excess water shall not be applied during installation of rock base and rough grading due to the potential of softening the subgrade and altering the grading.
- D. Crushed stone shall be smoothed and compacted uniformly to design grades by alternating raking, water settling, and rolling operations. Minimal rolling is advisable to achieve design grades and compaction. Only static rolling is allowed and max 3-5 ton rollers should be used on the permeable stone base. Vibratory rolling of the permeable stone is not permitted.

- E. If the required compacted depth of the base course exceeds 6 inches, the base stone course shall be constructed in 2 or more layers or lifts of approximate equal thickness. Each layer shall achieve a uniform 90 percent relative compaction.
- F. Top of porous rock elevations shall be verified using laser-operation survey instruments. Refer to Conformance Surveying specifications for requirements.
- G. The final grade shall be ideally compacted to a uniform 90 – 92 percent relative compaction.
- H. Contractor shall not overwork the stone material and consequently modify its gradation characteristics. Minimal moving of the stone upon placement of the material on the subgrade and rolling is advisable to achieve design grades and compaction. Do not compact greater than 93 percent relative compaction.
- I. Contractor shall manually screed the top stone surface to ensure tolerances are met.
- J. Top of rock elevations shall be verified using laser-operation survey instruments. Refer to Conformance Surveying specifications for requirements.
- K. Finish surface planarity shall be verified, and if necessary adjusted, by the Contractor using string line method.
 - 1. Entire finished surface shall be “walked” with mason’s line in increments of approximately 3 feet.
 - 2. A mason’s line shall be held taught between two workers separated by a distance of approximately 40 feet then placed directly on the finished surface parallel to the direction of greatest slope.
 - 3. A third worker shall check for separations between the mason’s line and the finished surface that are equal to or greater than the specified tolerances.
 - 4. Areas of separation shall be outlined with marking paint and the depth of separation indicated.
 - 5. Areas outlined with marking paint shall be filled with top rock to the depth indicated and raked by hand. Filled areas shall be compacted to provide a non-yielding, smooth, flat surface.
 - 6. Final finished surface planarity shall be approved by the District and the synthetic turf installer.
- L. Once the top of the permeable rock base is installed and compacted, the Contractor shall notify the District Testing Agent that it is ready for the field permeability test.
 - 1. The Agent shall be given 2 working days’ notice and have 2 days to complete the in-field test which will consist of a minimum of 4 controlled field permeability tests per synthetic turf field.
 - 2. Tests shall be by the following test method: ASTM F2898-11: “Standard Test Method for Permeability of Synthetic Turf Sports Field Base Stone and Surface System by Non-confined Area Flood Test Method”
 - 3. Permeability of placed engineered permeable rock base shall comply with section 1.10 D.
 - 4. If the test does not comply with section 1.10, the Contractor shall provide within 48 hours a written repair procedure to correct the permeability deficiency.
 - 5. Repair work, including associated delays, shall be the Contractor’s sole responsibility. Fine tuning of the field base due to the testing operations is the responsibility of the Contractor.

END OF SECTION

SECTION 32 32 00

LANDSCAPE CONCRETE MASONRY

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Concrete unit masonry at pool area columns and mechanical building walls.
 - 2. Mortar and grout.
 - 3. Reinforcement for masonry.
- B. Related Requirements:
 - 1. Landscape Concrete: Section 32 32 15; concrete footings.
 - 2. Exterior Site Painting: Section 09 91 15; painting of masonry.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Submittal Procedures: Action and Informational Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.
- B. Coordinate with other Sections for work to be installed in conjunction with concrete unit masonry.

1.03 ACTION SUBMITTALS

- A. Shop Drawings: To-scale drawings to illustrate detailing, fabrication, bending and placement of unit masonry reinforcing bars.
 - 1. Comply with ACI 315 showing bar schedules, stirrup spacing, diagrams of bent bars and arrangements of masonry reinforcement.
 - 2. Indicate location of conduit, plumbing and other items embedded in unit masonry walls in coordination with placement of reinforcement.
- B. Samples for Verification:
 - 1. Full-size units for each exposed decorative CMU unit other than gray, smooth-faced, units.
 - 2. Colored mortar for each color required.
- C. Mix Designs:
 - 1. Verification of mortar strength and governmental approval if other than proportion specifications included in CBC Table 21-A are to be used.
 - 2. Verification of grout strength if other than proportion specifications included in CBC Table 21-B are to be used.

1.04 INFORMATIONAL SUBMITTALS

- A. Mill test reports for all reinforcing steel.
- B. Certificates:
 - 1. Material certificates for the following signed by the manufacturer and the Contractor certifying that each material complies with requirements and standards specified.
 - a. Each material and grade of reinforcing bars.
 - b. Each type and size of anchors, inserts, ties and accessories.
 - 2. Plant certificates for concrete masonry units to the District's Testing Agency and Architect stating that all units have been properly cured before shipment and that they conform to requirements of these Specifications, including but not limited to, requirements for moisture content per ASTM C90.

- C. Extreme Weather Procedures: Cold and hot-weather construction procedures evidencing compliance with requirements specified in ACI 530.1 and these Specifications.

1.05 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with applicable requirements of CBC Chapter 24 - Masonry.
- B. Industry Standards: Comply with applicable requirements of:
 - 1. American Concrete Institute (ACI):
 - a. ACI 315 - Details and Detailing of Concrete Reinforcement.
 - b. ACI 530.1 – Specifications for Masonry Structures
 - 2. Concrete Masonry Association of California and Nevada (CMACN) - Typical Details for Concrete Masonry.
- C. Mockup: First installed area of exterior exposed CMU, at least 20 square feet, shall serve as a mock-up for review and approval by District's Representative of workmanship, visual effect, and interface with adjacent construction.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. At the time of delivery to the site, masonry units shall conform to moisture requirements of ASTM C90 Type I, Table 1. In addition, masonry units shall meet moisture requirements during laying of units and grouting until work is complete.
- B. Store masonry units above ground on level platforms which allow air circulation under stacked units.
- C. Cover materials as necessary to protect against wetting prior to use.

1.07 FIELD CONDITIONS

- A. Environmental:
 - 1. Hot Weather Conditions: Protect masonry construction from direct exposure to wind and sun when erected in an ambient air temperature of 90 degrees F or greater in the shade and when relative humidity is less than 50 percent.
 - 2. Cold Weather Conditions: Do not place unit masonry when temperature is below 40 degrees F, unless District's Representative approves and precautions are taken for preventing damage from freezing before and after placement.
 - a. Maintain minimum 40 degrees temperature for at least 96 hours after mortar and grout are placed.
 - b. Prevent masonry from freezing for at least 7 days after placement and grouting.
 - c. Materials used shall be free from frost.
 - d. Masonry shall not be placed on frozen substrate.
- B. Protection:
 - 1. Protect surrounding work as required against damage from masonry work.
 - 2. Protect masonry units from moisture absorption until masonry wall is completed and facing materials or coatings are installed.

PART 2 - PRODUCTS

2.01 DESIGN AND PERFORMANCE CRITERIA

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6 except as modified by requirements in the Contract Documents.

- B. Source Limitations:
 - 1. Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
 - 2. Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.
- C. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work and will be within 20 feet vertically and horizontally of a walking surface.

2.02 CONCRETE MASONRY UNITS

- A. Regular (Precision) Hollow Concrete Masonry Units: ASTM C90, medium weight smooth face, uniform gray color.
 - 1. Masonry units shall have minimum compressive strength of 2,800 psi, for minimum design f'm of 2,000 psi.
 - 2. Provide open end units or "H" block units, for stacked bond pattern.
 - 3. Provide bond beam units at horizontal reinforcing.
 - 4. Provide open end units at vertical reinforcing.

2.03 REINFORCEMENT AND ANCHORAGES

- A. Refer to CONCRETE MASONRY NOTES, Sheet S1.1 for additional requirements
- B. Horizontal Reinforcement: Hot-dip galvanized, ladder-type, single-wythe, 9-gage wire reinforcing; Hohmann and Barnard, Dur-O-Wall, Heckmann, Wire-Bond, or equal.
- C. Reinforcing Bars:
 - 1. Bars: New billet steel, ASTM A615, Grade 60.
 - 2. Tie Wires: ASTM A82.
- D. Reinforcing Bar Positioners: Dur-O-Wall "D/A 811" and "D/A 816," Heckman Building Products, Inc. No. 376, Hohmann & Barnard, Inc. "#RB Rebar Positioner," or equal.

2.04 MORTAR AND GROUT MATERIALS

- A. Cement for Mortar and Grout: Type I or Type II Portland Cement conforming to ASTM C150.
 - 1. Type II Portland Cement may be used only if it equals strength of Type I.
 - 2. All cement used (mortar and grout) shall be low alkali type (0.6 percent maximum).
- B. Aggregate:
 - 1. Mortar: Sand shall conform to ASTM C144 for standard CMU except that not less than 3 percent of sand shall pass #100 sieves.
 - 2. Grout: Grout shall have minimum compressive strength of 3,000 psi, per ASTM C476.
 - a. Course: Maximum 3/8-inch size; 200 percent by volume.
 - b. Fine: Washed river sand; 225 percent by volume.
- C. Lime Putty: Made from hydrated lime conforming to ASTM C207.
- D. Grout Admixture: Sika Chemical Corporation "Sika Grout Aid Type II."
- E. Mortar Coloring: Standard commercial brand with mix of less than 6 percent weight of Portland cement.
 - 1. Color: To match CMU color, unless otherwise selected by Architect.

F. Water: Clean and potable.

2.05 MORTAR AND GROUT MIXES

A. General:

1. Accurately measure materials for mortar and grout in suitably calibrated devices. Measurements based on dry loose volume. Shovel measurements or fractional sack batches not acceptable.
2. Place sand, cement and water, in that order, in mixer and mix for at least two minutes.
3. For mortar, add lime and continue mixing for at least 10 more minutes or as much longer as required to secure a uniform mass.
4. Retemper mortar only by adding water into a basin made with mortar. Work mortar carefully in.
5. Remove from work any mortar or grout which is unused within one hour after initial mixing.
6. Proportion grout by volume with sufficient water added to produce consistency for pouring without segregation.
7. Do not use calcium chloride in mortar or grout.
8. Admixtures: Add in accordance with admixture manufacturer's instructions and if included in the approved mix design.

B. Mortar Mix: In compliance with CBC requirements and ASTM A270, Type S for regular grade block.

C. Grout Mix: In compliance with CBC requirements and ASTM C476.

D. Design Strengths:

1. Mortar: Not less than 1,800 psi at 28 days.
2. Grout: Not less than 3,000 psi at 28 days.

PART 3 - EXECUTION

3.01 REINFORCING STEEL

- A. Place reinforcement in accordance with ACI 531, supported and secured against displacement, with 1/2-inch minimum clearance from the interior face of the masonry unit.
- B. Maintain position within 1/2-inch of true dimension.
- C. Verify reinforcement is clean, free of scale, dirt, or other foreign coatings which would reduce bond to grout.

3.02 MORTAR BEDS

A. Hollow Units: Provide full mortar coverage on horizontal and vertical face shells and webs in all courses.

3.03 PLACING AND BONDING

- A. Placing and Bonding: Lay masonry to lines and levels indicated, plumb and true, using only dry masonry units.
- B. Cutting: Make jobsite cuts with proper tools to provide straight unchipped edges and to fit masonry construction to final form. Take care to prevent breaking masonry unit corners or edges.
- C. Laying: Lay masonry in full bed and head joint of mortar, properly jointed with other Work.
 1. Buttering corners of joints, or excessive furrowing of mortar joints will not be accepted.
 2. Do not shift or tap masonry units after mortar has taken initial set. Where adjustment is necessary, remove mortar and replace.

- D. Pattern: Lay masonry in running bond, with vertical joints located at center of masonry units above and below. Align vertical cells for continuity of reinforcement and grout. Course one block unit and one mortar joint to equal 8-inches. Make vertical and horizontal joints equal and of uniform thickness.
- E. Horizontal and Vertical Face Joints:
 - 1. Nominal thickness: 3/8-inch, uniform.
 - 2. Tooling: Tool joints when thumb-print hard with joint tools to compress mortar to ensure full contact with block surfaces.
 - 3. Concealed joints: Flush.
 - 4. Exposed joints: Flush.
 - 5. Internal cleaning: Remove mortar protruding into cells of cavities to be reinforced or filled.
- F. Intersections and Corners: Fully bond intersections, external and internal corners.
- G. Joining Masonry Work: Provide expansion joints in accordance with reference standards. When joining fresh masonry to set or partially set masonry construction, clean exposed surface of set masonry and remove loose mortar prior to laying fresh masonry.
- H. Cold Joints: If necessary to stop off a horizontal run of masonry, rack back one-half block length in each course. Do not use toothing to join new masonry to set or partially set masonry when continuing a horizontal run.
- I. Cleaning: Remove excess mortar before mortar sets. Clean surfaces at exposed masonry to present even surface texture and color.

3.04 BUILT-IN WORK

- A. Avoid cutting and patching. Coordinate placement of built-in products specified in other Sections so built-in products are placed as masonry is laid.
- B. Install bolts, anchors, nailing blocks, sleeves, inserts, frames, flashings, conduit and other built-in products as masonry progresses. Install bolts in templates to assure proper alignment and location.
- C. Solidly grout spaces around built-in products.

3.05 GROUTING

- A. Grout all cells of masonry units which contain rebar, bolts, etc., all cells below grade, and as specified on the Drawings. Work grout into cores and cavities to eliminate voids. Do not displace reinforcing steel when placing grout.
- B. Inspection Holes: Provide inspection and cleanout holes at base of vertical cell grout lifts in excess of 5 feet. Clean concrete grout spaces of excess mortar and debris before grouting.
- C. Construction Joints: When grouting is halted for one hour or longer, form horizontal construction joints by stopping the pour of the grout 1-1/2 inches below top of uppermost unit.
- D. After inspection of concrete grout spaces, plug cleanout holes with masonry units. Brace against wet grout pressure.

3.06 PROTECTION OF WORK

- A. Protect sills, ledges and off-sets from mortar drippings or other damage during construction. Remove misplaced mortar or grout immediately.

- B. Cover top of walls with non-staining waterproof coverings when Work is not in progress.

3.07 CURING

- A. In hot, dry conditions, CMU shall be fogged during a 3-day curing period at least twice a day.
- B. Exercise care to prevent mortar blotches, uneven coloring in mortar, and other disfigurements to exposed concrete block wall. Should disfiguration occur, do not acid wash. Lightly sandblast the entire section of the wall to secure uniformity or appearance.

3.08 POINTING AND CLEANING

- A. At final completion of unit masonry work, fill holes in joints and tool.
- B. Cut out and re-point defective joints.
- C. Dry brush masonry surface after mortar has set, at end of each day and after final pointing.
- D. Leave masonry and surrounding surfaces clean and free of mortar spots and droppings.

END OF SECTION

SECTION 32 32 15
LANDSCAPE CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Architecturally exposed formed concrete.
 - 2. Natural site concrete at utility pads.
 - 3. Subgrade, natural, as-cast concrete for seatwalls, foundations, landscape fencing, furnishings and other site improvements.

- B. Related Requirements:
 - 1. Section 31 20 00 - Earth Moving
 - 2. Section 32 13 13 - Concrete Paving
 - 3. Section 32 36 00 - Landscape Decorative Metal; safety nosing at steps, and other landscape metal work embedded in concrete.

1.02 REFERENCES

- A. State of California, Business and Transportation Agency, Department of Transportation (Caltrans) "Standard Specifications."

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Submittal Procedures: Action and Informational Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.

- B. Pre-Installation Meeting: Conduct meeting at Project with District's Representative and concrete installer at site to review scope of landscape concrete work and expectations.
 - 1. Meeting shall be scheduled after approval of mockups and sufficiently in advance of commencement of architecturally exposed concrete for the site improvements.
 - 2. Record discussions of conference and any conflict, incompatibility, or inadequacy. Furnish a copy of record to each participant.

- C. Coordination:
 - 1. Coordinate delivery so that mixes may be immediately poured upon arrival at site.
 - 2. Coordinate proper installation of accessories and anchorage embedded in concrete and for the provision of holes, openings, and other penetrations necessary to the execution of the work of other trades.
 - 3. Coordinate mix design and finishing of colored concrete work to assure appearance match with cast-in-place concrete included on the Structural Drawings.

1.04 ACTION SUBMITTALS

- A. Formwork: Submit for concrete seatwalls.
 - 1. Show joints, edge profiles, form material, and other items that affect appearance of exposed surface. Indicate specified Class.
 - 2. See Section 32 33 00, "Site Furnishings," for additional requirements.

- B. Reinforcing Steel: Fabricators drawings for steel reinforcing showing complete bending and placing details of reinforcement necessary for location of reinforcement.

- C. Product Data: Manufacturers' current catalog cuts and specifications for the following:
 - 1. Formwork panels and board form liners, if used.
 - 2. Expansion joint filler materials.
 - 3. Color admixtures.
 - 4. Curing compounds.
 - 5. Other items as requested by District's Representative.

- D. Samples:
 - 1. Concrete materials as required for testing and inspection.
 - 2. Expansion Joint Sealant: Manufacturer's standard bead samples showing full range of colors available.
 - 3. Concrete Panels: Not less than 12 inches by 12 inches for each selected color and finish texture using concrete mix proposed for this Project.
 - a. Indicate materials and methods used to produce each color and texture.
 - 4. Mockup work shall not commence until a concrete sample panels have been approved.

- E. Concrete Mix: Mix design and certified compressive strength test report for each concrete strength and type indicating additives and maximum aggregate size required. Report shall be prepared and certified by the ready-mix concrete supplier.

1.05 INFORMATIONAL SUBMITTALS

- A. Statement of installer/finisher qualifications if requested by District's Representative.

- B. Mill Certificates and Certifications for reinforcing.

- C. Delivery tickets for each load of concrete delivered to the site.

- D. NRMCA Certificate of Conformance: Submit a copy of the NRMCA Certificate of Conformance to the District's Testing Agency for the ready-mix plant, equipment, and mix trucks that will supply the concrete for the project.

- E. Record of pre-installation meeting.

1.06 QUALITY ASSURANCE

- A. Codes and Standards: Comply with the applicable provisions of the following codes, specifications and standards, except where more stringent requirements are shown or specified:
 - 1. California Building Code, Title 24, Part 2, Chapter 19A – Concrete.
 - 2. American Concrete Institute (ACI):
 - a. ACI 301: Specifications for Structural Concrete for Buildings
 - b. ACI 303.1: Standard Specification for Cast-In-Place Architectural Concrete.
 - c. ACI 303R: Guide to Cast-In-Place Architectural Concrete.
 - d. ACI 318: Building Code Requirements for Reinforced Concrete.
 - e. ACI 614: Recommended Practice for Measuring, Mixing, and Placing Concrete.
 - 3. Concrete Reinforcing Steel Institute, Manual of Standard Practice.
 - 4. NRMCA - National Ready-Mix Concrete Association, Quality Control Manual – Section 3: Certification of Ready Mixed Concrete Production Facilities.

- B. Contractor shall be responsible for quality of concrete in place and shall bear burden of proof that concrete as placed meets minimum requirements.

- C. Qualifications:
 - 1. Contractors Design Laboratory: When mixes are proportioned by trial batch method, engage a laboratory conforming to ASTM E329 and under direction of a civil engineer licensed in the State of California.

2. Installer for Formed Surfaces: An experienced concrete contractor who has specialized experience installing cast-in-place architectural concrete similar in quality level, material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance. Installer shall retain a quality-control inspector, experienced in inspecting cast-in-place architectural concrete, and who is an ACI-certified Concrete Construction Inspector or is certified by ICC, as a Reinforced Concrete Special Inspector.
 3. Contractor's Testing Agency: An independent testing agency meeting "Recommended Requirements for Independent Laboratory Qualification," published by American Council of Independent Laboratories and basic requirements of ASTM E329, "Use in the Evaluation of Testing and Inspection Agencies as Used in Construction."
- D. Concrete Testing:
1. The District may retain, at its expense, a testing laboratory to perform material evaluation tests in accordance with Section 01 45 00 - Quality Control.
 2. Testing may include slump tests and securing samples of concrete, cement, aggregates or other materials for testing. Applicable materials shall be provided by the Contractor at no additional cost to the District.
- E. Mockups:
1. General:
 - a. Mix design shall match that used on accepted sample panels and proposed for use in final construction including cement and color additive.
 - b. Prepare at least one month before start of final concrete work to allow concrete to cure before observation.
 - c. Concrete color and finish for mockup appearance shall match color and finish of accepted sample.
 - d. Build mockups at the location indicated or, if not indicated, as selected by the District's Representative.
 - e. Notify District's Representative 5 working days in advance of dates and times when mock-ups will be constructed and layouts will be ready for review.
 - f. Contractor shall allow for preparation of 1 comprehensive mockup and up to 2 flat paving mockups for evaluation and final approval of each concrete.
 - g. Color and texture shall be approved before starting construction.
 - h. Perform specified slip-resistance testing on paving mockups.
 - i. Maintain final accepted mockups in an undisturbed condition as a standard for judging the completed Work.
 - j. Retain samples of sands, aggregates, and color additive used in the mockups for comparison with materials used in final work.
 - k. Demolish and remove mockups when directed if not incorporated into the final work.
 2. Walls and Steps:
 - a. Wall Size: Minimum 4 feet long by maximum height and include 2 tie holes, horizontal and vertical corner treatment, and specified texture finishes.
 - b. Stair Size: Minimum 2 treads and 2 risers by 4 feet long and including safety scoring at nosing.
 3. Board Formed Concrete: An on-site mockup is required for the board-formed architectural cast-in-place concrete for verification of concrete appearance using the proposed mix design. Mockup will also be used for final evaluation and approval of appearance, formwork layout, and workmanship
 - a. Size: Not less than 4 foot x 4 foot and to include a typical outside corner.
 - b. Form release agent, if required in final construction, shall also be used on mock-up.
 - c. Prepare promptly to allow concrete to cure sufficiently before observation by District's Representative.
 - d. Mockup will be evaluated for visual appearance of concrete with and without water repellent and patching methods.
 - e. Repairs: Representative areas of concrete shall be intentionally damaged, in the presence of the District's Representative, to mimic honeycombing, spalling, and other defects as may be experienced upon stripping of formwork.

- f. Repair it to demonstrate materials and methods proposed for repair of surface blemishes.
 - g. Specific procedures and materials used for patched area shall be thoroughly documented.
 - F. Lines and levels shall be established by a licensed surveyor or registered civil engineer.
 - G. District's Representative will review all forms and joint layout prior to casting concrete.
- 1.07 DELIVERY, STORAGE, AND HANDLING
 - A. Coordinate delivery so that mixes may be immediately poured upon arrival at site.
- 1.08 FIELD CONDITIONS
 - A. Maintain control of concrete dust and water. Do not permit adjacent areas to be contaminated.
 - B. For protection of existing trees to remain, see Arborist Report on the Drawings and Section 32 01 90 – Existing Tree Protection and Maintenance.
 - C. Maintain control of concrete dust and water. Do not permit adjacent areas to be contaminated.

PART 2 - PRODUCTS

2.01 BASE MATERIALS

- A. Aggregate: As specified in Section 32 11 00 - Base Courses.

2.02 FORMWORK

- A. General:
 - 1. Comply with ACI 347, "Recommended Practice for Concrete Formwork," for formwork and other form-facing material requirements.
 - 2. Furnish in largest practicable sizes to minimize number of joints unless otherwise shown on the Drawings.
 - 3. Seal joints to prevent leakage of paste using demonstrated effective method that will not affect appearance of finished surface.
 - 4. Forms may be reused at concealed surfaces. Forms shall not be reused for exposed concrete surfaces if there is any evidence of surface wear or defect that would impair the quality of the surface or if their reuse will be evident and produce a noticeable variation in the appearance in the completed work.
 - 5. Formwork Surface Class at Exposed Concrete: Class A. In addition to ACI 303.1 limits on form-facing panel deflection, limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, to 1/8 inch.
- B. Forming Materials:
 - 1. Panels at Smooth Concrete: New, manufactured without addition of urea-formaldehyde, minimum 3/4-inch thick, MDO plywood made specifically for forming of Architectural Concrete to achieve joint pattern shown on Drawings or accepted shop drawings; "PureKor MDO Concrete Formply" by Panel Source International, Inc., or equal.
 - 2. Boards, or Form Liners Providing the Appearance of Boards: Made specifically for forming of Architectural Concrete to achieve board pattern and appearance shown on the Drawings and approved mockup.
 - 3. Form Boards: 2 x 8 with resawn face, sized to net 7-1/4 inch width as required for layouts shown on the Drawings.
 - 4. Unexposed Surfaces of Concrete: Plywood, lumber, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

5. Framing: Contractor option, subject to meeting necessary strengths and surface tolerances.
- C. Form Hardware:
1. Ties:
 - a. Typical: Metal, spreader type, removable to 1-inch from concrete face.
 - b. Exposed Concrete: Fiberglass rod ties, tinted to color to match concrete; “SuperTie” by RJD Industries, Inc., or equal, in tensile strength as selected by form designer.
 2. Wire ties and wood spreaders will not be allowed except that such devices may be permitted for footings, shallow foundations and similar other totally concealed below grade surfaces. Wood spreaders shall not remain in concrete.
- D. Form Release Agents:
1. Concealed Concrete: Contractor option.
 2. Exposed Concrete: Colorless, free from oils, chemically active, guaranteed to provide clean, stain-free concrete release and not to interfere with future applied coatings and finishes.

2.03 REINFORCING

- A. Materials:
1. Reinforcing Steel: Deformed billet steel bars, ASTM A615, Grade 60 for No. 5 and larger, Grade 40 for No. 4 and smaller.
 2. Tie Wire: ASTM A82, black annealed.
 3. Spacers, Bar Supports, and Other Accessories: In accordance with ACI 315. Galvanize metal items exposed to moisture, or use approved other non-corrodible, non-staining supports.
 4. Smooth Dowels for Expansion Joints: ASTM A615, Grade 40 smooth, billet-steel bars, shop painted with iron-oxide zinc-chromate primer.
- B. Reinforcing steel shall be cut and bent cold to exact lengths and shapes to comply with Drawings, reviewed shop drawings, and referenced codes and standards.
- C. Comply with the additional requirement shown on the Drawings.

2.04 CONCRETE MATERIALS

- A. Portland Cement: ASTM C150, Type II, low alkali brand, with a proven history of successful use with proposed aggregates. Cement shall be same brand and from same source throughout the Project.
- B. Hardrock Aggregate: ASTM C33.
- C. Water: Clean, potable concrete mixing water free from injurious amounts of salts, oils, acids, alkalis, organic materials or other deleterious matter.

2.05 CONCRETE ADDITIVES

- A. Pigment for Integrally Colored Site Concrete: ASTM C979, synthetic mineral-oxide pigments or colored water-reducing admixtures, color stable, nonfading, and resistant to lime and other alkalis; “Chromix Admixture for Color-Conditioned Concrete” by L. M. Scofield Co. as specified, or equal.
1. If added to mix at Project site, additive shall be furnished in manufacturer’s “Mix-Ready” disintegrating bags.
 2. Dosage Rate: As required to achieve color of approved sample but not exceeding 10 percent of weight of cementitious materials in mix.
 3. Colors: n/a.
- B. Waterproofing: Crystalline type; “Xypex Admix C-1000” by Xypex Chemical Corporation, or equal.
- C. Additional Additives: As approved for structural concrete and recommended by concrete mix designer.

2.06 ACCESSORIES

- A. Curing Materials:
 1. Liquid Curing Compounds: ASTM C309, Type 1.
 2. Sheet Material: Waterproofed Kraft paper, ASTM C17, regular type.
- B. Fiber Expansion Joint Material: Preformed cellular fiber complying with ASTM D1751; 1/2 inch thick unless otherwise indicated; "SealTight Fiber Expansion Joint Filler" by W.R. Meadows or equal precut to proper size.

2.07 CONCRETE MIXING

- A. General:
 1. Mix designs for concrete shall be Contractor-designed at its expense. Designs shall be prepared by a qualified agency approved by the District's Representative.
 2. Use admixtures according to manufacturer's written instructions.
 3. Ensure equipment and plant will afford accurate weighing, minimize segregation, and will efficiently handle materials.
 4. Deposit concrete into final position within 90 minutes of introduction of cement.
- B. Waterproofing: Crystalline waterproofing powder shall be added to the concrete mix at water features at rate of 3 percent by weight of portland cement content, unless otherwise recommended by manufacturer for mix design.
 1. Waterproofing shall be added to the concrete mix at time of batching.
 2. Thorough blending of the admixture throughout the concrete mix to ensure a homogeneous mixture is obtained.
- C. Minimum ultimate compression strength of concrete at 28 days is as follows:

Item	Strength	Maximum slump	Size of aggregate	Cement (# of 94 lb. sacks per yard)	W/C Ratio
Slab-On-Grade	3,000	4 inches	3/4"-1"	5	0.60
Walls and Footings	3,000	4 inches	3/4"-1"	5	0.60

- D. Adjustment to Concrete Mixes:
 1. Mix design adjustments may be requested by Contractor when job conditions, weather, test results warrant, or to meet appearance of accepted samples or mockup.
 2. Test data for revised mix design shall be submitted to and accepted by Architect before using in work.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Use templates for anchor plates, bolts, inserts and other items embedded in concrete. Accurately secure so that they will not be displaced during placing of concrete.
- B. Piping and Conduit: Do not embed piping, other than electrical conduit at irrigation sleeves, in structural concrete.
 1. Locate conduit to maintain strength of structures at maximum. Verify size, length, and location of electrical conduit.
 2. Provide sleeves for irrigation lines provided under Section 32 84 00 - Irrigation.

- C. Aggregate Base Course: Compact base course to thickness shown on Drawings in accordance with recommendations of the Geotechnical Engineer.

3.02 INSTALLATION OF FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.
 - 1. Forms shall be tight enough to prevent loss of concrete mortar.
 - 2. Wavy surfaces and bulged vertical or slab surfaces in finished work will be rejected.
- B. Ties for exposed concrete surfaces shall be arranged symmetrically and shall be aligned both vertically and horizontally. Do not stagger.
- C. Extend forms for all exposed concrete at least 6 inches below finish grade.
- D. Do not disturb earth at bottoms of excavations for footings or foundations. Maintain these areas free of water, properly cleaned and leveled off.
- E. Assemble forms so that all construction joints appear only as shown on Drawings and as accepted by District's Representative. Incorporate all formwork joints into required reveal and expansion joints. No exposed form joints will be permitted.
- F. Ease all exposed edges, unless otherwise shown on Drawings. Chamfer edges as shown on Drawings.
- G. Thoroughly clean all formwork prior to pouring concrete. Where no form coating is used, wet down all wood.
- H. Place and secure anchorage devices and other embedded items. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
- I. Leave no wood in concrete, except pressure-treated nailers.

3.03 PLACING REINFORCEMENT

- A. Comply with CRSI's "Manual of Standard Practice" and additional requirements for placing reinforcement specified for structural concrete on the Drawings.
- B. Reinforcement shall be free of paint, oil, dirt, scale, or loose rust or coating that might reduce bond with concrete.
- C. When there has been a delay in placing concrete, reinforcement shall be inspected and, if necessary, cleaned, relocated, and tied at no additional cost to District.
- D. Wherever conduits, piping, inserts, sleeves, and similar item interfere with placing of reinforcing steel, obtain District's Representative's approval of method of procedure before concrete is placed.
- E. Securely tie and support reinforcement to prevent displacement by construction traffic and during casting of concrete.
- F. Splices not shown on the Drawings shall be accepted by District's Representative, in writing.
- G. Unless permitted in writing, reinforcement shall not be bent after being partially embedded in hardened concrete.

- H. Dowels shall be tied securely in place before concrete is deposited.

3.04 PLACING OF CONCRETE

- A. Notify District's Representative minimum 5 working days prior to pour.
- B. Preparation:
 - 1. Protect finished surfaces adjacent to areas to receive concrete.
 - 2. Verify that the Project Engineer and City Inspector, if required, have inspected reinforcement.
 - 3. Notify Project Engineer, City Inspector if required, and Contractor's testing laboratory at least two working days before placing concrete.
- C. Placing:
 - 1. Moisten earth, and spray forms and reinforcement with water before placing concrete.
 - 2. Place concrete in continuous operation to permit proper and thorough integration and to complete scheduled placement.
 - 3. Hot-Weather Concreting: Conform to ACI 305 when mean daily temperature rises above 80 degrees F.
 - 4. Use vibrators for thorough consolidation of concrete.
 - a. Provide vibrators at each point of deposit during simultaneous placing to ensure timely consolidation around reinforcement, embedded items, and into corners of forms; ensure availability of spare vibrators in case of failures.
 - b. Do not place vibrators against reinforcement, attach to forms, or use to spread concrete.
 - 5. Distribute concrete in maximum 18-inch layers, unless otherwise accepted.
 - 6. Space points of deposit to eliminate need for lateral flow.

3.05 REMOVING AND REUSING FORMS

- A. Formwork for a given area shall be removed at the same time to enhance uniformity of final appearance.
- B. Formwork that does not support weight of concrete may be removed after cumulatively curing at not less than 50 degrees F for 24 hours after placing concrete provided concrete is hard enough to not be damaged by form-removal operations and provided curing and protection operations are maintained.
- C. Remove forms for exposed concrete so as to avoid damage to finish. Do not use pinch bars and similar tools for prying against exposed surfaces.
- D. Upon removal of forms, remove bolts, wires, and similar metal items not necessary to finished work to minimum 1 inch from surface. Remove them in such a way as to eliminate danger of rust stains from form-tie materials or other unprotected ferrous materials embedded in or adjacent to exposed concrete surfaces.
- E. Re-use of forms will only be permitted as specified. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Apply new form-release agent. Align and secure joint to avoid offsets.

3.06 FINISHING FORMED SURFACES

- A. Rough-Formed Finish on Unexposed Concrete: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched. Remove fins and other projections exceeding ACI 347R.
- B. Formed Finish on Exposed Concrete: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.

1. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch in height.
 2. Finish appearance shall match concrete on Building.
- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.
- D. Adjusting:
1. Remove projecting fins, bolts, wire, nails, and similar items not necessary for the work, or cut them back 1 inch from the surface and patch in an inconspicuous manner.
 2. Immediately after removal of forms, cut off snap ties extending from the face of concrete to at least 1 inch deep in the concrete. Fill or plug as detailed in Drawings.
 3. Remove in its entirety and replace defective concrete work which after corrective patching, rubbing, or similar procedures fail to duplicate the appearance of unpatched work, conform to the standards set forth in these Specifications, or is determined as unacceptable by the District's Representative.

3.07 FLATWORK FINISHING

- A. General:
1. Provide each concrete finish where shown in the Drawings.
 2. Provide samples and mockups as specified of all concrete finishes for review and acceptance prior to pouring concrete.
- B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats.
- C. Trowel Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighthen until surface is free of trowel marks and uniform in texture and appearance.

3.08 EXPANSION JOINTS

- A. General:
1. Provide construction and expansion joints as shown. Where not shown, coordinate locations with the District's Representative.
 2. Form construction and isolation joints and tool edges true to line, with faces perpendicular to surface plane of concrete.
 3. Use only experienced personnel and forms or templates to achieve consistent lines.
- B. Unless noted otherwise on the Drawings, expansion shall be 1/2-inch wide, the full depth of the concrete section and conforming to Section 51 of the Caltrans "Standard Specifications."
1. Extend joint fillers full width and depth of joint.
 2. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
 3. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 4. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 5. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- C. Sealant Filling of Expansion Joints:
1. After the curing period, strip out all depth gauge strips and carefully clean expansion joints.

2. Fill with joint compound in accordance with sealant manufacturer's instructions and ASTM C1193. Avoid spilling compound on adjacent surfaces or overflowing from joint.

3.09 PROTECTION AND CURING

- A. Protection:
 1. Protect concrete against rapid drying and damage by rain.
 2. Keep concrete moist for at least 7 days.
 3. Protect with liquid curing compound, or a covering that will not stain or discolor finished concrete surfaces.
 4. Obtain acceptance of proposed method prior to use.
- B. Curing: Cure concrete in accordance with the ACI Manual of Concrete Practice and all applicable requirements for curing and protection of concrete included in Sections 90-7 and 90-8 of the Caltrans "Standard Specifications."
- C. Integral Color Concrete: Cure colored concrete with only products approved by the manufacturer of the integral color pigments.

3.10 FIELD QUALITY CONTROL

- A. Samples: District's testing agency will take samples for laboratory testing during the course of the work when required by Code. Other specified and required testing shall be by the Contractor's testing laboratory.
- B. Contractor shall pay for full costs of removal of rejected concrete and its replacement with concrete of specified strength and retesting.

END OF SECTION

SECTION 32 33 00

SITE FURNISHINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Site furnishings and installation accessories as shown on the Drawings including, but not necessarily limited to, the following:
 - a. Drinking fountain (pedestal mount)
 - b. Litter Receptacle
 - c. Recycle Bin
 - d. Shade Canopy
 - 2. Site Furnishings Product Matrix.
- B. Related Requirements:
 - 1. Section 01 33 00 – Submittal Procedures
 - 2. Section 32 12 16 - Asphalt Paving
 - 3. Section 32 13 13 – Concrete Paving
 - 4. Section 32 18 13 – Synthetic Turf

1.02 REFERENCES

- A. State of California, Business and Transportation Agency, Department of Transportation (Caltrans) "Standard Specifications."

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Submittal Procedures: Action and Informational Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.
- B. Scheduling and Sequencing:
 - 1. Do not install site furnishings prior to acceptance by Owner's Representative of area to receive items.
 - 2. Coordinate construction timing of installation of site furnishings in conformance with other work interfacing with installation of the site furnishing items.

1.04 ACTION SUBMITTALS

- A. Shop Drawings: Submit complete shop drawings for all materials or furnishings requiring field or shop fabrication.
- B. Product Data: Manufacturer's catalog cut sheets of materials and equipment to be provided.
 - 1. Include the manufacturer and distributor name, and subcontractor as applicable.
 - 2. Cut sheets clearly describe the specific product by catalog number and that additional non-specified products that may appear on the same cut sheet are crossed out where applicable.
- C. Samples: Colors and finishes for products and furnishings requiring selection by the Owner's Representative.

1.05 INFORMATIONAL SUBMITTALS

- A. Statement of qualifications for manufacturers and installer if requested by the Owner's Representative.

1.06 CLOSEOUT SUBMITTALS

- A. Provide operation and maintenance data for items with operable, movable, or replaceable parts, for items with mechanical connections, and for other items as applicable.
- B. Extended warranties as specified.

1.07 QUALITY ASSURANCE

- A. Furnishings shall be reviewed for conformance with the intent of the Contract Documents and accepted by the Contractor prior to installation.
- B. Site furnishings shall be in a new, "first-class" condition as determined by the Owner's Representative at the time of Final Acceptance.
- C. Field Samples and Mockups: As requested by the Owner's Representative.

1.08 DELIVERY, STORAGE AND HANDLING

- A. General:
 - 1. The Contractor is responsible for coordination of the delivery, acceptance, handling and storage of site furnishings.
 - 2. Store and handle site furnishings as acceptable to the Owner's Representative and so that work or access of others is not impeded.
 - 3. Protect site furnishings from theft or damage until such items have been accepted by the Owner.
- B. Packaging and Labeling: Furnish materials in manufacturer's unopened, original packaging, bearing original labels showing quantity, description and name of manufacturer. Verify that materials and components are adequately padded and securely bound in such a manner that no damage occurs to the product during delivery and unloading at the site.
- C. Storage: Damaged materials will be rejected. Remove damaged materials from job site immediately, and pay cost of replacement. Determination of damage shall be the sole authority of the Owner's Representative.
- D. Painted Finishes: Provide non-scratching, non-staining, firmly-bound covering for shop-painted finishes until installed and accepted.
- E. Protect wood materials from stains.

1.09 WARRANTY

- A. Manufacturers: Provide Owner with manufacturer's written extended product warranties as available for the specified products.

PART 2 - PRODUCTS

2.01 SITE FURNISHINGS - GENERAL

- A. In addition to those described in the following Articles, refer to the Site Furnishing Matrix included at the end of this Section for complete list of items to be provided.

2.02 WASTE AND RECYCLING RECEPTACLES

- A. Product and Manufacturer: Powder coated aluminum; WS-303 by Wausau Made. as specified, or equal.
 - 1. Size: 31 gallon.
 - 2. Opening: Top opening.
 - a. Waste Receptacle: 22" funnel with hood
 - b. Recycle Receptacle: 22" funnel with hood, with recycle logo signage on top of hood
 - 3. Colors:
 - a. Trash Receptacle: Powder-coated Maize yellow
 - b. Recycle Receptacle: Powder-coated Black
 - 4. Quantity: See Drawings.
 - 5. Mounting: Surface mount, see drawings.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Prior to commencement of work described in this Section, carefully inspect installed work, and verify all such work is correct and complete. Immediately notify the Owner's Representative of any discrepancy before proceeding with work.

3.02 INSTALLATION - GENERAL

- A. Conform to layout shown on Drawings. Final placement shall be field verified with the Owner's Representative.
- B. Installation of products shall be as shown in the Drawings, or according to manufacturer's instructions. If discrepancies are found, or if information is lacking, consult with the Owner's Representative prior to beginning the work.
- C. Install products level and plumb in accordance with manufacturer's instructions at locations indicated on the Drawings.
- D. Concrete footings shall conform to requirements of Section 32 32 15 – Landscape Concrete unless noted otherwise.
- E. Furnish anchorage and fastening required for installation to ensure proper fit and accurate placements. Bolts, where exposed, shall be cut back to within three threads of the nut.

3.03 CLEANING AND ADJUSTMENT

- A. Protect furnishings from damage until acceptance of work. Do not remove protective wrappings from furnishings until so instructed by the Owner's Representative.

- B. Clean soiled site furnishings prior to acceptance by Owner.
- C. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by the Owner's Representative.
- D. Replace damaged items to the satisfaction of the Owner's Representative. Replace missing accessories at no cost to Owner.

3.04 SITE FURNISHINGS MATRIX

ITEM	DESCRIPTION	MANUFACTURER	MODEL NO.	QTY.	FINISH/COLOR	DISTRIBUTOR/CONTACT
A.	Drinking Fountain	Most Dependable	10145 SMFA w/ recessed hose bib	2	TBD	Most Dependable Fountains angela@mostdependable.com (800) 552-6331
B.	Litter Receptacle	Wausau Made	Model WS 303 – Powder coated Top Opening, Surface Mount, Signage, Locking lid	Per Plans	Maize Yellow	Wausau Made Shelly Janda (707) 374-4015
C.	Recycle Bin	Wausau Made	Model WS 303 – Powder coated, Top Opening, Surface Mount, Signage, Locking lid	Per Plans	Black	Wausau Made Shelly Janda (707) 374-4015
D.	Shade Canopy	USA Shade	See PC drawings	3	See PC drawings	USA Shade Erik Anslinger (408) 478-1646

END OF SECTION

SECTION 32 36 00

LANDSCAPE DECORATIVE METAL

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
1. The following exterior ornamental metal work:
 - a. Guardrails and handrails including:
 - 1) Drinking Fountain Rails.
 - b. Fences and gates including:
 - 1) Ornamental Iron fences and gates.
 - c. Other miscellaneous ornamental metal as shown on the Drawings.
 2. Finish hardware for gates.
 3. Shop applied coatings for decorative metal items.
- B. Related Requirements:
1. Landscape Concrete: Section 32 32 15; foundations for decorative metal items.
 2. Finish Hardware: Section 08 71 00; gate hardware
 3. Exterior Site Painting: Section 09 91 15; field applied coatings.

1.02 REFERENCES

- A. American Institute of Steel Construction (AISC):
1. "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings," including "Commentary on the AISC Specification."
- B. American Society for Testing and Materials (ASTM):
1. A36/A36M: "Specification for Carbon Structural Steel."
 2. A47/A47M: "Specification for Ferritic Malleable Iron Castings."
 3. A48/A48M: "Specification for Gray Iron Castings."
 4. A53/A53M: "Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless."
 5. A167: "Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate Sheet and Strip."
 6. A176: "Specification for Stainless and Heat-Resisting Chromium Steel Plate, Sheet and Strip."
 7. A240/A240M: "Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications."
 8. A276: "Specification for Stainless Steel Bars and Shapes."
 9. A307: "Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength."
 10. A492: "Specification for Stainless and Heat-Resisting Steel Rope Wire."
 11. A500/A500M: "Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes."
 12. B26/B26M: "Standard Specification for Aluminum-Alloy Sand Castings."
 13. B247: "Standard Specification for Aluminum and Aluminum-Alloy Die Forgings, Hand Forgings, and Rolled Ring Forgings."
 14. C864: "Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers."
 15. A1008/A1008M-09: "Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable."
 16. C1107/C1107M: "Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)."

17. D6386-10: "Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting."
 18. D7396-08: "Standard Guide for Preparation of New, Continuous Zinc-Coated (Galvanized) Steel Surfaces for Painting."
 19. E350-95(2005)e1: "Standard Test Methods for Chemical Analysis of Carbon Steel, Low-Alloy Steel, Silicon Electrical Steel, Ingot Iron, and Wrought Iron."
- C. American Architectural Manufacturers Associates (AAMA):
1. CW-12: Structural Properties of Glass."
 2. 2605: "Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels."
- D. American National Standards Institute (ANSI) /American Welding Society (AWS):
1. ANSI/AWS D1.1/D1.1M: "Structural Welding Code."
 2. ANSI/AWS D1.3/D1.3M: "Structural Welding Code - Sheet Steel."
- E. Industrial Perforators Association (IPA):
1. "Designers, Specifiers and Buyers Handbook for Perforated Metals"
- F. National Association of Architectural Metal Manufacturers (NAAMM)
1. Architectural Metal Products Division (AMP): AMP 500-06, "Metal Finishes Manual for Architectural and Metal Products."
- G. SSPC: The Society for Protective Coatings (SSPC) "Painting Manual":
1. Surface Preparation Specifications:
 - a. SSPC-SP 3: "Power Tool Cleaning."
 - b. SSPC-SP 6: "Commercial Blast Cleaning."

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Submittal Procedures: Action and Informational Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.
- B. Coordination:
1. Coordinate installation of anchorages. Furnish setting drawings, diagrams, templates, and directions for installing anchorages, including sleeves, inserts, anchor bolts, and items with integral anchors, to be embedded in concrete and masonry.
 2. Coordinate with other Sections to ensure proper drainage and watertight interface with adjacent construction.
 3. Coordinate sequence of installation with Sections whose work adjoins decorative metalwork.

1.04 DESIGN AND PERFORMANCE REQUIREMENTS

- A. Industry Standards:
1. General: Decorative metal shall conform to the recommended practices of the Architectural Products Division (AMP) of the National Association of Architectural Metal Manufacturers (NAAMM), Section 10 of the AISC Code of Standard Practice, and the additional requirements of this Section.
 2. Railings and guardrails shall comply with the "Metal Rail Manual" of National Ornamental and Miscellaneous Metals Association (NOMMA).
- B. If modifications to designs indicated are proposed in order to meet code requirements, indicate them as such on shop drawing submittals. Work with Architect to arrive at an acceptable design that is sufficiently similar to the design indicated.
- C. Design exterior decorative metal items to drain properly, to be watertight where appropriate, and for watertight connection to adjacent construction.

- D. Structural Performance of Railing Assemblies, Handrails, and Guardrails:
1. General:
 - a. Stainless Steel: In engineering stainless steel railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on 60 percent of minimum yield strength.
 - b. Glass: 25 percent of mean modulus of rupture (50 percent probability of breakage), as listed in "Mechanical Properties" in AAMA's Aluminum Curtain Wall Series CW-12, "Structural Properties of Glass."
 2. Handrails and Top Rails of Guardrails:
 - a. Uniform load of 50 lbf/ft applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 3. Infill of Guardrails:
 - a. Concentrated load of 50 lbf applied horizontally on an area of 1 square foot.
 - b. Infill load and other loads need not be assumed to act concurrently.
- E. Regulatory Requirements:
1. Comply with the Americans with Disabilities Act (ADA) Design Guidelines.
 2. Comply with the CBC and other applicable State and local codes and regulations.
- F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
- G. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
- H. Design interface and connections to existing work in such a way as to minimize damage and defacement to existing construction.

1.05 ACTION SUBMITTALS

- A. Shop Drawings:
1. Prepare and submit large-scale drawings for fabrication and erection of assemblies not completely shown by manufacturer's product data.
 - a. Shop drawings are specifically required for the following:
 - 1) Ornamental Iron fences and gates at Pool
 - 2) Drinking fountain rails
 - b. Include, as appropriate, plans, elevations, complete details, thicknesses, sizes, types, grades, classes of metal, connecting and joining methods, anchorages.
 - c. Show required field measurements and interface with work of other Sections.
 - d. Welds, both shop and field, shall be indicated by AWS "Symbols for Welding, Brazing and Nondestructive Examination," A2.4.
 - e. Indicate all required field measurements.
 2. Provide setting drawings, templates, instructions, and directions for installation of base plates and anchorage devices.
 3. Coordinate with shop drawing requirements of other Sections whose work adjoins exterior decorative metalwork.
 4. Provide shop drawings for specified mockups.
- B. Product Data: Manufacturer's specifications and installation instructions for manufactured products to be used in the fabrication of work, including manufactured railings, shop-applied paint products, and hardware.
- C. Samples:
1. Exposed metals in selected finishes, 12 inches or 12 inches long as applicable.

2. Each type of exposed fastener or hardware.
3. Samples of products involving selection of color, texture, or design including mechanical finishes.
4. For custom castings, submit finished samples showing ability to reproduce detail, cast-metal color, and quality of finish. Samples may be of similar previous work.
5. Additional samples as requested by the District's Representative.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualifications as specified.
- B. Welding:
 1. Statement of qualifications for fabricator, installer, and welders.
 2. Completed "Procedure Qualification Record" (PQR) and "Welding Procedures Specification" (WPS) forms for the welds to be performed under this Section.
- C. Delegated-Design: Prepare and submit shop drawings and engineering calculations for railings, guardrails, and ornamental fence to verify compliance with performance and design criteria, and acceptance by the authorities having jurisdiction.
 1. Indicate dimensions, profiles and framing member sizes, anchorage, size and type of fasteners.
 2. Drawings and calculations shall be signed and sealed by the engineer in responsible charge retained by the Contractor. Engineer shall be a California licensed civil or structural engineer.
 3. Although all calculations shall be submitted, review of calculations by District's Representative will not relieve Contractor of any responsibilities for providing systems of required strength.
- D. Galvanizing: Proposed methods of cleaning and profiling surfaces. Include methods for each decorative item.

1.07 QUALITY ASSURANCE

- A. Fabricator/Installer Qualifications: Documented experience in fabrication and installation of decorative metal similar to that indicated for this Project, and with a record of successful in-service performance.
- B. Organic-Coating, Powder Coating, Applicator Qualifications: A firm experienced in successfully applying coatings of type indicated and employing competent control personnel to conduct continuing, effective quality-control program to ensure compliance with requirements.
- C. Welder Qualifications: Certified and qualified in accordance with procedures specified in American Welding Society Standard in accordance with AWS D1.1, using procedures, materials, and equipment of the type required for the work.
- D. Welding procedures and operations shall comply with AWS B2.1, "Standard for Welding Procedure and Performance Qualifications." Comply with AWS publication "Welding Zinc Coated Steel" for galvanized products.
- E. Mockups: As requested by District's Representative.
 1. Provide a full-size mockup of each type or installation condition of the following items for review and approval by District's Representative:
 - a. Handrails: Assembled section of central and end post to include 12 inches of top rail and 12 inches of post.
 - b. Guardrails: One complete section, post to post.
 - c. Gates.
 - d. Fencing.
 2. Include all required anchorages and fasteners.
 3. Mockups shall not be fabricated until submittals, including metal samples, have been submitted and approved.
 4. Each mockup shall consist of a typical assembly in specified finish, complete with mounting devices.

5. Specified sizes shall be increased if necessary to demonstrate workmanship, welding, and visual effect of completed assembly.
6. If requested by District's Representative, make modifications to mockups without additional charge to District.
7. If approved by District's Representative, install or leave mockup on Project as directed.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Store decorative metal in a protected location on site until ready for installation. Protect from uncured concrete and from soiling and abrasion.

1.09 FIELD CONDITIONS

- A. Where decorative metal is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on shop drawings.

PART 2 - PRODUCTS

2.01 METAL MATERIALS

- A. General: Provide metals free from surface blemishes where exposed to view in finished unit. Exposed-to-view surfaces exhibiting pitting, seam marks, roller marks, stains, discolorations, or other imperfections on finished units are not acceptable.
- B. Steel: Provide in form indicated, to comply with the following requirements:
 1. Plate, Shapes, and Bars: ASTM A36.
 2. Sheet: Commercial-quality, cold-rolled, stretcher-leveled, carbon-steel sheet complying with ASTM A1008, Class I, matte finish.
 3. Tubing: Cold formed, ASTM A500.
 4. Pipe: ASTM A53, Grade B, Schedule 40.
 5. Gray-Iron Castings: ASTM A48, Class 30.
 6. Malleable-Iron Castings: ASTM A47, grade as recommended by fabricator for type of use indicated.
 7. Wrought Iron: Low carbon alloy (less than 0.035 percent), malleable iron with good tensile strength and suitable for shaping and hammering as required by fabricator for use indicated.
- C. Weathering Steel: ASTM A588; USS "Cor-Ten" or equal.
- D. Stainless Steel:
 1. Alloy: Type 316, unless otherwise indicated or specified.
 2. Sheet and Plate: ASTM A167 or A240.
 3. Bars: ASTM A276.
 4. Tubing for Railings and Guardrails: ASTM A554.
 5. Finish: American Iron and Steel Institute (AISI) No. 4 or Euro Inox 2k, satin directional brushed, unless otherwise noted. See Drawings for direction of polish.
- E. Galvanized-Steel Sheet: Commercial Quality, ASTM A653.
 1. Coating Designation: G90.
 2. Thickness: As required by SMACNA for specific conditions and as indicated.
- F. Aluminum:
 1. Sheet: ASTM B209.
 2. Pipe: Schedule 40.
 3. Extrusions: ASTM B221, alloy 6063-T5. Provide high-strength 7000 Series alloy at locations required to meet specified performance criteria and where noted.

4. Die and Hand Forgings: ASTM B247/B247M, Alloy 6061-T6.
5. Castings: ASTM B26/B26M, Alloy A356.0-T6.
6. Finish: As scheduled and noted.

2.02 GATE HARDWARE

- A. Swing Gates:
1. Hinges: Refer to Section 08 71 00 – Finish Hardware
 2. Self-closing Hinges:
 - a. For gates up to 330 lbs and 5-feet wide: Heavy-duty self-closing hinge with hydraulic damping, ADA compliant (requiring maximum 5 lbs of operating force per CBC 11B-309.4); Locinox Mammoth Heavy Duty “Mammoth180” or accepted equal.
 - b. For gates up to 440 lbs and 6 and ½ -feet wide: Heavy-duty self-closing hinge with hydraulic damping, ADA compliant (requiring maximum 5 lbs of operating force per CBC 11B-309.4); Locinox Mammoth Ultra Heavy Duty “Mammoth-HD” or accepted equal.
 3. Door Hardware: Refer to Section 08 71 00 – Finish Hardware

2.03 ADDITIONAL MATERIALS AND COMPONENTS

- A. Mesh Infill: By McNichols
1. 24 gage perforated metal panel with 3/32” holes at 3/16” staggered centers, hemmed edges.
 2. Finish to match ornamental gate and hardware.
- B. Fasteners: As shown and as selected by fabricator. Indicate exposed fasteners on shop drawings.
1. Use fasteners of same basic metal as fastened metal, except as otherwise indicated or specified.
 2. Do not use metals that are corrosive or incompatible with materials joined.
- C. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, non-staining, noncorrosive, nongaseous; Sonneborn “SonogROUT 10K” or equal complying with ASTM C1107.
- D. Manufactured Picket Fence: “AllGuard” by Capitol Steel Products or equal.
1. Pickets: 1 inch x 1 inch x 0.095 wall tubular steel, with 3RL curve top panel, height and spacing as shown on plans.
 2. Rings: 3” diameter x 5/8” x 5/16” flat bar solid rings
 3. Horizontal Rails:
 - a. 2” x 1” x 1/8” punched channel top rails
 - b. 2” x 2” , 0.095 wall bottom rail.
 4. Posts: per plans
 5. Factory Finish: Black primer and paint, as specified in Section 09 91 15 – Exterior Site Painting.
 6. Coordinate with Section 2.02, “Gate Hardware,” for operating hardware and for proper fit and operation of security system at fence and gate.

2.04 FABRICATION - GENERAL

- A. Comply with AWS for recommended practices in shop welding and brazing.
- B. Mill joints to a tight, hairline fit. Cope or miter corner joints. Form joints exposed to weather to exclude water penetration.
- C. Mechanical field connections for railings, gates, and fencing shall be with countersunk screws, sleeves, or routed lapped members. Applied clips, angles, and non-flush fasteners are not acceptable.
- D. Provide weep holes where water may accumulate. Locate weep holes in inconspicuous locations.
- E. Finish exposed surfaces to smooth, sharp, well-defined lines and arris.

- F. Welding and Brazing: Comply with AWS-recommended practices.
 - 1. Exposed welds shall be continuous.
 - 2. Welds, burrs, roller marks, seams, and rough surfaces shall be ground neat and smooth. Mill markings shall be completely removed.
 - 3. Gouges, dents, and other surface abuse shall be filled and ground smooth.
 - 4. Weld and braze behind finished surfaces without distorting or discoloring exposed side.
 - 5. Remove flux from exposed welded and brazed joints. Dress exposed and contact surfaces.

2.05 GALVANIZING

- A. Provide zinc coating for ferrous steel by the hot-dip process after fabrication.
 - 1. Comply with ASTM A153 for galvanizing of iron and steel hardware.
 - 2. Comply with ASTM A123 for galvanizing of assembled steel products and rolled, pressed, and forged-steel shapes, plates, bars, and strips 1/8 inch thick and heavier.
- B. Minimum Cleaning Requirements Prior to Galvanizing: In accordance with SSPC Specification SP-10, "Near White Blast Cleaning."
- C. Newly galvanized items shall not be water quenched or chromate quenched after galvanizing.

2.06 PROTECTIVE PAINT COATINGS

- A. General:
 - 1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 2. Corrosion Control: Prevent galvanic action and other forms of corrosion by insulating metals from direct contact with incompatible materials.
 - 3. Decorative metals shall be spray finished in shop to the greatest extent possible. Where not shop finished, field finish painting shall conform to requirements of Section 09 90 00, "Painting and Coating."
 - 4. Finish exposed fasteners to match adjacent metal.
- B. Products:
 - 1. Shop Primers and Finish Paints: As specified under each coating system.
 - 2. Galvanizing-Repair Paint: Minimum 82 percent zinc-dust-content paint for regalvanizing welds in galvanized steel, complying with FS DOD-P-21035a; Z.R.C. Cold Galvanizing Compound by ZRC Worldwide, International Protective Coatings, or approved equal.
- C. Galvanized Surfaces:
 - 1. Surfaces shall be cleaned and profiled prior to receiving applied coatings.
 - a. Methods shall be selected based on age of galvanized coating, condition of surface and intended paint coating.
 - b. High spots and rough edges shall be smoothed out.
 - c. Care shall be taken not to damage the zinc coating.
 - 2. Repair galvanized coating damaged after fabrication during handling, installation, or welding. Use specified repair paint in accordance with ASTM A780, AGA publication, "Recommended Practice for Touch-up of Damaged Galvanized Coatings," and manufacturer's recommendations for application of repair paint.
 - 3. Comply with the additional recommendations included in the AGA document "Duplex Systems: Painting Over Hot Dip Galvanized Steel," and ASTM D6386.
- D. Shop-prime work to the greatest extent possible, except surfaces and edges to be field welded.
- E. High-Performance Powder Coating on Galvanized Steel: Shop spray-applied Commercial grade polyester resin-based thermosetting powder coat; Series 28 High Performance Architectural Coating by Tiger Drylac, or equal.

1. Prepare, treat, and coat galvanized metal to comply with resin manufacturer's written instructions and as follows:
 - a. Treat prepared metal with zinc-phosphate pretreatment, rinse, and seal surfaces.
 - b. Apply thermosetting polyester powder coating with cured-film thickness not less than 1.5 mils per coat.
 - c. Number of Coats: Two, to achieve a total DFT of 3.5 to 5.0 mils on edges and corners.
 2. Color: Solid, standard or custom, as selected by District's Representative.
 3. Gloss: As scheduled or selected by District's Representative.
- F. Field-Applied Finish Coatings: As specified in Section 09 91 15 – Exterior Site Painting.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install metal work as shown on the Drawings in accordance with reviewed submittals.
- B. Perform cutting, drilling, and fitting required for installation.
- C. Set work accurately in location, alignment, and elevation; plumb, level, true, and free of rack; measured from established lines and levels.
- D. Field Welding: Comply with applicable AWS specification for procedures of manual shielded metal arc welding, for appearance and quality of welds, and for methods used in correcting welding work. Grind exposed welded joints smooth.
- E. Erection Tolerances:
 1. Maximum Variation from Plumb: 1/4 inch.
 2. Maximum Misalignment from True Position: 1/4 inch.
- F. Repair galvanizing and shop-applied coatings to match finish of adjacent surfaces.

END OF SECTION

SECTION 32 80 00

IRRIGATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Landscape irrigation system work is shown on the Drawings including, but not necessarily limited to, the following:
 - 1. Water supply to irrigation system.
 - 2. Water backflow prevention system.
 - 3. Automatic irrigation controls and systems.
 - 4. Line voltage connections to the irrigation controllers and low voltage control wiring from controllers to remote control valves.

- B. Work Included Under Other Sections:
 - 1. Irrigation water stub-out.
 - 2. Irrigation sleeves.

- C. Related Requirements:
 - 1. Section 31 01 90 - Landscape and Site Maintenance
 - 2. Section 31 23 00 - Excavation and Fill
 - 3. Section 32 90 00 - Planting
 - 4. Section 33 11 00 - Domestic Water Utilities

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. D1785 - Standard Specifications for (PVC) Plastic Pipe, Schedules 40 and 80.
 - 2. D2241 - Standard Specifications for PVC Pressure-Rated Pipe (SDR Series).
 - 3. D2564 - Standard Specifications for Solvent Cements for (PVC) Plastic Pipe and Fittings.
 - 4. F2768 - Standard Specification for Modified Stub ACME Thread Joint with Elastomeric Seal in Plastic Piping Components.
 - 5. D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets.
 - 6. F512 - Standard Specification for Smooth-Wall Poly(Vinyl Chloride) (PVC) Conduit and Fittings for Underground Installation.
 - 7. D2672 - Standard Specification for Joints for IPS PVC Pipe Using Solvent Cement.

- B. National Sanitation Foundation (NSF), requirements for Seal of Approval.

- C. Plastics Pipe Institute (PPI), recommendations for hydrostatic design stresses for PVC pipe.

- D. State of California, Business and Transportation Agency, Department of Transportation (Caltrans) "Standard Specifications."

- E. Permits and Fees: Contractor is responsible to obtain all required permits and pay all associated fees unless otherwise noted.

- F. Irrigation Association/American Society of Irrigation Consultants, Landscape Irrigation Best Management Practices, 2014 edition.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Substitutions for specified products shall be submitted for approval in accordance with Section 01 25 00 – Substitution Procedures.
- B. Submittal Procedures: Action and Informational Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.
- C. Coordination, Sequencing, and Scheduling:
 - 1. Contractor shall be solely responsible for coordinating, sequencing and scheduling work with applicable trades and subcontractors so as to ensure proper and timely installation of the irrigation system.
 - 2. The entire irrigation system shall be under full automatic operations for a period of two days prior to beginning of planting. Coordinate with Section 32 90 00 – Planting.
- D. Permits and Fees: Contractor is responsible to obtain all required permits and pay all associated fees unless otherwise noted.

1.04 ACTION SUBMITTALS

- A. Shop Drawings: A diagrammatic drawing of proposed mainline route and equipment locations for approval by the District's Representative. The Drawings may be marked and used for marking layout and equipment locations.
- B. Product Data: Manufacturer's literature or cut sheets of products specified and to be incorporated into the irrigation system. Specific products being submitted shall be highlighted or shown on boxes on cut sheets to designate which items are being submitted. Submittals not marked appropriately will be rejected.
- C. Materials List: Prior to installation, submit a materials list. Include manufacturer, model number, and description of all materials and equipment. List shall also include sealants, cements, lubricants and other proprietary items.

1.05 CLOSEOUT SUBMITTALS

- A. Record Drawings as specified.
- B. Maintenance equipment as specified.
- C. Warranties and Guarantees

1.06 RECORD DOCUMENTS

- A. Comply with Section 01 78 39 – Project Record Documents.
- B. Accurately record locations of all piping and equipment that varies from what is shown on the Drawings. Locations are to be clearly dimensioned horizontally to within 1 foot and vertically to within 0.5 feet from a hardscape edge or permanent site feature.
 - 1. The valve size, station number and gallons per minute shall be legible at each valve and shall match how the controller is wired.
 - 2. Additionally, each valve shall be annotated to describe which type of irrigation it is; rotor, rotator, spray, bubbler, drip tubing or other.
 - 3. Symbols for valves shall be annotated as: meter (M), backflow preventer device (BFP), master valve (MV), flow sensor (FS), hydrometer (H), quick coupler valve (QCV), where applicable.

- C. Contractor shall record and scan and submit PDF files of full size plan set of Record Drawings (As-builts Drawings) to the District's representative, and two sets of color coded plans shall be produced, one for placement at or within the irrigation controller cabinet reduced to 11" x 17", and one full size set for submittal to the District or stored at another location selected by the District's Representative.
 - 1. Both sets shall have all the irrigation valve zone lateral lines color-coded so as to readily distinguish between adjacent zones.
 - 2. The color-coded copies shall then be professionally laminated in minimum 5 mil clear plastic.

1.07 QUALITY ASSURANCE

- A. Unless otherwise specified, install all materials in accordance with manufacturer's details, specifications and recommendations.
- B. The Contractor shall be responsible to assure the irrigation installer personally or through an authorized and competent representative, supervises the work and retains the same supervisor on the job from commencement to completion.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Store PVC pipe in a neat and orderly manner fully supported and protected from sunlight.
- B. Equipment and materials shall be delivered, unloaded and handled so as to protect from damage at all times.

1.09 FIELD CONDITIONS

- A. PVC shall not be cemented during wet conditions at the discretion of the District's Representative.
- B. Trench excavation and backfilling shall not be performed during excessively wet conditions at the discretion of the District's Representative.
- C. Water Supply: Connections to, or the installation of, the water supply shall be at the locations shown on the Drawings. Minor changes caused by actual site conditions shall be made at no additional expense to District.
- D. Discrepancies: In the event of discrepancy, immediately notify the District's Representative. Do not proceed with installation or irrigation components or system in areas of discrepancy until discrepancies have been resolved.

1.10 MAINTENANCE EQUIPMENT

- A. Turn-over Materials: Provide 1 each of the following to the District's Representative:
 - 1. One quick coupler attachment key equipped with standard thread hose bib for each 5 quick couplers installed on the project.
 - 2. One key for locking quick coupler covers for each 5 quick coupler valves installed on the project.
 - 3. One key for hose bib operation for each 5 hose bibs installed on the project.
 - 4. One set of keys to irrigation controller and other installed locking cabinets or pedestals.
- B. Full set of remaining nozzles for each rotor sprinkler.

1.11 GUARANTY

- A. Contractor: Provide District with a separate written guaranty for the entire irrigation system against defects in installation, workmanship and equipment, for a period of 1 year from the date of Final Acceptance.

- B. Contractor shall make necessary repairs to the system as well as to other work affected by defects in the system during guaranty period. Repairs shall be made at the Contractor's sole expense.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Use only new materials of brands shown on Drawings, specified herein or as acceptable to the District's Representative.

2.02 PIPE

- A. General:
 - 1. Plastic pipe shall be extruded of an improved PVC virgin pipe compound in accordance with ASTM D2672, ASTM D2241 or ASTM D1785.
 - 2. Pipe shall be marked continuously with manufacturer's name, nominal pipe size, schedule or class, PVC type and grade, National Sanitation Foundation approval, Commercial Standards designation, and date of extrusion.
- B. Plastic Pipe: Polyvinyl chloride PVC (Type I) 1120.
 - 1. Intermittent-Pressure Lateral Piping: 1120-Schedule 40 PVC plastic pipe with Schedule 40, Type 1, Grade 1, PVC solvent weld fittings.
 - 2. Constant-Pressure Mainline Piping 2 inches and Smaller: Schedule 40 with solvent weld fittings.
 - 3. Constant-Pressure Mainline Piping 2-1/2 Inches and larger: Class 200 SDR-21 or 2-1/2" to 3" Class 315 SDR-14, if requested by District, or C900 Class 200 DR-14, if the system is using recycled or well water.
 - 4. Constant-pressure mainline piping 4 inches and larger shall be Class 200 PVC ring-tite with IPS ductile iron fittings and mechanical restraints at all bell fittings and fittings at changes in direction.
 - 5. Constant-pressure mainline piping 3 inches and larger on systems with booster pumps shall be Class 200 PVC ring-tite with IPS ductile iron fittings and mechanical restraints at all bell fittings and fittings at changes in direction.
 - 6. If the system is operated with recycled water, PVC pipe shall be "Purple Pipe."

2.03 FITTINGS

- A. PVC Fittings: Polyvinyl chloride (Type I) plastic 1120, Schedule 40 or Schedule 80 where noted on the Drawings.
- B. PVC Nipples: Polyvinyl chloride (Type I) plastic 1120, Schedule 80.
- C. Joint Restraint for Ductile Iron Fittings: Shall be manufactured of ductile iron per ASTM A536. Gripping surfaces shall be machined serrations. As cast gripping surfaces are not permitted.
 - 1. Sizes 1 1/2" to 4": Joint Restraint shall be Knuckle Restraint by The Harrington Corporation or approved equal. Grip Ring shall be one piece residing within a housing that engages the fitting lugs. Grip Ring shall be activated by one bolt.
 - 2. Sizes 4" to 12": Joint Restraint shall be Clam Shell Restraint by The Harrington Corporation or approved equal. Restraint shall not require separate restraining rods. The pipe gripping structure and fitting connection structure shall be integral and one piece.
 - 3. Flange Bolts are to be 316 Stainless Steel.
 - 4. Reductions on Tees: Reducing on Run and/or Branch Tee's shall be such that the size of the "main body" is that of the largest leg of the tee.
 - 5. Butt Fusion Fittings:
 - a. Molded butt fusion fittings shall be DR 11 per ASTM D3261.
 - b. Fabricated butt fusion fittings shall be per AWWA C906

- c. Fabricated Tee's and Elbows shall be of DR 9 pipe with ends machined to DR 11.
 - d. Tee's and 90 Degree Bends shall be 3 Segment.
 - e. 45 Degree Bends and bends of lesser angle shall be 2 Segment
 - f. Reducers shall be of DR 11 pipe with ends DR 11.
 - g. Reducers shall be of the "swage reducer" style.
 - h. Branch Saddle Reducing Tees shall be DR 11 pipe and DR 11 Branch Saddles with ends DR 11.
 6. Socket Fusion Fittings are permitted on 2" and smaller lines and shall be DR 11 or "stronger" per ASTM D2683
 7. Polypropylene Compression Fittings: Are permitted on 2" and smaller lines. They must be suitable for use on HDPE pipe per ASTM D3035 (IPS diameter, OD controlled). Fittings shall be long term rated for 230 psi complying with ISO 14236 and meet the dimensional and performance requirements of AWWA C800. Fitting "Bodies" shall be Polypropylene. Fitting "Compression Nuts" shall be Acetal. Joint seal activation shall be accomplished solely by the Compression Nut. Joint "Seals" shall not "interfere" with pipe insertion. No bevelling or lubrication of pipe shall be required. Fitting components shall not require dismantling prior to assembly on to pipe. Compression fittings shall be Phimac or approved equal.
 8. Polypropylene Compression Fittings with Female Acme outlets: Philmac service tees and service elbows with 1 1/2" Female Acme thread outlets shall serve compatible swing joint serving irrigation sprinkler heads.
 9. Electrofusion Fittings including Electrofusion Couplings, Electrofusion Branch Saddles, Electrofusion x FNPT Saddles, and Electrofusion Swivel Saddles shall be DR 11 per ASTM F1055. Electrofusion Swivel Saddle shall be as manufactured by The Harrington Corporation or approved equal.
 10. Flange Adapter Systems:
 - a. Flange adapters shall be molded or machined from stock and be SDR 11 complying with ASTM F2880.
 - b. Back Up Rings shall be Ductile Iron per ASTM A536 and DR 11.
 11. Accessories shall be 1/8" Neoprene Gaskets and Grade 5 or stronger, zinc plated Cap Screws or Threaded Rod and Nuts.
 12. Threaded Transitions: HDPE x MNPT Brass or Stainless Steel transitions shall be DR 11. Brass shall be red brass. Stainless Steel shall be grade 304.
 13. Flange Bolts are to be 316 Stainless Steel.
- D. PVC fittings used with UVR pipe shall be Schedule 40 UVR PVC type.

2.04 BACKFLOW PREVENTER

- A. Device: As specified on Drawings.
- B. Enclosure: Low profile, vandal-resistant; "Strongbox" Model series SBBC-CR powder coated cold-rolled steel or stainless steel Model series SBBC-SS by V.I.T. Products, Inc., or equal.
 1. Enclosure size to be verified with size of installed backflow device by Contractor.
- C. Insulation Blanket: "WeatherGaurd Blanket" by Best Choice USA, or equal.

2.05 VALVES AND SENSORS

- A. General:
 1. Each valve shall be installed with unions before and after the valve.
 2. Control Valves shall be labeled with tags denoting the associated controllers and station numbers.
 3. Gate Valves and Ball Valves:
 - a. Valves shall have a minimum working pressure of not less than 150 psi and shall conform to AWWA standards.
 - b. Provide purple tags on all valves if system is designed for recycled water.
- B. Gate Valves and Ball Valves: As specified on Drawings.

- C. Remote Control Valves: As specified on Drawings.
- D. Quick Coupling Valves: As specified on Drawings. Provide purple lid if system is designed for recycled water.
- E. Drain Valves:
 - 1. Drain Valves shall be 2" Nibco T113 or approved equal.
- F. Isolation Valves for Air/Vacuum Relief
 - 1. Isolation valves for air/vacuum relief shall be bronze ball valves.

2.06 CONCRETE VALVE BOXES

- A. General:
 - 1. Manufacturer: Christy as specified and the basis of design, or equal.
 - 2. Valve Boxes shall have bolt down type lids with locking where specified.
- B. Ball Valves, Round:
 - 1. Valves 1 Inch and 1-1/2 Inches: Model equivalent to Christy G05 with G05CT locking lid.
 - 2. Valves 2 Inches and Larger: Model equivalent to Christy G12 with G12C lid for valves.
 - 3. Boxes shall be labeled as "Irrigation – BV" on lid.
- C. Gate Valves, Round:
 - 1. Valves 1 Inch and 1-1/2 Inches: Model equivalent to Christy G05 with G05CT locking lid.
 - 2. Valves 2 Inches and Larger: Model equivalent to Christy G12 with G12C lid for valves.
 - 3. Boxes shall be labeled as "Irrigation – GV" on lid.
- D. Remote Control Valves, Rectangular:
 - 1. Valves 1 Inch and 1-1/2 Inches: Model equivalent to Christy N16 with N16T bolt down lid.
 - 2. Valves 2 Inches and 3 Inches: Model equivalent to Christy N36 with N36T bolt down lid.
 - 3. Boxes shall be labeled as "Irrigation - RCV" on lid.
- E. Quick Coupling Valves, Round:
 - 1. Model equivalent to Christy Model G05T with G05CT locking Lid.
 - 2. Boxes shall be labeled as "Irrigation – QC" on lid.
- F. Valve Boxes: Valve boxes shall have locking or bolt down type lids.

2.07 AUTOMATIC CONTROLLER AND ENCLOSURE

- A. Controller: Manufacturer, model, size, and type as specified on Drawings.
- B. Enclosure: Manufacturer, model, size, and type as specified on Drawings.
- C. Grounding: 5/8"x8' copper grounding rod (one per controller) including #6 solid copper ground wire.

2.08 ELECTRICAL

- A. General:
 - 1. Electrical equipment shall be NEMA Type 3, waterproofed for exterior installations.
 - 2. Electrical work shall conform to local codes and ordinances.
 - 3. Remote control wire shall be UL rated for direct-burial.
 - 4. Where two or more controllers are used, the control wires shall be a different color for each controller. These colors shall be noted on the "Record Drawings" placed in the controller cabinet.

- B. Low Voltage Control Valve Wiring:
 - 1. Conductors:
 - a. Control Wires: Type UF, 14 gauge wire. Insulating jacket color shall be red.
 - b. Common Wires: Type UF, 12 gauge wire. Insulating jacket color shall be white.
 - c. Spare Control Wires: Type UF, 14 gauge wire, Insulating jacket color shall be blue.
 - d. Spare Common Wire: Type UF, 12 gauge wire. Insulating jacket color shall be green.
 - 2. Splice connectors: 3M DBR-Y6 splice connectors, 3M Scotchcast #3570G-N Connector seal packs, or Spears DS-100 connectors with DS-300 sealant.

2.09 CONNECTING COMPOUNDS

- A. Primer: I Weld-On "P-70" Primer by IPS Corporation.
- B. Cement: Solvent cementing shall be in conformance with ASTM D2564 and ASTM D2855.
 - 1. Pipe Diameter up to 6 Inches: Weld-On #705 by IPS Corporation, Low VOC PVC solvent cement for Class 200 PVC or schedule 40 PVC.
 - 2. Pipe Diameter Larger than 6 Inches and Schedule 80 PVC: Weld-On #711 by IPS Corporation, Low VOC PVC solvent cement.
 - 3. Flexible PVC to Rigid PVC Connections: Weld-On #795 by IPS Corporation, Low VOC PVC solvent cement.

2.10 TREE AND SHRUB BUBBLERS

- A. Bubbler Nozzle Assemblies: As specified on the Drawings.
- B. Install bubblers with purple caps if system is designed for recycled water.

2.11 ADDITIONAL MATERIALS

- A. Tape:
 - 1. General:
 - a. On-site buried recycled water piping shall be identified by warning tape with a minimum width of 3 inches reading "caution – recycled water" (in black or white lettering on purple background). Tape shall run continuously on top of main line piping and shall be attached to piping with plastic tape banded around the warning tape and the pipe every 5 feet on center.
 - 2. Pipe Detection Tape: 3 inch wide, detectable type; "Terra Tape" "Sentry Line Detectable" from Reef Industries, Inc., 713.507.4251; or equal.
 - a. Text: "Caution Water Line Buried Below."
- B. Tracer Wire: Polyethylene insulated, copperclad steel; "SoloShot XTreme Tracer Wire" by Copperhead Industries, LLC. 877-726-5644, or equal.
- C. Sleeves: Class 200 PVC. Install sleeves in locations and at the depths shown on the Drawings. Sleeves shall extend a minimum of 6 inches past the edge of the above hard surface for ease of location.
- D. Teflon Tape: Variety commonly used for wrapping threaded connections.
- E. Valve Tags: Plastic pre-labeled station tags.
- F. Drain Rock: 3/4 inch wash drain rock complying with requirement specified in Section 32 11 00 – Base Courses.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Prior to starting work, test and verify that water pressure levels meet the requirements specified on the Drawings. Notify the District's Representative immediately of any discrepancies.
- B. Irrigation Drawings are diagrammatic. Main lines and lateral lines shown parallel in the Drawings may be placed in a common trench, provided that a minimum horizontal distance of 3 inches is maintained between buried lines, as per Drawings.
- C. Sprinkler heads are shown schematically. Suspected discrepancies in coverage or sizes of areas to be irrigated shall be brought to the attention of the District's Representative prior to installation. Contractor shall re-direct work to avoid delay while awaiting resolution.

3.02 PREPARATION

- A. Contractor shall make provisions and take necessary precautions to protect existing and completed work or features.
- B. Layout:
 - 1. Prior to installation, the Contractor shall stake out all pressure supply lines, routing and location of backflow preventer, all valves, sprinkler heads, bubblers, drip tubing, and automatic controller for review by the District's Representative.
 - 2. Layout irrigation system and make minor adjustments required due to differences between site and Drawings. Where piping is shown on Drawings under paved areas, but running parallel and adjacent to planted areas, install the piping in the planted areas.

3.03 TRENCHING

- A. Conform to Section 31 23 00 – Excavation and Fill.
- B. Excavate trenches with vertical walls, uniform bottom, free of deleterious materials, and wide enough for pipes to lay side by side, fully supported on trench bedding. There shall be a minimum 3 inch clearance between all pipes.
 - 1. No lines shall be installed parallel to and directly over another line.
 - 2. When lines must cross, the angle shall be forty-five to ninety degrees, and a minimum of three inch (3") vertical clearance shall be maintained.
- C. Provide minimum coverage depths as follows:
 - 1. Mainline: 24 inches in landscape areas, 30 inches in sleeves under paving.
 - 2. Lateral Lines: 18 inches in landscape areas, 30 inches in sleeves under paving.
- D. Hydraulic driving methods shall not be used under paved surfaces.

3.04 PIPE INSTALLATION

- A. Comply with manufacturer's instructions as applicable.
- B. Rubber Ring Seal Joint:
 - 1. Use factory-made male end or prepare field-cut male end to exact specifications of factory-made end.
 - 2. Carefully clean bell or coupling and insert rubber ring without lubricant. Position ring carefully according to manufacturer's specifications.

3. Lubricate male end according to manufacturer's instructions and insert male end to specified depth. Use hands only when inserting PVC pipe.
- C. Thrust Blocks:
1. Thrust blocks shall be provided on 3 inch and 4 inch main lines where specified and as necessary to resist system pressure on, and pipe movement of, pressurized lines and fittings. Thrust blocks shall be concrete and the size shall be based on an average soil safe bearing load of 3,000 pounds per square foot.
 2. Form thrust blocks in such a manner such that concrete comes in contact only with the fittings, not over the fitting joint. Thrust blocks shall be between solid soil undisturbed and the fitting.
 3. Install thrust blocks as shown in Drawings and as described above.
 4. Main lines of 3 inches and 4 inches with operating pressures of 85 psi or more, and systems with a booster pump, shall have mechanical restraints at all fittings and changes of flow direction.
 5. Main lines 6 inches and larger shall have ductile iron fittings with joint restraints installed at all couplings and changes in flow direction.
- D. Solvent Welded Joints:
1. Assemble above ground where possible.
 2. Cut square, ream, and thoroughly clean shavings and burs from pipe ends.
 3. Make joint using specified primer and cement, continuously wiping off excess.
 4. Allow 60 minutes of set-up time before handling and 24 hours curing before applying water pressure.
- E. Threaded Joints:
1. Use Teflon tape on all pressurized, threaded plastic to plastic and plastic to metal joints.
 2. Hand tighten and use only light strap-type friction wrench pressure to complete.
- F. Snake pipe to provide a minimum of 1 additional foot for each 100 feet of pipe to allow for expansion and contraction.
- G. Pipe shall be installed as specified and generally as shown in Drawings.
- H. Cap or plug pipe openings as soon as pipes have been installed to prevent intrusions of debris.
- I. Sleeves:
1. Install pipe sleeves where necessary, where shown and at all points where pipes pass through concrete or masonry. In footings, install sleeving that allows 1 inch minimum clearance around pipes.
 2. Each end of sleeve shall extend a minimum of 6 inches beyond edge of paving or structure above. Provide removable non-decaying plug or cap at each end of sleeve, to prevent earth from entering pipe.
- J. Thoroughly flush system prior to installing valves, screens and nozzles.
- K. Install pipe detection tape and tracer wire above mainline.

3.05 EQUIPMENT AND INSTALLATION

- A. Reduced Pressure Backflow Prevention Device: Install in accordance with local codes and as shown on the Drawings.
- B. Gate Valves and Ball Valves:
1. Install as shown on the Drawings.
 2. Valves shall be installed in valve boxes to provide a minimum of 2 inch clearance between the highest point of the valve and the bottom of the valve box lid.
 3. Valves shall not be installed in any area that is within the athletic field of play. All valves shall be located within valve boxes set 12 inches from fencing or edge bands as shown.

4. Locate all boxes a minimum of 10 feet from striping of any field of play.
- C. Remote Control Valves:
1. Install as shown in Drawings.
 2. Valve boxes shall be set plumb, flush, and square with adjacent structures.
 3. Valves shall be installed in valve boxes to provide 2 inch clearance between the highest point of the valve and the bottom of the valve box lid.
 4. Install valve tags in an acceptable manner indicating valve station and controller number.
 5. Provide 12 inch minimum separation when valve boxes are grouped together, and align in a straight, parallel, even, and orderly manner.
 6. Locate all boxes a minimum of 10 feet from striping of any field of play.
 7. Locate valves in shrub/ground cover areas whenever possible.
- D. Quick Coupler Valves:
1. Install as shown on the Drawings.
 2. Quick coupling valves shall be installed in valve boxes to provide 2 inch clearance between the highest point of the valve cover and the bottom of the valve box lid.
 3. Locate all boxes a minimum of 10 feet from striping of any field of play.
 4. Quick couplers in synthetic fields shall be located against synthetic turf edgeband and curbs.
- E. Controller:
1. Install as shown in Drawings.
 2. District's Representative shall determine final approved controller locations.
- F. Control Wire:
1. Install control wire along main line, or as shown in Drawings.
 2. Connect control wires to controller in sequential arrangement according to identification number in the Drawings. Label each controller station with permanent non-fading labels indicating valve identification number and controlled.
 3. Bundle multiple wires with tape or ties at 20 foot intervals maximum. Do not tape wires in sleeves.
 4. Make all splices in control valve boxes using only specified connectors.
 5. Provide 36 inch wire coil at each remote control valve and at all mainline directional changes.
 6. Install 2 spare control wires and one looped spare common wire to run by, and loop into, every remote control valve box of system. Terminate wires inside controller enclosure unconnected and clearly labeled as extra.
 7. All wiring under paving shall be installed in a PVC pipe sleeve large enough to allow withdrawal and insertion of individual proposed wires and room for 12 additional wires.
 8. Control wire under 2,000 feet in length shall be 14 gauge.
 9. If control wire run is over 2,000 feet, shall be 12 gauge.
 10. Install terminus ends of two wire cable with 36 inch loop in 8 inch round valve box and record location of each box on the Record Drawings.
- G. Tree Bubbler Assemblies:
1. Install in perforated pipe sump as shown on the Drawings.
 2. Coordinate installation with planting operations to ensure timely and proper placement of heads.

3.06 FIELD QUALITY CONTROL

- A. General:
1. Notify District's Representative for the following reviews, with minimum 2 working days' notice:
 - a. Pressure testing mains prior to installing heads.
 - b. Coverage test prior to planting turf shrubs and or groundcover.
 - c. Pre-maintenance observation prior to acceptance of installed irrigation system.
 - d. Final observation prior to release of project to District.
 2. Contractor shall provide all equipment and personnel required to conduct tests.
 3. Provide up-to-date Project Record Drawings at each review.

4. If District's Representative is called out for review prior to the system being ready as specified, the contractor shall be back-charged for the full cost of the review time, report and travel.

B. Pressure Tests:

1. Testing shall occur with trenches open. Small amounts of backfill between fittings shall be allowed to prevent pipe displacement. All fittings shall be visible prior to testing.
2. Test all pressure supply lines under a minimum hydrostatic pressure of 125 psi. Pipe shall hold pressure for a period of 6 consecutive hours with no more than 5 psi loss in order to pass test.
3. Lateral lines shall be tested under full line pressure for a period of 1 hour prior to backfilling. Cap all heads and center load pipe between fittings prior to testing.
4. Correct all deficiencies revealed by tests to the satisfaction of the District's Representative.

C. System Flushing:

1. After lateral lines, swing joints and sprinkler heads are in place and connected, and prior to installation of sprinkler nozzles, thoroughly flush all lines with water to completely clean lines of debris.
2. Install sprinkler filters and nozzles only after lines have been flushed to the satisfaction of the District's Representative.

D. Coverage Tests:

1. Perform coverage tests after systems are completed and operational, after finish grading as specified in Section 32 90 00 - Planting has been completed, but prior to any planting, in the presence of the District's Representative.
2. Correct all deficiencies to the satisfaction of the District's Representative prior to planting.
3. No overspray or runoff of recycled water is allowed on any non-approved use area.

3.07 BACKFILLING

A. General:

1. Backfill only after specified tests have been performed and accepted.
2. Clean trenches of debris and deleterious material before backfilling.
3. Backfill as shown on the Drawings with native material granular in nature and free from deleterious material rocks and clods 2" or larger.
4. Install pipe detection tape over entire run of mainline as shown in Drawings.
5. Compact trenching to 95 percent relative density under pavement and 85 percent relative density within planting areas.
6. Dress off and compact trench surfaces with finish grade in a manner to ensure no settling of trenches will occur. If settling occurs, contractor is to bring in additional topsoil, recompact and grade to be flush with adjacent finish grade.
7. Comply with additional requirements specified in Section 31 23 00 – Excavation and Fill.

3.08 ADJUSTING

- A. Adjust and balance system to eliminate overspray, fogging or misting and as directed by District's Representative.

3.09 DEMONSTRATION

- A. Instruct District's personnel in complete and proper operation and maintenance of system prior to Final Acceptance.

3.10 MAINTENANCE

- A. Contractor shall service and maintain irrigation system during specified Landscape Maintenance Period as specified in Section 31 01 90 - Landscape and Site Maintenance.

- B. The entire irrigation system shall be under fully accepted automatic operations for a period of 2 days prior to commencement of planting.
- C. Final Acceptance and start of guaranty period shall occur no later than the end of the specified Landscape Maintenance Period.

3.11 FINAL REVIEW

- A. Provide District's Representative with Record Documents and other specified closeout submittals prior to Final Review.

END OF SECTION

SECTION 32 90 00

PLANTING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Landscaping as shown on the Drawings including, but not be limited to the following:
 - 1. Soil preparation.
 - 2. Fine grading of landscape areas.
 - 3. Plant material.
 - 4. Landscape Maintenance Period.

- B. Related Requirements:
 - 1. Section 02 41 13 - Site Clearing and Demolition.
 - 2. Section 31 01 90 - Landscape and Site Maintenance.
 - 3. Section 32 80 00 – Irrigation.

1.02 REFERENCES

- A. American Joint Committee on Horticulture Nomenclature (AJCHN): Standardized Plant Names.
- B. American Association of Nurserymen, Inc. (AAN): American Standard for Nursery Stock.
- C. Sunset Western Garden Book, Lane Publishing Company.
- D. Agricultural Code of California.
- E. State of California, Business and Transportation Agency, Department of Transportation (Caltrans) "Standard Specifications."

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Submittal Procedures: Action and Informational Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.
- B. Coordination:
 - 1. Irrigation and drainage systems shall be inspected and tested before start of any Work of this Section. Before covering subsurface drains and any subsurface drainage weeps, Contractor shall inspect and be responsible for their performance.

1.04 ACTION SUBMITTALS

- A. Plant Materials and Products:
 - 1. Thirty days prior to planting, submit 4 copies of documentation that plants specified have been ordered. Include names and addresses of suppliers.
 - 2. Substitutions: If substitutions are required, they shall be brought to the attention of the District's Representative, at time of submittal. Refer to Section 01 25 00 – Substitution Procedures for additional requirements.

- B. Product Data:
 - 1. Manufacturer's descriptive literature for products proposed for use.
 - 2. Certified chemical analysis of the following:

- a. Fertilizers.
 - b. Herbicides.
- C. Samples: Submit 4 samples of the following in minimum 1 quart size “zip-lock” plastic bag:
- 1. Soil amendment. Include current evaluation and sieve analysis.
 - 2. Bark mulch top dress.
 - 3. Topsoil, as applicable. Include current fertility and structure analyses.

1.05 QUALITY ASSURANCE

- A. Regulatory Requirements:
- 1. Perform work in accordance with all applicable laws, codes, and regulation required by authorities having jurisdiction over such work and provide for all review and permits required by Federal, State, and local authorities in furnishing, transporting, and installing materials.
 - 2. Certificates of review required by law for transportation shall accompany invoice for each shipment of plants. File copies of certificates with the District’s Representative after acceptance of material. Review by Federal or State governments at place of growth does not preclude rejection of plants at project site.
 - 3. Control of Work: Comply with Section 5 of the Standard Specifications.
 - 4. Control of Materials: Comply with Section 6 of the Standard Specifications.
- B. Contractor shall employ on-site supervisor at all times during execution of the planting. Supervisor shall be thoroughly familiar and experienced with the materials and products being installed and proper methods of their installation. Notify the District’s Representative immediately of changes in supervisory personnel.
- C. Products and materials shall be new, first quality, and acceptable to the District’s Representative.
- D. Tree, Shrubs and Plants: Provide trees, shrubs and plants of quantity, size, genus, species and variety shown and scheduled for landscape work and complying with recommendations and requirements of ANSI Z60.1 “American Standard for Nursery Stock.” Provide healthy, vigorous stock, grown in a recognized nursery in accordance with good horticultural practice and free of disease, insects, larvae, and other defects such as girdling or bound roots, knots, sun-scald, injuries, abrasions and disfigurement.
- E. Analysis and Standards: Package standard products with manufacturers certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.
- F. Quality Review: The District’s Representative will review trees and shrubs before planting for compliance with specified requirements for genus, species, variety, size and quantity. District’s Representative retains right to further review trees and shrubs for size and condition of root systems, trunks, stems branches or structure, buds, and other required features, and to disqualify unsatisfactory or defective material at any time during the progress of work. Remove disqualified trees or shrubs immediately from project site and replace with materials acceptable to District’s Representative.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. General:
- 1. Ship plant material and seed with certificates of inspection required by governing authorities. Comply with regulations applicable to plant materials.
 - 2. Handle and store all products of this Section in such a manner as to protect them from damage at all times.
 - 3. Storage of products on-site shall be coordinated by the contractor in an orderly manner so as not to unnecessarily impede the work or reasonable use of project site.
- B. Plants:

1. Delivery: Coordinate with District's Representative. Provide proper identification for landscape labor force and vehicles at all times while on site.
 2. Storage: Coordinate with District's Representative. Provide exposure as required by plant variety and provide wind protection for all plants. Water regularly to maintain thorough moisture in root zone. Temporary, automatic irrigation system will be required at discretion of District's Representative if extended storage period becomes necessary. Protect dark colored plant containers from direct exposure to the sun.
 3. Labeling: At least one plant of each variety or type shall be legibly labeled at all times clearly indicating correct plant name as indicated on Drawings. Labels shall be durable with waterproof ink.
- C. Fertilizers:
1. Deliver in original, unopened containers with original labels intact and legible which state the guaranteed chemical analysis.
 2. Fertilizer, lime, soil sterilant, and all other potentially toxic products shall not be stored with any other landscape materials.
- D. Bulk Material:
1. Coordinate delivery and storage of bulk material with District's Representative.
 2. Confine materials to neat piles in areas acceptable to the District's Representative.

1.07 FIELD CONDITIONS

- A. Planting operations shall not be conducted under the following conditions, subject to the discretion of the District's Representative:
1. Freezing weather.
 2. Excessive heat.
 3. High winds.
 4. Excessively wet conditions.

1.08 WARRANTY

- A. Contractor shall warrant work executed and all materials provided or used under this Section shall be free of defects and poor workmanship for a period of 1 year after Final Acceptance.
- B. Contractor shall warrant plant materials shall be in a healthy and thriving condition 1 year after Final Acceptance, unless it can be proven that the unhealthy or non-thriving material is due to causes other than the Contractor's materials or workmanship.
1. Replace dead plants and plants not in vigorous condition immediately upon notification by District's Representative during Warranty Period.
 2. Replaced plants shall be subsequently guaranteed by the Contractor for an additional year following date of replacement.
 3. Repair defective materials and work shall be acceptable to the District's Representative.

1.09 MAINTENANCE PERIOD

- A. Refer to Section 31 01 90 - Landscape and Site Maintenance for information.

PART 2 - PRODUCTS

2.01 TOPSOIL

- A. Topsoil shall be clean on-site material that has been previously stripped from the top 6 inches of original grade, or import material as applicable. Acceptable topsoil shall be free from rocks, stones, rubble, and clay clods over 2 inches in diameter, roots, toxins, and other deleterious materials.

- B. Imported topsoil shall have an agricultural suitability test by a qualified soils laboratory, dated within 30 days of purchase.
 - 1. Import topsoil proposed for use shall be submitted to the District's Representative for review and acceptance prior to delivery to the Project site.
 - 2. Submit samples and current soil fertility and structure analyses in the quantity specified.

2.02 FERTILIZERS

- A. General:
 - 1. Fertilizers shall be of an acceptable brand with a guaranteed chemical analysis as required by USDA regulations.
 - 2. Fertilizers shall be dry and (except plant tabs) free flowing.
- B. Pre-Plant Fertilizer: Shall be of the following chemical analysis:
 - Nitrogen: 6 percent.
 - Phosphoric Acid: 20 percent
 - Soluble Potash: 20 percent
- C. Post-Plant Fertilizer: Shall be of the following chemical analysis:
 - Nitrogen: 16 percent
 - Phosphoric Acid: 6 percent
 - Soluble Potash: 8 percent
- D. Plant Tabs: 7 gram tabs designed for 12 month slow release with the following chemical analysis by weight; "Gro-Power" or equal:
 - Nitrogen: 12 percent
 - Phosphoric Acid: 8 percent
 - Soluble Potash: 8 percent
 - Humus: 20 percent
 - Humic Acid: 4 percent
 - Sulfur: 3.5 percent
 - Iron: 2 percent
 - Micronutrients

2.03 SOIL ADDITIVES

- A. Soil Amendment: "Super Humus" Compost available from BFI Organics Inc., 1995 Oakland Road, San Jose, CA, 408-262-1401; "Organic Compost" available from Z-Best Products Inc. 705 Los Esteros Road, San Jose CA, 408-934-6152; or acceptable equal meeting or exceeding the following criteria:

- 1. Gradation:
 - a. A minimum of 90 percent of the material shall pass a 2 inch screen.
 - b. Material passing screen shall meet the following criteria:

Sieve Designation	Percent Passing
9.51 mm (3/8")	85-100
2.38 mm (No. 8)	50-80
500 Micron (No. 35)	0-40

- 2. Organic Content:
 - a. Minimum 25 percent based on dry weight and determined by ash method.
 - b. Minimum 240 pounds organic matter per cubic yard of compost.
- 3. Carbon to Nitrogen Ratio: Maximum 35:1 if material is claimed to be nitrogen stabilized.
- 4. PH: 5.5-8.0 as determined in saturated paste.

5. Soluble Salts: Refer to manufacturers specification guidelines.
6. Moisture Content: 25-60 percent.
7. Contaminants: No glass, metal and visible plastics.
8. Color: Dark brown to black.
9. Odor: Soil-like, musty or moldy, and not sour, ammonia-like or putrid.

B. Soil Conditioner: 4 percent sulfur; "Gro-Power Plus (5-3-1) by Gro-Power Inc., 800-473-1307, or equal.

C. Soil Sulphur: Agricultural grade, 99 percent pure, pelletized or granular form, not powdered.

D. Iron Sulphate: Non-staining iron with micro-nutrients, soil penetrant, trace minerals, and humic acids; "Gro-Power Premium Green" by Gro-Power Inc., 800-473-1307, or equal.

2.04 MULCH TOP DRESS

A. Material: Medium-sized, 3/4 inch to 2 inches, decorative chipped wood, homogenous in appearance, free of deleterious and inorganic material, sticks, shredded, stringy, and fibrous materials; "Golden Nuggets" from Sun Up, 800-222-255; "MBC Red" from My Bark Company, Inc., 209-786-4042; or equal.

2.05 PLANTS

A. General:

1. Plants shall conform to the species and minimum sizes shown on the Drawings.
2. Quantities shown on the Drawings are for the Contractor's convenience only. Contractor shall provide plant material to fulfill the intent of the Planting Plan at the discretion of the District's Representative.

B. Condition: Plants shall conform to the following minimum requirements:

1. Nursery grown unless otherwise specified.
2. Supplied in appropriate container, balled and burlapped, or bare root as specified on Drawings.

2.06 HERBICIDES

A. Pre-Emergent: "Ronstar-G" pelletized, "Surflan" liquid, or equal.

B. Other Herbicides: Submit for review and accepted by District's Representative prior to use.

2.07 ADDITIONAL MATERIALS

A. Water: Clean, fresh, and free of substances or matter which could inhibit vigorous growth of plants.

B. General: Products and materials shall be new, first quality as acceptable to the District's Representative.

C. Tree Anchor System: As shown and specified on the Drawings.

D. Header Board: As shown and specified on the Drawings.

E. Root Barriers: Model #UB 24-2 "Universal Barrier" by Deep Root Partners L.P, 800-458-7668, or equal.

F. Palm Tree Backfill Mix: Oasis Palm Backfill Mix as available from Horticultural Consultants, Inc. 800-460-7256, or equal.

PART 3 - EXECUTION

3.01 TOPSOIL INSTALLATION

- A. Subgrade soil shall be cut or filled to the depth required such that after placement of required amount of topsoil and specified preparation procedures have been accomplished, specified finish grades will be attained.
- B. Subgrade soil shall be cross-ripped as specified.
- C. Planting areas shall contain a minimum of 6 inches of acceptable topsoil applied as applicable and where required. Only previously accepted topsoil shall be installed.
- D. Refer to Section 31 20 00 – Earth Moving for rough grading information.

3.02 PREPARATION

- A. Make provisions and take necessary precautions to protect existing and new improvements from damage during execution of planting work.
- B. Initial Preparations:
 - 1. Prior to beginning of planting, thoroughly cross-rip, with second rip shall be performed at 90 degrees to first rip, planting area soil to a depth of twelve 12 inches.
 - 2. Remove all rocks, sticks, clods, debris, and other deleterious materials over one-half (1/2) inch in diameter from top 6 inches of soil.
 - 3. Float, rake, and roll all planting areas as necessary to establish smooth, clean, non-yielding planting beds.
 - 4. Prevent erosion of the soil between completion of soil preparation and planting.
- C. Concrete Mowbands and Wood Header Boards: Install in accordance with the Drawings and repeat specified initial preparations as necessary.

3.03 SOIL PREPARATION AND FINISH GRADES

- A. Soil Preparation:
 - 1. Thoroughly roto-till the following additives into the top 6 inches of planting area soil at the following rates per 1,000 square feet:
 - a. Soil Amendment: 6 Cubic Yards.
 - b. Soil Conditioner: 200 Pounds.
 - c. Pre-Plant Fertilizer: 35 Pounds.
 - d. Soil Sulfur: 20 Pounds.
 - 2. The above additive recipe shall be used by Contractor for establishing the cost of soil additives in the Contract sum.
 - a. A site specific fertility test shall be performed by the Contractor after rough grading and applicable topsoil placement or replacement operations are complete. Soil shall be sent to Gro-Power, or other testing agency approved by District's Representative, for tests.
 - b. The results of the testing will be reviewed by the District Representative and direction for amendment additives ratio will be provided.
 - c. The Contract sum will be modified, in accordance with the procedures for changes in the work included in the Contract, if there is a variance from the above specified additives or quantities.
 - 3. After additives are fully incorporated into the soil, the Contractor shall perform further testing to check conformance with the newly recommended materials and quantities. If deficiencies are found, the Contractor shall be solely responsible for the cost of adding deficient material as necessary and re-testing required to verify conformance.

4. Contractor shall also schedule 7 working days after soil samples have been taken to allow for receipt and evaluation of soil tests at no cost or delay to the project.
- B. Planting Area Finish Grades:
1. After tilling in additives and re-compaction to 85 percent relative compaction, rake planting areas smooth and set finish grades as follows.
 2. After soil preparation, finish grades of planting areas shall be 1 inch below adjacent paving, headers, utility boxes, irrigation boxes, and other in-grade items. Finish grade slopes shall be consistent.
 3. Drainage structures, including catch basins, area drains, and concrete swales, shall be flush with finish grade to allow for proper drainage. Soil shall be sloped consistently from spot elevations provided to drain.
 4. In planting areas to receive mulch, depth of mulch shall taper within 3 feet of paving edge to a depth from 3 inches to 1 inch at edge of pavement.
 5. Irrigation head elevation relative to finish grade shall be installed as shown.
 6. After sand channel drainage system, finish grade shall be re-established.
 7. Infield fines and warning tracks shall be graded to be flush with depth of sod soil. If sod is at 3/4 inches, then that will be the difference of the sod subgrade to the infield fines finish grade prior to placement of the sod.

3.04 TREE, SHRUB AND GROUND COVER PLANTING

- A. These areas shall receive specified topsoil and soil amendments prior to commencing with tree, shrub and ground cover planting.
- B. Layout: Coordinate layout of plants with District's Representative for review and acceptance.
- C. Plant Pit Excavation:
1. Excavate pits to sizes indicated in Drawings.
 2. Thoroughly scarify all sides of plant pits to remove "auger slick" and encourage root penetration.
- D. Set trees and shrubs in pit on tamped backfill base as per Details. Set plumb and face for best appearance. Thoroughly scarify all plant root balls to eliminate any circling roots and to encourage root growth. Set plant so root crown will level with or be slightly above surrounding grade after settlement.
- E. Backfilling:
1. Backfill mix for 1 gallon size and larger shall consist of 100 percent native site soil with plant tabs added per manufacturer's recommendations.
 2. Tamp backfill mix under and around root balls.
 3. Flood plant pit when half backfilled; allow to drain.
 4. Complete backfilling. Tamp as necessary, do not over compact.
- F. Palm Pit Backfilling:
1. Fill the hole with specified backfill mixture.
 2. Water in as you fill hole with sand to wash the material around the exposed roots.
 3. Avoiding leaving any air pockets or voids that will allow the roots to dry out.
 4. The specified backfill should ensure good drainage plus provide rigidity so you may not have to brace the tree.
- G. Watering:
1. Thoroughly water plants immediately after planting.
 2. Construct water basins as specified in Drawings.
- H. Finish Grade Restoration: Restore finish grades by hand raking. Dispose of excess subgrade soil.

3.05 TREE ANCHORS

- A. Anchor trees as shown in the Drawings.
- B. Set tree anchors per manufacturer's recommendations, without damage to rootball and sufficiently deep to provide necessary support.
- C. Tree ties shall be tied loosely enough to allow movement, yet taut enough to support tree.

3.06 HERBICIDE APPLICATION

- A. Apply in accordance with manufacturers' recommendations.
- B. Apply pre-emergent herbicide to soil prior to placement of bark mulch top-dress.

3.07 MULCH TOP DRESS

- A. Apply 3 inches of specified bark mulch top dress to all non-turf and hydroseeded planting areas and other areas as may be specified in the Drawings. Trees in hydroseeded areas shall receive the tree well and mulch in the well.
- B. Rake mulch top dress evenly to create a uniform surface and pull bark mulch top dress away from trunks or stalks of plants 1 to 2 inches.
- C. Mulch shall not dictate finish grade in planting areas. Mulch is to be added to finish grade.

3.08 INSTALLATION OF ADDITIONAL MATERIALS

- A. Header Board: Install as shown on the Drawings.
- B. Root Barriers: Install as shown on the Drawings.

3.09 FIELD QUALITY CONTROL

- A. New turf areas shall be fenced off during turf establishment and specified Landscape Maintenance Period subject to the discretion of the District's Representative.
- B. The District's Representative will review and accept the following prior to the Contractor proceeding with subsequent work:
 - 1. Preparation: At completion of finish grading and prior to planting, grading tolerances and soil preparation will be checked for conformance to Contract Documents.
 - 2. Layout of plants, header board, and other major items shall be as directed and accepted by the District's Representative.
 - 3. Pre-Maintenance Review: At completion of planting, work shall be reviewed for conformance with Contract Documents. Acceptance shall mark beginning of the specified maintenance period. If acceptance is not given, a punch-list of items requiring attention will be issued to the Contractor. One more review will be allowed after Contractor certifies in writing that the punch-list has been completed. Punch-list shall be completed to the satisfaction of the District's Representative prior to commencement of the Specified Maintenance Period.
- C. Costs incurred from repeat reviews required due to Contractor not being prepared and other non-conformance with Contract Documents will be back charged to the Contractor.

END OF SECTION

33 11 00

DOMESTIC WATER UTILITIES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Domestic water and fire system work is shown on the Drawings including, but is not necessarily limited to, the following:
 - 1. Intermediate staking and layout for domestic water system.
 - 2. Pipes, fittings, valves, valve boxes, connections, for drinking fountains and proposed buildings incorporating domestic water systems.
 - 3. Field testing and disinfection.

- B. Related Requirements:
 - 1. Section 32 11 00 - Base Courses
 - 2. Section 32 23 00 - Excavation and Fill
 - 3. Section 32 80 00 - Irrigation
 - 4. Section 32 90 00 - Planting

1.02 REFERENCES

- A. American Water Works Association: Current edition of Standards as specified.

- B. California Plumbing Code: Current Edition.

- C. State of California, Business and Transportation Agency, Department of Transportation (Caltrans) "Standard Specifications."

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Submittal Procedures: Action and Informational Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.

- B. Sequence and Scheduling:
 - 1. Refer to other Contract Documents, determine the extent and character of related work, and properly coordinate work specified herein with that described elsewhere to produce a complete, operational installation.
 - 2. Contractor shall be solely responsible for coordinating, sequencing, and scheduling work with other trades and subcontractors to insure proper and timely performance of the work under this Section.

1.04 ACTION SUBMITTALS

- A. Product Data: Manufacturer's "cut-sheets" for products proposed for use.

1.05 INFORMATIONAL SUBMITTALS

- A. Certification that ductile iron pipe supplied for this Project has been manufactured in compliance with all requirements of AWWA C151.

- B. Certification that PVC pipe supplied for this project has been manufactured in compliance with all requirements of AWWA C900.

1.06 CLOSEOUT SUBMITTALS

- A. Project Record Drawings that provide accurately record locations of utilities remaining, re-routed utilities, new utilities, and newly discovered utilities by horizontal dimensions, elevations, inverts, and slope gradients. Comply with additional requirements specified in Section 01 78 39 – Project Record Documents.
- B. Warranty as specified.
- C. Results of field testing of completed system.
- D. Certificate of Compliance for disinfection.

1.07 QUALITY ASSURANCE

- A. Unless otherwise specified, install materials in accordance with manufacturer's recommendations.
- B. Contractor shall make necessary repairs to the domestic water system and other work affected by defects in the system through project Final Acceptance and specified warranty period. Repairs shall be made at the Contractor expense and at no additional cost to District.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Store pipe in a neat and orderly manner fully supported and protected from sunlight.
- B. Do not dump pipe off truck. Pipes are to be delivered, unloaded and handled so as to prevent damaging the material.

1.09 FIELD CONDITIONS

- A. PVC pipe shall not be cemented during wet conditions as determined by the District's Representative.
- B. Trench excavation and backfilling shall not be executed during excessively wet conditions as determined by the District's Representative.

1.10 WARRANTY

- A. Contractor: Provide District with a special written 1-year warranty covering entire water system against defects in installation, workmanship, and equipment from date of final acceptance.
 - 1. Contractor shall make necessary repairs to the system as well as to other work affected by defects in the system during warranty period.
 - 2. Repairs shall be made at the Contractor's sole expense.

1.11 MAINTENANCE

- A. Service: Contractor shall service and maintain domestic water system as necessary until project final acceptance.

PART 2 - PRODUCTS

2.01 PIPE AND FITTINGS

- A. General:

1. Pipe materials for domestic and fire water lines shall be in conformance with the California Plumbing Code and local governing agencies.
 2. Plans and details, if shown, are schematic in nature and do not necessarily identify all fittings and appurtenances required to provide a complete installation. The Contractor is responsible for providing complete and functional systems.
 3. Materials and procedures not specifically addressed herein shall comply with the appropriate AWWA standard.
 4. Materials proposed for use shall be in a new, "first class" condition unless otherwise noted.
- B. Water Lines 3 Inches and Greater Diameter:
1. Ductile Iron Pipe (DIP): Cement lined, of domestic manufacturer complying with ANSI/AWWA C151/A21.5, minimum Class 52; "Tyton Joint" by U.S. Pipe, Pacific States, or acceptable equal.
 - a. Cement mortar lining shall comply with ANSI/AWWA C104/A21.4.
 - b. Buried ductile iron pipe and fittings shall be wrapped in an 8-mil thick polyethylene film sleeve.
 2. Polyvinyl Chloride Pipe (PVC): Conform to AWWA C900, Class 200, of domestic manufacture, and meeting cast iron outside diameter sizes; C900 Series North American Specialty Products, JM Eagle, or acceptable equal.
 - a. Pipe shall be furnished with integral bells.
 - b. Spigot end pipe with separate double hub couplings is not acceptable.
- C. Water Lines 2 Inches and Smaller Diameter: One of the following.
1. Annealed (soft) Type "K" copper (Cu).
 2. Polyvinyl chloride (PVC) conforming to ASTM D1785, Schedule 80 PVC, of domestic manufacture, and meeting cast iron outside diameter sizes; ASTM D1785 Series North American Specialty Products, JM Eagle, or acceptable equal.
 - a. Pipe shall be furnished with integral bells.
 - b. Spigot end pipe with separate double hub couplings is not acceptable.
- D. Couplings and Sleeves:
1. General:
 - a. Couplings and sleeves shall be a minimum of 200-psi working pressure-rated unless except as otherwise noted.
 - b. Couplings and sleeves shall be mechanical joint type.
 - c. Couplings, sleeves, and accessories shall be of domestic manufacture; "Trim Tyton" by U.S. Pipe, Union Foundry, Tyler Pipe and Couplings, or acceptable equal.
 2. DIP and PVC Pipe 3 Inches thru 12 Inches:
 - a. Unless otherwise noted, couplings and sleeves for DIP and PVC shall be ductile iron conforming to AWWA C153, and shall be 350 psi working pressure rated.
 - b. Unless otherwise noted, flanges on all DIP spools shall conform to ANSI/AWWA C115/A21.15.
 3. PVC Pipe 2 1/2 Inches and Smaller: Schedule 40, solvent-weld PVC socket couplings.
 4. Copper Tubing: "Mueller 110" compression connections by Mueller Company Ltd., or acceptable equal.
- E. Gate Valves:
1. Use gate valves designed for a working pressure of not less than 150 psi.
 2. Provide connections as required for the piping in which they are installed.
 3. Provide an arrow on the operating nut or wheel, cast in metal, indicating direction of opening.
- F. Thrust Blocks: Class "A" concrete construction with dimensions conforming to the California Plumbing Code.
- G. Valve Boxes:
1. Size: 10 inches round boxes for gate valves.
 2. Box lid shall be labeled with "water" and shall be bolted down.

3. Boxes located in landscape areas shall be round plastic; Carson Model 910-10 with 910-4 lid, or equal.
 4. Boxes located in paving shall be concrete with concrete lid.
- H. Pipe Detection Tape: 3 inch wide, detectable type; "Terra Tape" "Sentry Line Detectable" from Reef Industries, Inc., 713.507.4251; or equal.
1. Text: "Caution Water Line Buried Below."
- I. Tracer Wire: Polyethylene insulated, copperclad steel; "SoloShot XTreme Tracer Wire" by Copperhead Industries, LLC. 877-726-5644, or equal.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Prior to starting work, test and verify that water pressure levels meet the domestic water system requirements. Notify the District's Representative immediately of any discrepancies and re-direct work to avoid delay.
- B. The utility plan and the piping details on the Drawings are diagrammatic. Pipe lines shown parallel in the Drawings may be placed in a common trench, provided that a minimum horizontal distance of 6 inches is maintained between buried lines, except for sanitary sewer lines, which require 10 feet horizontal clearance.

3.02 HANDLING

- A. Handle pipe accessories so as to ensure delivery to the trench in sound, undamaged condition.
- B. Use pinch bars or tongs for aligning or turning the pipe only on the bare end of the pipe.
- C. Thoroughly clean interior of pipe and accessories before lowering pipe into trench. Keep clean during laying operations by plugging or other acceptable method.
- D. Before installation, inspect each piece of pipe and each fitting for defects.
- E. Replace material found to be defective, both before or after laying, with sound material meeting the specified requirements and without additional cost to the District.
- F. Rubber gaskets: Store in a cool dark place until just prior to time of installation.

3.03 PIPE CUTTING

- A. Cut pipe neatly and without damage to the pipe.
- B. Unless otherwise recommended by the pipe manufacturer, cut pipe with mechanical cutter only.
- C. Use wheel cutters when practicable.
- D. Cut pipe square, and remove all burrs prior to use.

3.04 TRENCHING

- A. Conform to requirements specified in Section 31 23 00 – Excavation and Fill and the following.

- B. Excavate trenches with vertical sides uniform bottom, free of deleterious materials, and wide enough for pipes to lay side by side, fully supported on bottom.
 - 1. No lines shall be installed parallel to and directly over another line.
 - 2. When lines must cross, the angle shall be 45 to 90 degrees, and a minimum of 6 inch vertical clearance shall be maintained.
- C. Provide minimum coverage for pressurized service as follows:
 - 1. Landscape Areas: 24 inches.
 - 2. Paved Areas: 30 inches.

3.05 PLACING AND LAYING

- A. General:
 - 1. Lower pipe and accessories into trench by means recommended by the manufacturer.
 - 2. Except where necessary in making connections to other lines, lay pipe with the wide bell end opening facing source.
 - 3. Rest the full length of each section of pipe solidly on the pipe bed, with recesses excavated to accommodate wells, couplings, and joints.
 - 4. Replace pipe that has been disturbed after laying.
 - 5. Do not lay pipe in water, or when trench conditions are unsuitable for the work. De-water trench until jointing is completed.
 - 6. Securely close open ends of pipe and valves when work is not in progress.
 - 7. Where any part of coating or lining is damaged, repair at no additional cost to the District.
 - 8. Follow manufacturer's detailed instructions in installing and assembling pipe.
- B. Plastic Pipe:
 - 1. Position pipe and fittings in trench in a manner that identifying markings will be readily visible for inspection.
 - 2. Cutting and joining:
 - a. Protect against abrasion from serrated holding devices.
 - b. Remove burrs and glosses from surfaces to be jointed; use abrasive paper, file, or steel wool.
 - c. Remove dirt, dust, and moisture by wiping clean with dry cloth.
 - 3. Align pipe system components without strain.
 - 4. Support plastic pipe in trenches with a 2 inch minimum layer of bedding Provide a minimum 3 inch bedding sand cover. Allow no rocks, debris, or potentially damaging substances within 6 inches of plastic pipe in trenches.
- C. Connections: Use appropriate fittings to suit the actual condition where connections are made between new work and service points.

3.06 JOINTING

- A. Mechanical Joints and Push-On Type Joints: Install in accordance with AWWA C600, modified as necessary by the recommendation of the manufacturer, to provide for special requirements of specified pipe.
- B. Make connections between different types of pipe and accessories with transition fittings.
- C. Rubber Gaskets:
 - 1. Handle and install in strict accordance with the recommendations of the manufacturer.
 - 2. Lubricants for gaskets shall be manufactured by or approved by the pipe manufacturer for use under the conditions found in the field.

3.07 SETTING VALVES AND VALVE BOXES

- A. Center valve boxes on the valves, setting plumb.

- B. Tamp earth fill around each valve box to a distance of four feet on all sides, or to be undisturbed trench face if less than four feet.
- C. Tighten mechanical joints, and fully open and close each valve to assure that all parts are in working condition.

3.08 THRUST BLOCKS

- A. Provide and install thrust blocks in accordance with California Plumbing Code requirements and installation guidelines.

3.09 TESTING, INSPECTING, AND DISINFECTION

- A. General:
 - 1. Do not allow or cause the work of this Section to be covered up or enclosed until after it has been completely inspected and tested, and has been accepted by the District's Representative and governing authorities when applicable.
 - 2. Perform tests and disinfection in a manner acceptable to governmental agencies having jurisdiction.
- B. Testing:
 - 1. Except for joint material setting, or where concrete reaction backing necessitates a five day delay, pipelines joints, or couplings may be subjected to hydrostatic pressure, inspected, and tested for leakage at any time after partial completion of backfill.
 - 2. Testing of water service shall be in accordance with the requirements of AWWA C600 for hydrostatic testing.
 - 3. Contractor shall keep records of each piping test, including date and time of test, name of witnessing District Representative, test pressure, description of piping tested, and clarifying comments including those related to leaks and repairs made.
 - 4. Tests shall last 4 hours and be tested at 200 psi.
- C. Disinfection:
 - 1. Before acceptance of the domestic water system, disinfect each unit of completed service line in accordance with AWWA C601 and criteria of the local governing jurisdiction.
 - 2. Proposed method for disinfection shall be submitted to the District's Representative for review and acceptance.
 - 3. Furnish two copies of a Certificate of Compliance to the District.

3.10 BACKFILLING

- A. Backfill only after specified tests have been performed and accepted.
- B. Clean trenches of debris and deleterious material before backfilling.
- C. Backfill, as specified or shown in Drawings, shall be free from deleterious material.
- D. Compact trenching to 95 percent relative compaction under pavement and 85 percent relative compaction within planting areas.
- E. Trench surfaces shall be flush with finish grade. Trench settlements shall be corrected by the Contractor at no additional cost to the District.
- F. Install pipe detection tape and reinforced tracer wire above pressurized lines.

3.11 DEMONSTRATION

- A. Contractor shall instruct District's personnel in complete and proper operation of domestic water system per prior to Contract closeout.

3.12 FINAL REVIEW

- A. Provide District's Representative with specified closeout submittals prior to Final Review.

END OF SECTION

SECTION 33 30 00

SANITARY SEWERAGE UTILITIES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Site sanitary sewerage and related work as shown on the Drawings and specified including, but is necessarily limited to, the following:
 - 1. Sanitary sewerage system installation for drinking fountains.
 - 2. Sanitary sewerage system installation for restrooms/concessions building
- B. Related Requirements:
 - 1. Section 31 20 00 - Earth Moving
 - 2. Section 31 23 00 - Excavation and Fill
 - 3. Section 32 11 00 - Base Courses
 - 4. Section 32 32 15 - Landscape Concrete
 - 5. Section 32 33 00 - Site Furnishings
 - 6. Section 33 11 00 - Domestic Water Utilities

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. C700 Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated.
 - 2. D3034: Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- B. American Water Works Association (AWWA):
 - 1. C110: Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. (76 mm Through 1,219 mm) for Water.
 - 2. C111: Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - 3. C151: Ductile-Iron Pipe, Centrifugally Cast, for Water.
- C. California Plumbing Code, current edition, Sections as specified.
- D. State of California, Business and Transportation Agency, Department of Transportation (Caltrans) "Standard Specifications."
- E. "The Greenbook: Standard Specifications for Public Works Construction," current edition.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Submittal Procedures: Action and Informational Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.
- B. Sequencing and Scheduling:
 - 1. Refer to all other Contract Documents, determine the extent and character of related work, and properly coordinate work specified herein with work included under other Sections to produce a complete, operational installation.
 - 2. Contractor shall be solely responsible for coordinating, sequencing, and scheduling work with applicable trades and subcontractors to insure proper and timely performance.

1.04 ACTION SUBMITTALS

- A. Product Data: Manufacturers' data sheets for the following:
 - 1. Piping materials and fittings.
 - 2. Special pipe couplings.
 - 3. Precast concrete clean out boxes and box covers.

1.05 INFORMATIONAL SUBMITTALS

- A. Design Mix Reports and Calculations: Submit for each class of cast in place concrete.
- B. Field Test Reports: Indicate and interpret test results for compliance with specified performance.

1.06 QUALITY ASSURANCE

- A. Control of Work: Conform to Section 5 of the Standard Specifications.
- B. Control of Materials: Conform to Section 6 of the Standard Specifications.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store pipe neat and orderly stacked and blocked to prevent damage. Cracked, checked, spalled or otherwise damaged pipe shall be removed from site.
- B. Use of chain slings shall not be permitted.
- C. Pipe, fittings, precast sections, cast iron fittings, covers and all other materials shall be carefully handled at all times.
- D. All pipelines and fittings shall be kept clean and closed during construction.

1.08 FIELD CONDITIONS

- A. Make provisions to take the necessary precautions to protect existing work from damage during execution of this work.
- B. Work of this Section shall not be executed when site conditions are detrimental to quality of work as determined by the District's Representative.
- C. PVC pipe shall not be solvent welded during wet conditions.

PART 2 - PRODUCTS

2.01 PIPE AND FITTINGS

- A. General: Pipe and fittings shall be clearly and permanently marked to identify manufacturer, type, class, or schedule and NSF approval as applicable.
- B. Polyvinyl Chloride Pipe (PVC) and Fittings: SDR 26 bell and spigot, Type I PVC 1120, and complying with ASTM D3034.
- C. Ductile Iron Pipe (DIP) Joints and Fittings: Class 50, rubber gasket push-on type, in compliance with AWWA C151, C111, and C110.

- D. Vitrified Clay Pipe (VCP) and Fittings: Extra strength, unglazed for socket and spigot joint, complying with ASTM C700.

2.02 MANHOLES

- A. Manhole: Precast concrete, ASTM C913; designed according to ASTM C890 for A-16 (ASSHTO HS20-44), heavy-traffic, structural loading; Oldcastle Precast, Stockton, CA, or equal.
 - 1. Depth: As required by location of existing storm drain.
 - 2. Dimensions: .
 - 3. Steps: Manufacturer's standard polypropylene coated steel.
 - 4. Grade Rings: Precast, sized as required, with grouted joints.
 - 5. Frame and Cover: Manufacturer's standard cast iron, 24 inches inside diameter. Identification shall conform to City standards.
 - 6. Base: Manufacturer's precast unit or cast-in-place, at Contractor's option.

2.03 STRUCTURES

- A. Clean Outs: As detailed on Drawings and as follows.
 - 1. Non-Vehicular Travel Areas: Christy "F8" by Oldcastle Precast clean out boxes, or equal.
 - 2. Vehicular Travel Areas: Christy "G5" Oldcastle Precast clean out boxes, or equal.

2.04 MISCELLANEOUS MATERIALS

- A. Crushed Rock: 3/4 inch bedding rock as specified in Section 32 11 00 – Base Courses.
- B. Mortar: Conform to applicable sections of the Standard Specifications. Mixture shall be a 1:2 portland cement to sand mixture with a minimum of water.
- C. PVC Solvent Cement: Conform to pipe manufacturer's recommendations.
- D. PVC Primer: Conform to pipe and solvent cement manufacturer's recommendations.
- E. Reinforcing Bars: Refer to Section 32 32 15 – Landscape Concrete.
- F. Minor concrete shall comply with Section 32 32 15 – Landscape Concrete and applicable sections of the Standard Specifications.

PART 3 - EXECUTION

3.01 PIPE LAYING

- A. General:
 - 1. The District's Representative will review and accept pipe prior to installation.
 - 2. Pipe shall be installed in conformance with Section 31 23 00 – Excavation and Fill.
 - 3. Sanitary sewer installations shall be reviewed and accepted by the District's Representative prior to backfilling.
- B. Pipe:
 - 1. Pipe shall be laid in trench to specified lines and grades fully and evenly supported layer of bedding material as specified and identified on the Drawings. Excavate bedding so bell fittings are clear from soil 6 inches on each side of joint and to a depth sufficient to avoid contamination of joint. Refer to Drawings for additional information.
 - 2. Pipe shall be laid beginning at the outlet and proceeding with each bell end opening facing upgrade.
 - 3. Cut pipe square and ream to remove burrs prior to use.

4. Connections:
 - a. Thoroughly clean and dry all components to be joined.
 - b. Apply primer and sufficient cement to coat joint surfaces of both components and fill gaps but not in excess.
 - c. Join pipe, wipe off excess cement, and fully support pipe until joint has cured.
- C. Provide sleeving where shown, and where pipes penetrate walls, using schedule 40 PVC pipe minimum 1/4 inch diameter larger than pipe or other method acceptable to the District's Representative.

3.02 MANHOLES

- A. Install as indicated on plans.

3.03 STRUCTURES AT GRADE

- A. General:
 1. Set rim or cover elevations to specified grades.
 2. Adjust as required to set flush with proposed grades and pavement sections.
- B. Clean Outs:
 1. Excavate as required.
 2. Set on firm unyielding base. Set on compacted select backfill material unless otherwise indicated.

3.04 SANITARY SEWER CONNECTIONS

- A. Sanitary sewer connections to existing sewer mains shall be made water tight, straight and true to line, grade and "crown to crown" unless noted otherwise.

3.05 FIELD QUALITY CONTROL

- A. The District's Representative shall review and accept work at the following stages:
 1. Excavated trench with bedding in place prior to any pipe being laid.
 2. Pipe laid prior to backfilling. Any pipe covered prior to acceptance shall be uncovered for review and re-backfilled at contractor's expense.
- B. The Contractor shall furnish the necessary labor, equipment and materials necessary to perform air tests of the completed sewerage project before the system is placed in operation or connected to other lines.
- C. In no case shall the Contractor place the newly constructed sewer in operation without acceptance by the District's Representative.

3.06 PIPELINE TESTING AND FLUSHING

- A. New sections of sanitary sewer main shall be air tested using the following procedures:
 1. Test is conducted between 2 consecutive manholes, or as directed by the District's Representative.
 2. The test section of the sewer line is plugged at each end. One of the plugs used at the manhole must be tapped and equipped for the air inlet connection for filling the line from the air compressor.
 3. Service laterals, stubs and fittings into the sewer test section should be properly capped or plugged and carefully braced against the internal pressure to prevent air leakage by slippage and blowouts.
 4. Connect air hose to tapped plug selected for the air inlet. Then connect the other end of the air hose to the portable air control equipment which consists of valves and pressure gauges used to control the air entry rate to the sewer test section, and to monitor the air pressure in the pipe line. More specifically, the air control equipment includes a shut-off valve, pressure regulating valve,

- pressure reduction valve and a monitoring pressure gage having a pressure range from 0-5 psi. The gage shall have minimum divisions of 0.10 psi and an accuracy of 0.40 psi.
5. Connect another air hose between the air compressor, or other source of compressed air, and the air control equipment. This completes the test equipment set-up. Test operations may commence.
 6. Supply air to the test section slowly, filling the pipe line until a constant pressure of 3.5 psi is maintained. The air pressure must be regulated to prevent the pressure inside the pipe from exceeding 5.0 psi.
 7. When constant pressure of 3.5 psi is reached, throttle the air supply to maintain the internal pressure above 3.0 psi for at least 5 minutes. This time permits the temperature of the entering air to equalize with the temperature of the pipe wall. During this stabilization period it is advisable to check all capped and plugged fittings with a soap solution to detect any leakage at these connections. If leakage is detected at any cap or plug, release the pressure in the line and tighten all leaky caps and plugs. Then start the test operation again by supplying air. When it is necessary to bleed off the air to tighten or repair a faulty plug, a new 5-minute interval shall be allowed after the pipe line has been refilled.
 8. After the stabilization period, adjust the air pressure to 3.5 psi and shut-off or disconnect the air supply. Observe the gage until the air pressure reaches 3.0 psi. At 3.0 psi commence timing with a stop watch which is allowed to run until the line pressure drops to 2.5 psi at which time the stop watch is stopped. The time required, as shown on the stop watch, for a pressure loss of 0.5 psi is used to compute the air loss.
 9. If the time, in minutes and seconds, for the air pressure drop from 3.0 to 2.5 psi is greater than that shown in the following table for the designated pipe size, the section undergoing test shall have passed and shall be presumed to be free of defects. The test may be discontinued at that time.
 10. If the time, in minutes and seconds, for the 0.5 psi drop is less than that shown in the following table for the designated pipe size, the section of the pipe shall not have passed the test; therefore, adequate repairs must be made and the line retested.

Requirements for Air Testing:		
Pipe size in Inches	Time	
	Minutes	Seconds
4	2	32
6	3	50
8	5	06
10	6	22
12	7	39
14	8	56
15	9	35
16	10	12
18	11	34
20	12	45
21	13	30
For larger diameter pipe use the following: Minimum time in seconds = 462 x pipe diameter in feet		

11. For 8 inch and smaller pipe, only: If, during the five minute saturation period pressure drops less than 0.5 psi after the initial pressurization and air is not added, the pipe section undergoing test shall have passed.
12. Multi-Pipe Sizes: When the sewer line undergoing test is 8 inches or large diameter pipe and includes 4 inch or 6 inch laterals, the figures in the Table for uniform sewer main sizes will not give reliable or accurate criteria for the test. Where multi-pipe sizes are to undergo the air test, compute the average size in inches which is then multiplied by 38.2 seconds. The results will give the minimum time in seconds acceptable for a pressure drop of 0.5 psi for the averaged diameter pipe.
13. Adjustment Required for Groundwater:

- a. An air pressure correction is required when the ground water table is above the sewer line being tested. Under this condition, the air test pressure must be increased 0.433 psi for each foot the ground water level is above the invert of the pipe.
- b. Where ground water is encountered or is anticipated to be above the sewer pipe before the air testing will be conducted, the following procedure shall be implemented at the time the sewer main and manholes are constructed.
 - 1) Install a pipe nipple, threaded one or both ends and approximately 10 inches long, through the manhole wall directly on top of one of the sewer pipes entering the manhole with threaded end of nipple extending inside the manhole.
 - 2) Seal pipe nipple with a threaded cap.
 - 3) Immediately before air testing, determine the ground water level by removing the threaded cap from the nipple, blowing air through the pipe nipple to remove any obstructions, and then connecting a clear plastic tube to the pipe nipple.
 - 4) Hold plastic tube vertically permitting water to rise in it to the groundwater level.
 - 5) After water level has stabilized in plastic tube, measure vertical height of water, in feet, above invert of sewer pipe.
 - 6) Determine air pressure correction, which must be added to the 3.0 psi normal starting pressure of test, by dividing the vertical height in feet by 2.31. The result gives the air pressure correction in pounds per square inch to be added.

Example: If the vertical height of water from the sewer invert to the top of the water column measures 11.55 feet, the additional air pressure required would be:

$$(11.55) / (2.31) = 5.0 \text{ psi}$$

Therefore, the starting pressure of the test would be 3.0 plus 5 or 8.0 psi, and the 0.5 pound drop becomes 7.5 psi. There is no change in the allowable drop (0.5 psi) or in the time requirements established for the basic air test.

- B. After the line has passed the air test, it shall be balled and flushed with water to clean. A metal screen shall be used downstream at the point of connection to the existing system to collect and remove rock and other debris that is flushed out during cleaning.

END OF SECTION

SECTION 33 40 00

STORM DRAINAGE UTILITIES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Storm drainage system improvements and related work as shown on the Drawings and specified including, but is necessarily limited to, the following:
1. Pipe and fittings.
 2. Nonpressure transition couplings.
 3. Pressure pipe couplings.
 4. Expansion joints and deflection fittings.
 5. Cleanouts.
 6. Drains.
 7. Encasement for piping.
 8. Catch basins.
 9. Stormwater inlets.
 10. Stormwater detention structures.
 11. Pipe outlets.
 12. Manholes.
- B. Related Requirements:
1. Section 31 20 00 - Earth Moving
 2. Section 31 23 00 - Excavation and Fill
 3. Section 32 11 00 - Base Courses
 4. Section 32 32 15 - Landscape Concrete
 5. Section 32 33 00 - Site Furnishings
 6. Section 33 10 10 - Domestic Water Utilities

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM):
1. C478: Standard Specification for Circular Precast Reinforced Concrete Manhole Sections.
 2. C923: Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals.
 3. D2321: Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
 4. D2412: Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
 5. D2729: Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 6. D3034: Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 7. D3350: Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
 8. D4101: Standard Specification for Polypropylene Injection and Extrusion Materials.
- B. California Building Code, Current Edition.
- C. State of California, Business and Transportation Agency, Department of Transportation (Caltrans) "Standard Specifications."

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Submittal Procedures: Action and Informational Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.

- B. Coordinate work of this section with all other work contained in the Contract Documents.

1.04 ACTION SUBMITTALS

- A. Shop Drawings:
 - 1. Manholes: Include plans, elevations, sections, details, frames, ladder (where applicable), and covers.
 - 2. Catch basins, stormwater inlets, and dry wells. Include plans, elevations, sections, details, frames, covers, and grates.
- B. Product Data: Manufacturer's cut-sheets of products to be used.

1.05 INFORMATIONAL SUBMITTALS

- A. Field Test Reports indicating and interpreting test results for compliance with performance.

1.06 CLOSEOUT SUBMITTALS

- A. Record Drawings:
 - 1. Accurately record location of new piping, drain structures, and connections to existing systems using horizontal dimensions, elevations, inverts and slope gradients as applicable.
 - 2. Comply with the additional requirements of Section 01 78 39 – Project Record Documents.

1.07 QUALITY ASSURANCE

- A. Control of Work: Conform to Section 5 of the Standard Specifications.
- B. Control of Materials: Conform to Section 6 of the Standard Specifications.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Store pipe neatly and orderly, stacked and blocked to prevent damage. Cracked, checked, spalled or otherwise damaged pipe and precast concrete units shall be removed from site.
- B. Use of chain slings shall not be permitted.
- C. Piping, fittings and related materials shall be carefully handled. Comply with manufacturer's rigging instructions for precast items. Use of chain slings is not be permitted.
- D. All pipelines, fittings and drainage structures shall be kept clean and closed during construction.

1.09 FIELD CONDITIONS

- A. Make provisions for, and take the necessary precautions to protect existing and new work from damage during entire life of project.
- B. Work of this Section shall not be executed when site conditions are detrimental to quality of work as determined by the District's Representative.
- C. Do not interrupt service to facilities occupied or used by District without the District's written permission.

PART 2 - PRODUCTS

2.01 PIPE AND FITTINGS

A. General:

1. Pipe and fittings shall be clearly and permanently marked to identify manufacturer, type, class, or schedule and NSF approval as applicable.
2. Unless otherwise noted, Contractor has option of using either CHDPE or PVC pipe as specified.

B. Corrugated High Density Polyethylene (CHDPE) Pipe: Dual wall, perforated and solid with an integrally formed smooth waterway; "N-12 "drainage pipe by Advanced Drainage Systems, Inc., 510-913-2211, or equal.

1. Nominal sizes shall have a full circular cross-section, with an outer corrugated pipe wall and an essentially smooth inner wall (waterway).
2. Corrugations may be either annular or spiral.
3. Sizes shall conform to the AASHTO classification "Type S."
4. Pipe manufacturer for this specification shall comply with the requirements for test methods, dimensions, and markings found in AASHTO Designations M252 and M294.
5. The minimum parallel plate stiffness values when tested in accordance with ASTM D2412 shall be as follows:

Diameter	Pipe Stiffness
4 inch (100 mm)	50 psi (340 kPa)
6 inch (150 mm)	50 psi (340 kPa)
8 inch (200 mm)	50 psi (340 kPa)
10 inch (250 mm)	50 psi (340 kPa)
12 inch (300 mm)	50 psi (340 kPa)
15 inch (375 mm)	42 psi (290 kPa)

6. Fittings: Virgin PE compounds conforming with the requirements of ASTM D3350, cell class 324420C, and supplied or recommended by the pipe manufacturer.
 - a. The fittings shall not reduce or impair the overall integrity or function of the pipeline.
 - b. Common Corrugated Fittings:
 - 1) Couplers, reducers, and other in-line joint fittings.
 - 2) "Tees", "wyes", end caps, and other branch or complimentary assembly fittings.
 - c. Acceptable Installation Methods: Snap-on, screw-on, bell and spigot, and wrap around.
 - d. Couplings shall provide sufficient longitudinal strength to preserve pipe alignment and prevent separation at the joints.
 - e. Where designated on the Drawings and as required by the manufacturer, a neoprene or rubber gasket shall be supplied.

C. Smooth Polyvinyl Chloride Pipe (PVC) and Fittings: SDR 26, spigot end, Type I PVC 1120, NSF approved, and complying with ASTM D3034.

D. Smooth Polyvinyl Chloride (PVC) Perforated Drain Pipe and Fittings: Bell and non-pressure rated PVC SDR 35 pipe with two rows of perforations 120 degrees apart on bottom of pipe 5 inches on center, conforming with ASTM D2729 or ASTM D3034 and Section 68 of the Standard Specifications.

E. Reinforced Concrete Pipe (RCP) and Fittings: Conform to Section 65 of the Standard Specifications and AASHTO M 170 Class III, unless otherwise shown on the Drawings.

2.02 DRAINAGE STRUCTURES

- A. Manholes: Precast, complying with ASTM C478 and AASHTO M199 and Section 70 of the Standard Specifications; Forterra Pipe & Precast, Oldcastle Precast, or equal.
 - 1. Provide frame, cover, grade rings, and related materials required by the Drawings.
 - 2. Diameter: as shown on plans.
 - 3. Resilient connectors between manhole and piping shall comply with ASTM C923.
- B. Precast Catch Basins:
 - 1. General:
 - a. Grates in paved areas shall conform to ADA Standards for Accessible Design.
 - b. All catch basins to have locking mechanism or screw down grate to frame.
 - c. Provide two grade rings at each catch basin.
 - 2. 12-Inch Basin: "CB12" supplied by Central Precast – US Concrete, or equal.
 - a. Grating: Round, galvanized steel, ADA compliant, lockable, and meeting AASHTO H20 heavy-duty loading, or equal.
 - 3. 18-Inch Basins: "RBT 1812" as supplied by Oldcastle Precast, 888-965-3220, or equal.
 - a. Grating: Round, lockable.
 - 4. 24-inch Basins: "RBT 2412" as supplied by Oldcastle Precast, 888-965-3220, or equal.
 - a. Grating: Round, ADA compliant, and lockable.
 - 5. 36-Inch Basins: Christy "CB-3" drain box Oldcastle Precast, 888-965-3220, or equal.
 - a. Grating: Galvanized steel, ADA compliant, lockable, and meeting AASHTO H20 heavy-duty loading.
- C. PVC Catch Basins: Nyloplast, 866-888-8479, or equal.
 - 1. Basin Bodies: PVC.
 - 2. Connection to corrugated pipes shall be made with flexible rubber gasket meeting requirements of ASTM F477.
 - 3. Casting shall be ductile iron.
 - 4. Flashboards shall be constructed of a corrosion-resistant material.
 - 5. Inlet and Outlet Size: As indicated on the Drawings.
- D. Extensions: Provide box extensions, junction boxes and grade rings compatible with structures as necessary to finish at the proper elevation and to facilitate future elevation adjustments as noted below.
- E. Clean Outs: As shown or noted in the Drawings.
- F. French Drain: As shown or noted in the Drawings.
- G. Atrium Drains: 3-inch round, flat-top structural foam polyolefin with UV inhibitor; Part No. 70 by NDS, Inc., 888-825-4716, or equal.
- H. Drop Inlet: 12 inches, Model #1240 by NDS, Inc., 888-825-4716, or equal.
- I. Trench Drains: Pre-sloped slot channel drain; Model KS 100S by ACO Polymer Products, Inc., 888-490-9552, or equal.
 - 1. Provide appropriate end connections and 600 series catch basin with in-line trash bucket and outlet connections.
 - 2. Grates:
 - a. Pedestrian Locations: No. 494Q with quick lock locking device, and complying ADA Standards for Accessible Design.
 - b. Vehicular Traffic Locations: Galvanized, No. 411Q.
- J. Drinking Fountain Drain: Square with cast iron body and bronze grate; Z415 Series floor drain Model Z415SH by Zurn, or equal.
 - 1. Size: 8 inches by 8 inches.

2.03 ADDITIONAL MATERIALS

- A. Permeable Rock Beneath Synthetic Turf Area: As specified in Section 32 18 14 – Synthetic Turf Base.
- B. Drainage Rock: 3/4 inch crushed rock, unless otherwise shown on the Drawings, available through Stevens Creek Quarry, Inc., Cupertino, or TMT Enterprises, Inc., San Jose, or equal.
- C. Pea Gravel:
 - 1. Supplier: Harbor Sand & Gravel, Redwood City, TMT Enterprises, Inc., San Jose; or equal.
 - 2. Conform to the following gradation requirements:

U.S. Standard Sieve Mesh	Allowable Range Percent Retained on Sieve
1/2 inch (12.5 mm)	95% passing
1/4 inch (6.3 mm)	45% passing
10 mesh (2.0 mm)	No more than 10% passing
18 mesh (1.0 mm)	No more than 5% passing

- D. Filter Fabric: Mirafi 140N, or equal.
- E. Filter Fabric Fasteners: Metal clip type staple.
- F. Mortar: A 1:2 portland cement to sand mixture with a minimum of water conform to the applicable sections of the Standard Specifications.
- G. Steps at Manhole: Manufacture from deformed, 1/2-inch steel reinforcement rod complying with ASTM A615/A615M and encased in polypropylene complying with ASTM D4101. Include pattern designed to prevent lateral slippage off step.
- H. Structural Adhesives for Manholes, Catch Basins, and Junction Boxes: “Ram-Nek” by Henry Company, 800-523-0268, or equal as available.
- I. Reinforcing Bars: As specified in Section 32 32 15 – Landscape Concrete.
- J. Minor Concrete: Comply with requirements of Section 32 32 15 – Landscape Concrete.

PART 3 - EXECUTION

3.01 EARTHWORK

- A. Excavation, trenching, and backfilling are specified in Section 3120 00 "Earth Moving."

3.02 PIPING INSTALLATION

- A. General:
 - 1. Pipe shall be installed per manufacturers' instructions and in conformance with the Contracts Documents.
 - 2. Installation of thermoplastic pipe shall be in accordance with ASTM D2321.
- B. CHDPE Pipe:
 - 1. Pipe shall be installed with a minimum cover under the H-20 live load equal to 12 inches to the top of subgrade elevation.

2. Minimum compaction for pipe subject to H-20 live load is 90 percent in accordance with Section 19, Standard Specifications.
 3. CHDPE pipe shall be laid and jointed in accordance with generally accepted practice and the following provisions to provide the required work.
- C. Flat Panel Piping:
1. Install per the layout indicated on the Drawings and in strict compliance with Manufacturer's written recommended installation instructions.
 2. Contractor shall exercise caution to not crush or damage the piping during installation of the permeable rock base.

3.03 INSTALLATION OF DRAINAGE STRUCTURES

- A. General: Set rim or cover elevations to specified grades utilizing a minimum of two grade rings (or extensions) at top of drainage structure to facilitate potential elevation adjustments in the future.
- B. Catch Basins: Install as shown in the Drawings and as follows:
1. Excavate as required.
 2. Set on firm, unyielding base. Set on compacted select backfill material if directed by District's Representative.
 3. Prefabricated units not having a bottom shall be set on a poured-in-place concrete slab with smooth trowel finish. Mortar and properly seal unit to slab, making a water tight connection.
 4. Install pipe inlets and outlets to specified elevations. Grout and/or seal all joints to a watertight condition with material per manufacturer's recommendation.
- C. Manholes: Install per manufacturer's recommendations and as shown in the Drawings.
- D. Trench Drains: Install as shown in the Drawings and in accordance with the manufacturer's written recommendations.
- E. Drinking Fountain Drains, Atrium Drains and Drop Inlets: Install as shown in the Drawings and in accordance with the manufacturer's written recommendations.

3.04 IDENTIFICATION

- A. Materials and their installation are specified in Section 31 20 00 - Earth Moving. Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.
- B. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.05 FIELD QUALITY CONTROL

- A. The District's Representative shall review and accept work at the following stages:
1. Excavated trench with bedding in place prior to any pipe being laid.
 2. Pipe laid prior to backfilling. Pipe covered prior to review and acceptance shall be uncovered and re-backfilled at Contractor's expense.
 3. Drainage device location and pipe connection.
 4. New drainage system shall be flood tested and clean of debris.

END OF SECTION