

**Chavez High School
Athletic Facility Improvements
Stockton Unified School District**



DSA Submittal Specifications

March 27, 2020

PREPARED BY:



VERDE DESIGN

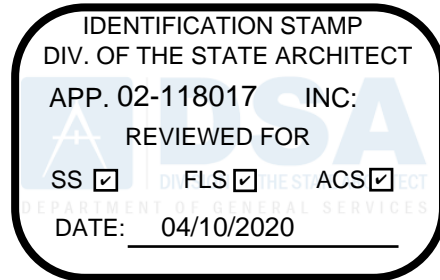
Project No. 1910900
DSA App No. 118017

**Chavez High School Athletic Facility Improvements
Stockton Unified School District**

SPECIFICATIONS SIGNATURE PAGE



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Division of the State Architect
State of California



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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 consists of Chavez High School Athletic Facility Improvements, including, but not necessarily limited to, the following:
 - 1. The following are examples. Revise to conform to scope of work of project.
 - 2. Demolition of a portion of the existing baseball and multi-use field
 - 3. Installation of new synthetic turf baseball stadium with lighting
 - 4. Installation of restroom/concessions building
 - 5. Renovations and improvements to existing multi-use field
 - 6. Perimeter paving, parking lot, site fencing, site furnishing improvements
 - 7. Site drainage, irrigation, and utility upgrades
- B. Bid Alternate work of this Contract shall include, but not necessarily be limited to, the following:
 - 1. Bid Alternate 1:
 - a. Home Plate Area, Pitcher's Mound, and Bullpens to be constructed of infield fines and/or clay, in lieu of synthetic turf.
- C. The Work specifically includes all work as represented by the Drawings and Specifications issued for construction and subsequent approved revisions and addenda.
- D. 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 Athletic Facility Improvements.
- 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 2016 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 5:00 PM and 8:00 AM, 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:

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

Date: _____

Comments:

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. WWSA 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 District's 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 District's 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 District's 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 District's 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 District's 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 District's 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 District's 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 District's Representative or a written order for a minor change in the work issued by the District's Representative.
- L. Notice To Proceed: The words "Notice to Proceed" shall mean the written notice issued by the District's 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 District's 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 Contractor 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, beamed 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 Playing Field
 - 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 the field crown, 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 field crown, 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 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. CMU dugouts.
 - b. Restroom/ticketing building.
 - c. Pavement markings in parking lot.
 - d. 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. Colors shall be as scheduled on the Drawings. Scheduled colors may have manufacturer identifications other than the acceptable manufacturers listed above. The Drawing listing is solely for the purpose of conveying color information and does not imply manufacturer's approval or waiver of the requirement that all coatings be from the same manufacturer, unless a specific system is not available from the primary manufacturer.
- 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. CMU Dugouts building exterior painted surfaces
 - b. Restroom/ticketing building exterior painted surfaces
- B. Related Requirements:
 - 1. Section 09 91 15 – Exterior Site Painting
 - 2. Section 32 32 15 – Landscape Concrete.

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 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 CEC 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 $\frac{3}{4}$ " 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 CEC. 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 CEC 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 CEC 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 an 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), | California Electrical Code CEC - Latest Revision:
 - 1. Underground Installations CEC Article 300
 - 2. Rigid Nonmetallic Conduit CEC 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. California Electrical Code (CEC).
- 2. 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 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 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 #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 26 56 68

SPORTS FIELD LIGHTING

PART 1 PERFORMANCE

1.01 RELATED DOCUMENTS

Drawings and general provisions of the bid documents, including general and supplementary conditions apply to this section.

1.02 DESCRIPTION OF WORK

- A. The Sports Lighting section includes:
1. Galvanized steel pole and luminaire mounting crossarm
 2. Luminaire, with appropriate glare/spill light control
 3. Lamps
 4. Pole Foundations
 5. Control System
- B. The purpose of this specification is to define the lighting performance standards, product values and features and manufacturer's service responsibilities.

1.03 SUBMITTALS

- A. Lighting manufacturer shall be Musco Sports Lighting LLC, Model LSG (Light Structure Green).
- B. Manufacturer shall provide submittal information 5days prior to bid opening.
- C. Submittal information required :
1. Light scans as per Section 1.04 of the specification.
 2. Spill scans as per Section 1.05 of the specification.
 3. Detailed warranty information as per Section 3.01 of the specification.
 4. Detail foundation design as described in Section 2.01 of the specification.
 5. Provide written information for the automated control system as per section 2.02. Detailed information on Lighting Contactor cabinets as per section 2.02
 6. A list of 5 similar project references in the State of California using the proposed equipment. The list shall include contact names and phone numbers.
 7. Provide a life cycle cost analysis based on: $\#$ luminaires x .12 kW rate x 400 annual usage hours x 25 years

1.04 SPORTS LIGHTING PERFORMANCE

- A. The manufacturer shall supply lighting equipment and computer generated point-by-point analysis to meet the following:
1. The performance criteria requires lighting equipment which will provide measured average illumination level shall be $\pm 10\%$ of predicted mean in accordance with IESNA RP-6-01 and measured within the first 100 hours of operation. Light Levels shall meet or exceed the following for the entire 5000 hour lamp life.

Area of Lighting	Entire Field	Grid Points	Grid Spacing
Little League Field	50.0 footcandles	25	20' x 20'

(Infield)			
Little League Field (Outfield)	30.0 footcandles	92	20' x 20'
Soccer Field 1&2	30.0 footcandles	77	30' x 30'
Baseball Field (Infield)	50.0 footcandles	25	30' x 30'
Baseball Field (Outfield)	30.0 footcandles	83	30' x 30'

2. Uniformity Ratio: The footcandle level shall have a uniformity ratio of maximum to minimum ratio of not greater than the following:

Area of Lighting	Entire Field
LL/Baseball (Infield)	2.0:1
LL/Baseball (Outfield)	2.5:1
Soccer Fields	2.5:1

3. The manufacturer guarantees field light intensity levels and uniformity ratios at initial start-up and throughout rated life of the lamp (5000 hrs). Light level readings shall be completed as detailed in the point-by-point analysis.

1.05 SPILL LIGHT ANALYSIS

1. Submitted spill/glare computer models shall depict the field test stations as being on a line along at 150' around the perimeter of the playing field, and the test stations shall be shown every 30' along the line with the field lights on. Bidder shall submit two (2) different models, as described below:
2. The lighting manufacturer shall be required to provide lighting calculations based upon the criteria of one of the following options:
 - a. Horizontal footcandles: No single point shall exceed .90 footcandles and the average of all points shall not exceed .25 footcandles. Models shall represent readings taken with the meter positioned horizontal 36 inches above grade.
 - b. Maximum footcandles: No single point shall exceed 3.25 footcandles and the average of all points shall not exceed 1.25 footcandles. Models shall represent readings taken with the test cell positioned 36 inches above grade and aimed at the brightest light source.
3. The lighting manufacturer shall be required to provide lighting calculations based upon the criteria of one of the following options:
 - a. Option A
 - i. Lamps shall be rated for a nominal 134,000 lumens over the rated life of the lamp;
 - ii. Light levels shall be constant/guaranteed for 5000 hrs (rated lamp life);
 - iii. Light levels shall be guaranteed over a 25 year period or 10,000 hours (whichever occurs first)
 - b. Option B
 - iv. Lamps shall be rated for a maximum of 155,000 initial lumens.
 - v. A Recoverable Light Loss Factor not greater than 0.70 shall be used.
 - vi. Light levels shall be guaranteed by the manufacturer for 10,000 hours. Manufacturer shall be responsible for all necessary lamps, equipment and labor to meet the light levels.
 - vii. Luminaires shall be NEMA 2, 3, 4 & 5, with no more than 10% being Nema 2's.
4. For either scenario, the lighting system shall meet the Maximum to Minimum ratio.

PART 2 MATERIALS

2.01 Lighting Structure

A. General Description

The lighting system shall consist of a steel pole system and cross-arm assembly, wire harness, and remote electrical component enclosure and concrete foundation.

B. Pole and Cross-arm Assembly

1. The wind loading on the pole and all attachments shall be based upon the CBC 2016 building code and wind speed of 110 mph.
2. Poles shall be hot dip galvanized after fabrication. Direct burial steel poles will not be accepted.

C. Foundation Design

1. The equipment manufacturer shall supply a stamped foundation designed by a licensed structural engineer of California.
2. If a Geotechnical Report is not provided by the Owner, a foundation design shall be based on soils that meet or exceed those of a Class 5 material as defined by the 2016 CBC Table 1806A.2

It is the contractor's responsibility to notify the owner of soil conditions other than the design criteria. The owner shall then be responsible and absorb the additional costs associated with:

- a. Providing engineered foundation embedment design by a registered engineer in the State of California for soils other than specified soil conditions.
- b. Additional materials required to achieve alternate foundation.

D. Luminaire Assembly

1. Luminaire shall be of die cast aluminum and powder-coated gray with external visor for glare control.
2. Lamps shall be 1500 watt metal halide and shall meet ANSI designation M48PC-1500 and be Philips MH1500MZ (Z lamp orientation) or an approved equal.

E. Remote Electrical Enclosure

1. Remote Electrical Enclosure to include ballasts, capacitor, disconnect and individual fixture fusing.
2. Obtain Owner/City pad lock and secure Remote Electrical Enclosure.

2.02 CONTROL AND MONITORING SYSTEM

1. Remote Monitoring System: System shall monitor lighting performance and notify manufacturer if individual luminaire outage is detected so that appropriate maintenance can be scheduled. The manufacturer shall notify the owner of outages within 24 hours, or the next business day. The controller shall determine switch position (manual or auto) and contactor status (open or closed).
2. Remote Lighting Control System: System shall include lighting contactors. System shall allow owners and users with a security code to schedule on/off system operation via a web site or phone. Manufacturer shall provide and maintain a two-way TCP/IP communication link. Trained staff shall be available 24/7 to provide scheduling support and assist with reporting needs with toll free number.

PART 3 WARRANTY AND ACCOUNTABILITY

3.01 WARRANTY

- A. Preventative and spot maintenance: Manufacturer shall provide all preventative and spot maintenance, including parts and labor for 25 years or 10,000 hours (whichever occurs first) from the date of equipment delivery. Individual lamp outages shall be repaired when more than 10% of the lamps are out on any one field, or when lamp outages materially impact the usage of any field. Owner agrees to check fuses in the event of a fixture outage.

3.02 LIFE CYCLE SAVINGS

- A. Energy Consumption: Based on a 5000 hour operating cycle, the average kWh consumption for the entire field lighting system shall be 138 or less.

- B. Complete Lamp replacement: Manufacturer shall include one group lamp replacement to be completed at the end of the 5000 hours of operation. Manufacturer shall warrant the system to meet designed light levels upon completion of this re-lamp.
 - C. Provide life cycle savings as per section 1.03
- 3.03 INSPECTION AND VERIFICATION – The lighting manufacturer shall guarantee illumination light levels within +/- 10% of the criteria in section 1.04. Field measurements shall be done per engineer's recommendation. Failure to achieve specified performance will be the manufacturer's responsibility and cost for corrective measures to meet specified performance.
- 3.04 FIELD TECHNICIAN - Manufacturer shall have available a local factory trained technician to provide project support including but not limited to: Lamp replacement, confirm luminaire aiming points, troubleshoot, and educate customer maintenance personnel.

PART 4 EXECUTION

4.01 Installation:

A. General:

1. All fixtures and luminaires shall be clean and lamps shall be operable at the time of acceptance
2. Install luminaires in accordance with manufacturer's instructions, complete with lamps, ready for operation as indicated.
3. Align, mount, and level the luminaires uniformly.
4. Avoid interference with and provide clearance for equipment. Where an indicated position conflicts with equipment locations, change the location of the luminaire by the minimum distance necessary. This change will require architect/engineering approval.

B. Mounting and Supports:

1. Mounting heights shall be base on lighting performance requirements of this section (Items 1.04 & 1.05)
2. Sport Lighting Manufacturer to provide Luminaire supports needed to secure fixtures based on manufacturer's recommended cross-arm assembly and comply with CBC 2016 building code.

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 warrantee 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 M600. Or approved equal. Qty. 4 (for pole speakers)
Power Amplifier: Shall be Bogen M450. Or approved equal. Qty. 1 (for speakers on top of Press box)
- F. CD/MP3 Player: Shall be Tascam CD-200BT or approved equal. Qty. 1.
- G. Athletic field speaker system: Shall be New Apogee AFI-4W-SX or approved equal. Qty. 8.
Press Box Speaker: Shall be New Apogee AFI-4W-SX or approved equal. Qty. 2.
- H. Pole Mounts for Apogee AFI-4W-SX speakers shall be Allen Products Polestar Series:
Dual Speaker Adapter: Polestar PM-DA-36. Qty. as required
Band Strap: Polestar PM-Band-60. Qty. as required
Pole Mount: Polestar PM-Mount-6Up. Qty. as required
- 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 Floor Mounted Rack: Shall be Middle Atlantic Products ERK 2527 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 Techtron 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 Techtron 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 28 31 00

NETWORKED FIRE ALARM & MASS NOTIFICATION SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Expandable emergency evacuation fire alarm system.

1.02 RELATED SECTIONS

- A. Section 13800 – Building Automation and Control.
- B. Section 13900 (21 00 00) – Fire Suppression.

1.03 REFERENCES

- A. Electrical Industries Association (EIA):
 - 1. RS-232-D – Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange
 - 2. RS-485 – standard defining the electrical characteristics of drivers and receivers for use in balanced digital multipoint systems
- B. National Fire Protection Association (NFPA):
 - 1. NFPA 12 – Standard on Carbon Dioxide Extinguishing Systems.
 - 2. NFPA 13 – Installation of Sprinkler Systems.
 - 3. NFPA 15 – Standard for Water Spray Fixed Systems for Fire Protection.
 - 4. NFPA 16 – Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems.
 - 5. NFPA 16A – Standard for the Installation of Closed Head Foam-Water Sprinkler Systems.
 - 6. CEC California Electrical Code
 - 7. NFPA 72 – National Fire Alarm Code.
 - 8. NFPA 90A – Standard for the Installation of Air Conditioning and Ventilating Systems.
 - 9. NFPA 101 – Life Safety Code.
 - 10. NFPA 750 – Standard on Water Mist Fire Protection Systems.
 - 11. NFPA 5000 – Building Construction and Safety Code.
- C. Underwriters Laboratories (UL):
 - 1. UL 268 – Standard for Smoke Detectors for Fire Alarm Signaling Systems.
 - 2. UL 864 – Standard for Control Units and Accessories for Fire Alarm Systems.
 - 3. UL 1971 – Standard for Signaling Devices for the Hearing Impaired.
 - 4. UL 2572 – Standard for Control and Communication Units For Mass Notification Systems.

1.04 SYSTEM DESCRIPTION

- A. A new intelligent reporting, Style 7 networked, fully peer-to-peer, microprocessor-controlled fire detection and emergency voice alarm communication system shall be installed in accordance with the specifications and as indicated on the Drawings.
- B. Each Signaling Line Circuit (SLC) and Notification Appliance Circuit (NAC): Limited to only 80 percent of its total capacity during initial installation.

- C. Basic Performance:
1. Network Communications Circuit (NetSOLO) Serving Network Nodes: Wired using single twisted non-shielded 2-conductor cable or connected using approved fiber optic cable between nodes in Class B configuration.
 2. Signaling Line Circuits (SLC) Serving Addressable Devices: Wired Class B.
 3. Initiation Device Circuits (IDC) Serving Non-addressable Devices Connected to Addressable Monitor Modules: Wired Class B.
 4. Notification Appliance Circuits (NAC) Serving Strobes, Horns and Speakers: Wired Class B.
 5. On Class B Configurations: Single ground fault or open circuit on Signaling Line Circuit shall not cause system malfunction, loss of operating power, or ability to report alarm.
 6. Alarm Signals Arriving at INCC COMMAND CENTER: Not be lost following primary power failure until alarm signal is processed and recorded.
 7. Transponders:
 - a. Operate in peer-to-peer fashion with other panels and transponders in system.
 - b. Each transponder shall store copy of audio evacuation messages and tones.
 - c. Systems that use centralized message storage and control at main fire alarm control panel shall not be acceptable.
 8. Network Node Communications, Audio Evacuation Channels and Fire Phone Communications:
 - a. Communicated between panels and transponders on single twisted pair of copper wires or fiber optic cables.
 - b. To enhance system survivability, ability to operate on loss of INCC Command Center, short or open of entire riser at INCC Command Center shall be demonstrated at time of system acceptance testing.
 - c. Systems that are not capable of providing true Class A performance for fire fighter's phone communications shall not be acceptable.
 9. Signaling Line Circuits (SLC):
 - a. Reside in remote transponders with associated audio zones.
 - b. SLC modules shall operate in peer-to-peer fashion with all other panels and transponders in system.
 - c. On loss of INCC Command Center, each transponder shall continue to communicate with remainder of system, including all SLC functions and audio messages located in all transponders.
 - d. Systems that provide a "Degraded" mode of operation upon loss of INCC Command Center or short in riser shall not be acceptable.
 10. Audio Amplifiers and Tone-Generating Equipment: Electrically supervised for normal and abnormal conditions.
 11. Amplifiers: Located in transponder cabinets serving no more than 3 floors per transponder to enhance system survivability, reduce required riser wiring, simplify installation, and reduce power losses in length of speaker circuits.
 12. Speaker NAC Circuits: Arranged such that there is a minimum of 1 speaker circuit per fire alarm zone.
 13. Notification Appliance Circuits (NAC), Speaker Circuits, and Control Equipment: Arranged such that loss of any 1 speaker circuit will not cause loss of any other speaker circuit in system.
 14. Speaker Circuits:
 - a. Electrically supervised for open and short circuit conditions.
 - b. If short circuit exists on speaker circuit, it shall not be possible to activate that circuit.
 - c. Arranged for 25 or 70 VRMS and shall be power limited in accordance with NEC
 - d. 20 percent spare capacity for future expansion or increased power output requirements.
 15. Speaker Circuits and Control Equipment:

- a. Arranged such that loss of any 1 speaker circuit will not cause loss of any other speaker circuit in system.
 - b. Systems utilizing "bulk" audio configurations shall not be acceptable.
 - 16. 2-Way Telephone Communication Circuits:
 - a. Shall communicate digitally over the network between transponders.
 - b. Supervised for open and short circuit conditions.
 - c. Short circuit condition on 2-way telephone communications circuit shall result in trouble condition and not result in call-in condition.
 - 17. Voice Communication:
 - a. Connect telephone circuits to speaker circuits to allow voice communication over speaker circuit from telephone handset.
 - b. Capable of remote phone-to-phone conversations and party-line communications as required.
- D. Basic System Functional Operation: When fire alarm condition is detected and reported by 1 of the system alarm initiating devices, the following functions shall immediately occur:
 - 1. System Alarm LEDs: Flash.
 - 2. Local Piezo-Electric Signal in Control Panel: Sound at a pulse rate.
 - 3. 80-Character LCD Display: Indicate all information associated with fire alarm condition, including type of alarm point and its location within protected premises.
 - 4. Historical Log: Record information associated with fire alarm control panel condition, along with time and date of occurrence. History Log shall have capacity for recording up to 4,100 events.
 - 5. System output programs assigned via control-by-event equations to be activated by particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated.
 - a. Close Fire Doors
 - b. Shot down air handlers as required by code
 - c. Notify the Central Station or Municipal Tie.
 - 6. Strobes flash synchronized continuously.
 - 7. Audio Portion of System: Sound alert tone followed by pre-recorded message determined by event and this scenario repeating or other message as approved by local authority until system is reset.
- E. Fire Alarm System Functionality:
 - 1. Provide complete, electrically supervised distributed, Class A networked analog/addressable fire alarm and control system, with analog initiating devices, integral multiple-channel voice evacuation, and fire fighter's phone system.
 - 2. Fire Alarm System:
 - a. Consist of multiple-voice channels with no additional hardware required for total of 4 channels.
 - b. Incorporate multiprocessor-based control panels, including model E3 Series modules includes Intelligent Network INCC Command Center(s) (INCC), Intelligent Loop Interface (ILI-MB-E3 or ILI95-MB-E3), Intelligent Network Transponders (INX), communicating over peer-to-peer token ring network with standard capacity of up to 64 nodes expandable to 122.
 - 3. Each ILI-MB-E3 or ILI95-MB-E3 Node: Incorporate 2 Signaling Line Circuits (SLC), with capacity to support in Velociti ® mode up to 159 analog addressable detectors and 159 addressable modules per ILI-MB-E3 SLC or support in Apollo mode up to 126 detectors and modules per ILI95-MB-E3 SLC.
 - 4. Voice, Data, and Fire Fighter's Phone Riser: Transmit over single pair of wires or fiber optic cable.
 - 5. Each Intelligent Network Transponder: Capable of providing 16 distributed voice messages, fire fighter phones connections, SLC loop for audio control devices, and integral network interface.

6. Each Network Node: Incorporate Boolean control-by-event programming, including as a minimum AND, OR, NOT, and Timer functions.
7. Control Panels: Capability to accept firmware upgrades via connection with laptop computer, without requirement of replacing microchips.
8. Network:
 - a. Based on peer-to-peer token ring technology operating at 625 K baud, using Class A configuration.
 - b. Capability of using twisted-pair wiring, pair of fiber optic Multi-mode cable strands up to 200 microns or Single-mode optimized for 9/125 microns, or any combination, to maximize flexibility in system configuration.
9. Each Network Node:
 - a. Capability of being programmed off-line using Windows-based software supplied by fire alarm system manufacturer. Capability of being downloaded by connecting laptop computer into any other node in system. Systems that require system software to be downloaded to each transponder at each transponder location shall not be acceptable.
 - b. Capability of being grouped with any number of additional nodes to produce a "Region", allowing that group of nodes to act as 1, while retaining peer-to-peer functionality. Systems utilizing "Master/Slave" configurations shall not be acceptable.
 - c. Capability of annunciating all events within its "Region" or annunciating all events from entire network, on front panel LCD or touchscreen display without additional equipment.
10. Each SLC Network Node: Capability of having integral DACT (digital alarm communicator transmitter) that can report events in either its region, or entire network to single central station monitoring account.
11. Each Control Panel: Capability of storing its entire program, and allow installer to activate only devices that are installed during construction, without further downloading of system.
12. Password Protection: Each system shall be provided with 4 levels of password protection with up to 16 passwords.
13. Have the capacity for multiple pre-recorded messages (at least sixteen (16), but more if required by local AHJ) and address a list of subjects.
 - Fire evacuation and relocation
 - Intruder or hostile person sighted within or around the building grounds
 - Directions to occupants to take cover within building
 - Emergency weather conditions appropriate for local area
 - All Clear

1.05 SUBMITTALS

- A. Comply with Section 01330 (01 33 00) – Submittal Procedures.
- B. Include sufficient information, clearly presented, to determine compliance with the specifications and the Drawings.
- C. Equipment Submittals:
 1. Cover Page: Indicate the following:
 - a. Project name and address.
 - b. Engineered systems distributor's name and other contact information.
 - c. Installing contractor's name and other contact information.
 - d. Date of equipment submittals. Indicate on revised submittals the original submittal date and revised submittal date.
 2. Table of Contents: Lists each section of equipment submittal.

3. Scope of Work Narrative: Detail indented scope of work.
 4. Sequence of Operations: Use matrix or written text format, detailing activation of each type of device and associated resulting activation of the following:
 - a. Control panel.
 - b. Annunciator panels.
 - c. Notification appliances.
 - d. Building fire safety functions, including elevator recall, elevator power shutdown, door lock release, door holder release, HVAC unit shutdown, smoke evacuation system activation, and stair pressurization fan activation.
 5. Bill of Material: Indicate for each component of system the following:
 - a. Quantity.
 - b. Model number.
 - c. Description.
 6. SLC Circuit Schedule: Detail address and associated description of each addressable device. Clearly provide information that indicates number of both active and spare addresses.
 7. Battery Calculations: Show load of each of, and total of, components of system along with standby and alarm times that calculations are based on. Show calculated spare capacity and size of intended battery.
- D. Shop Drawings:
1. Cover Page: Indicate the following:
 - a. Project name and address.
 - b. Engineered systems distributor's name and other contact information.
 - c. Installing contractor's name and other contact information.
 - d. Date of equipment submittals. Indicate on revised submittals the original submittal date and revised submittal date.
 2. Floor Plans:
 - a. Provide separate floor plan for each floor.
 - b. If a floor plan must be split using match lines to fit on the page, provide match lines and match line references that refer to sheet number that shows area on opposite side of match line.
 - c. Prepare using AutoCAD.
 - d. Prepare to scale 1/8 inch = 1'-0", unless otherwise required by the Architect or Engineer.
 - e. Show equipment and device locations.
 - f. Show wiring information in point-to-point format.
 - g. Show conduit routing, if required by the AHJ.
 3. Title Block: Provide on each sheet and include, at a minimum, the following:
 - a. Project name.
 - b. Project address.
 - c. Sheet name.
 - d. Sheet number.
 - e. Scale of drawing.
 - f. Date of drawing.
 - g. Revision dates, if applicable.
 4. Control Panel: Provide sheet that details exterior and interior views of control panel and clearly shows associated wiring information.
 5. Annunciator Panels: Provide sheet that details exterior and interior views of annunciator panels and clearly shows associated wiring information.
- E. Certification: Submit with equipment submittals and shop drawings, letter of certification from major equipment manufacturer, indicating proposed engineered system distributor is an authorized

representative of major equipment manufacturer. System distributor and installer shall be a company such as Sound and Signal, Inc. (925) 455-1778, www.soundandsignal.com

- F. Project Record Drawings:
 - 1. Submit complete project record drawings within 14 calendar days after acceptance test.
 - 2. Project record drawings shall be similar to shop drawings, but revised to reflect changes made during construction.
- G. Operation and Maintenance Manuals:
 - 1. Submit complete operation and maintenance manuals within 14 calendar days after acceptance test.
 - 2. Operation and maintenance manuals shall be similar to equipment submittals, but revised to reflect changes made during construction.
 - 3. Include factory's standard installation and operating instructions.

1.06 QUALITY ASSURANCE

- A. Codes and Standards:
 - 1. NFPA: System shall comply with the following NFPA codes and standards:
 - a. NFPA 12.
 - b. NFPA 13.
 - c. NFPA 15.
 - d. NFPA 16.
 - e. NFPA 16A.
 - f. CEC
 - g. NFPA 72.
 - h. NFPA 90A.
 - i. NFPA 101.
 - j. NFPA 750.
 - k. NFPA 5000.
 - 2. ADA: System shall conform to American with Disabilities Act (ADA).
- B. To ensure reliability and complete compatibility, all items of fire alarm system, including control panels, power supplies, initiating devices, and notification appliances, shall be listed by Underwriters Laboratories Inc. (UL) and shall bear "UL" label.
- C. Fire Alarm Control Panel Equipment: UL-listed under UL 864 Ninth Edition and UL 2572.
- D. Equipment, Programming, and Installation Supervision:
 - 1. Provide services of approved Platinum Level engineered systems distributor of Gamewell-FCI for equipment, programming, and installation supervision.
 - 2. Provide proof of factory training within 14 calendar days of award of the Contract.
- E. Software Modifications:
 - 1. Provide services of Platinum Level Gamewell-FCI factory-trained and authorized technician to perform system software modifications, upgrades, or changes.
 - 2. Provide use of all hardware, software, programming tools, and documentation necessary to modify fire alarm system software on-site.
 - 3. Modification includes addition and deletion of devices, circuits, zones, and changes to system operation and custom label changes for devices or zones.
 - 4. System structure and software shall place no limit on type or extent of software modifications on-site.

5. Modification of software shall not require power-down of system or loss of system fire protection while modifications are being made.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions.
- C. Handling: Protect materials from damage during handling and installation.

1.08 WARRANTY

- A. Warranty Period for System Equipment: 1 year from date of final acceptance.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Gamewell-FCI, Honeywell Fire Systems, 12 Clintonville Road, Northford, Connecticut 06472. Phone (203) 484-7161. Fax (203) 484-7118. Website: www.gamewell-fci.com.
- B. References to manufacturer's model numbers and other information is intended to establish minimum standards of performance, function, and quality. Equivalent equipment from Gamewell may be substituted for the specified equipment, as long as minimum standards are met. No other manufacturers, other than Gamewell-FCI, FCI, and Gamewell will be considered for use on this project.
- C. Substitute equipment proposed as equal to equipment specified shall meet or exceed requirements of this section. For equipment other than Gamewell-FCI E3 Series Expandable Emergency Evacuation Fire Alarm System, provide proof that such substitute equipment equals or exceeds features, functions, performance, and quality of specified equipment. This proof shall be provided by submission of a copy of specification with each copy of the submittals that has had each paragraph marked as either compliant or non-compliant along with a letter from engineering manager or product manager at factory that certifies information presented as either compliant or non-compliant including a detailed explanation of each paragraph identified as non-compliant. In order to ensure that the Owner is provided with a system that incorporates required survivability features, this letter shall also specifically certify that the system is capable of complying with the test requirements of this section.

2.02 DISTRIBUTED NETWORKED FIRE ALARM SYSTEM

- A. Distributed Networked Fire Alarm System: Gamewell-FCI E3 Series Expandable Emergency Evacuation Fire Alarm System.

2.03 INTELLIGENT NETWORK INCC COMMAND CENTER HARDWARE

- A. Intelligent Network INCC Command Center (INCC): Supply user interface, including LCD or touch-screen 1/4 VGA display Intelligent Loop Interface Modules (ILI-MB-E3/ILI95-MB-E3), manual switching, phone, and microphone inputs to the network. INCC shall consist of the following units and components:
 1. System Cabinet (B-, C-, or D-Size Cabinet) with associated inner door.

2. Power Supply Module (PM-9) with batteries.
 3. Intelligent Network Interface Voice Gateway (INI-VG).
 4. 80-Character LCD Display (LCD-E3).
 5. Intelligent Loop Main Board Interface (ILI-MB-E3 or ILI95-MB-E3).
 6. Optional Intelligent Loop Supplemental Interface (ILI-S-E3 or ILI95-S-E3).
 7. Optional DACT (DACT-E3).
 8. Optional ARCNET Repeater (RPT-E3) with fiber optic modules (FSL-E3 or FML-E3).
 9. Optional 1/4 VGA touch-screen display (NGA).
 10. Optional Auxiliary Switch Module (ASM-16).
 11. Optional LED Driver Module (ANU-48)
 12. Optional Microphone Assembly (INCC-MIC).
 13. Optional Telephone Assembly (INCC-TEL).
 14. Optional AM-50 Series amplifiers (AM-50, AM-50-70).
 15. Optional Addressable Node Expander (ANX-SR, ANX-MR-FO, ANX-MR-UTP).
- B. System Cabinet:
1. Surface or semi-flush mounted with texture finish.
 2. Consist of back box, inner door, and door.
 3. Available in at least 3 sizes to best fit project configuration.
 4. Houses 1 or more PM-9 Power Supply Modules, INI-VG Intelligent Network Interface Voice Gateway, 1 or more ILI-MB-E3/ILI95-MB-E3 assemblies, and other optional modules as specified.
 5. Construction: Dead-front steel construction with inner door to conceal internal circuitry and wiring.
 6. Wiring Gutter Space: A minimum of 1-inch wiring gutter space behind mounting plate.
 7. Wiring: Terminated on removable terminal blocks to allow field servicing of modules without disrupting system wiring.
- C. Power Supply Module (PM-9): Use latest technologies to provide system power, incorporates the following features:
1. Power-saving switching technology using no step-down transformers.
 2. 9-amp continuous-rated output to supply up to all power necessary under normal and emergency conditions for INCC Command Center Modules.
 3. Integral battery charger with capacity to charge up to 55 amp-hour batteries while under full load.
- D. Batteries:
1. Sufficient capacity to provide power for entire system upon loss of normal AC power for a period of 24 hours with 15 minutes of alarm signaling at end of this 24-hour period, as required by NFPA 72, Local Systems.
- E. Intelligent Network Interface Voice Gateway INCC Command Center (INI-VG): INI-VG shall be a multi-function board interchangeable in both INCC and INX. Functions of board shall have the following features as a minimum:
1. Microprocessor shall monitor all system events and perform all system programs, for all control-by-event (CBE) functions. System program shall not be lost upon failure of both primary and secondary power. Programming shall supporting Boolean logic including AND, OR, NOT, TIMING functions for maximum flexibility.
 2. Network Interface: Operate at 625 K baud configurable with any combination of wire and/or fiber topologies. Interface shall communicate with up to 122 nodes in peer-to-peer fashion.
 3. Fire Fighter Phone Riser: INI-VG shall generate local phone riser for use with AOM-TEL phone modules for connection to fire fighter phone stations and/or for connection of local

phone when used as INCC Command Center, including phone circuits. INI-VG shall mix its local phone riser to network in true Class A fashion. Systems not capable of true Class A communications for fire fighter's phone risers shall not be acceptable.

4. Advanced Processing: INI-VG shall incorporate latest in digital signaling processing technology with supporting Boolean logic including AND, OR, NOT, TIMING, COUNT, SCHEDULE functions.
5. Microphone Input: On-board and allow for addition of local microphone when used as INCC Command Center, including speaker circuit control.
6. Signal Processing: INCC shall use advanced Digital Signal Processing (DSP) technology to allow maximum flexibility of digital audio and control capabilities and operation. Signals to and from INCC shall be transmitted over single pair of twisted unshielded wire or fiber optic pair.
7. Field Programmable: INCC shall be capable of being fully programmed or modified by Field Configuration Program (FCP), to be downloaded via portable computer from any node in system.
8. Control-by-Event Programming (CBE): INCC shall be capable of programming using Boolean logic including AND, OR, NOT, COUNT, TIMING, and SCHEDULE functions to provide complete programming flexibility.
9. Remote INCC Command Center Options: System shall have capability of adding remote INCC Command Centers or re-locating INCC Command Centers utilizing only single pair of twisted unshielded wire or fiber optic pair for all functions.
10. RS-485 Serial Output: System shall incorporate RS-485 bus via ribbon harness for connection of modules inside same cabinet, and via 4-wire quick connector for connection of modules up to 3,000 feet from cabinet.
11. Riser Wiring: All data, voice, and fire fighter phone riser shall transmit over single pair of twisted unshielded wire or fiber optic pair for all functions configured in Class A format. Any short or open in data, voice, or phone sections shall not affect transmission over remainder of network.
12. Class A Network: All communication between control panels and transponders shall be through supervised Style 7 token passing network. In event of single short, open, or ground, all system communication shall operate as normal and report fault. This protection shall incorporate all data, voice, and fire fighter phone transmissions. Upon single short, open, or ground of either system data, live voice, pre-recorded channels, or phone risers, the function of each of these items shall continue to operate. "Degrade" functionality shall not be acceptable. This shall be demonstrated at system acceptance.

F. LCD Display Module (LCD-E3):

1. LCD Display: 80-character RS-485 based textual annunciator with capability of being mounted locally or remotely. Provides audible and visual annunciation of all alarms and trouble signals. Provide dedicated LEDs for:
 - a. AC Power On: Green.
 - b. Alarm: Red.
 - c. Supervisory: Yellow.
 - d. System Trouble: Yellow.
 - e. Power Fault: Yellow.
 - f. Ground Fault: Yellow.
 - g. System Silenced: Yellow.
2. 80-Character Alphanumeric Display: Provide status of all analog/addressable sensors, monitor and control modules. Display shall be liquid crystal type (LCD), clearly visible in dark and under all light conditions.
3. Panel shall contain 4 functional keys:
 - a. Alarm Acknowledge.
 - b. Trouble Acknowledge.
 - c. Signal Silence.
 - d. System Reset/Lamp Test.

4. Panel shall contain 3 configuration buttons:
 - a. Menu/Back.
 - b. Back Space/Edit.
 - c. OK/Enter.
 5. Panel shall have 12-key telephone-style keypad to permit selection of functions.
- G. Intelligent Loop Interface (ILI-MB-E3/ILI95-MB-E3): System shall be of multiprocessor design to allow maximum flexibility of capabilities and operation. Intelligent Loop Interface shall be capable of mounting in stand-alone enclosure or integrated with Intelligent Network INCC Command Center (INCC) as specified.
 1. Field Programmable: System shall be capable of being programmed by Field Configuration Program (FCP), allowing programming to be downloaded via portable computer from any node on network.
 2. RS-232C Serial Output: Supervised RS-232C serial port shall be provided to operate remote printers and/or video terminals, accept downloaded program from portable computer, or provide 80-column readout of all alarms, troubles, location descriptions, time, and date. Communication shall be standard ASCII code operating from 1,200 to 115,200 baud rate.
 3. RS-485 Serial Output: Each ILI-MB-E3/ILI95-MB-E3 shall incorporate RS-485 bus via ribbon harness for connection of modules inside same cabinet, and via 4-wire quick connector for connection of modules up to 3,000 feet from cabinet. RS-485 bus shall support up to 16 ASM-16 auxiliary switch modules, 6 LCD-E3 main annunciators, and 5 LCD-7100 annunciators.
 4. Peer-to-Peer Panel Configuration: All Loop Interface Modules shall incorporate own programming, log functions, Central Processor Unit, and control-by-event (CBE) programming. If any loop becomes disabled, each remaining loop driver shall continue to communicate with remainder of network and maintain normal operation. "Degrade" configurations under these conditions shall not be acceptable.
 5. Control-by-Event (CBE) Program: ILI-MB-E3/ILI95-MB-E3 shall be capable of programming using Boolean logic including AND, OR, NOT, TIMING, COUNT, SCHEDULE functions to provide complete programming flexibility.
 6. Alarm Verification: Smoke detector alarm verification shall be standard option while allowing other devices such as manual stations and sprinkler flow to create immediate alarm. This feature shall be selectable for smoke sensors that are installed in environments prone to nuisance or unwanted alarms.
 7. Alarm Signals: All alarm signals shall be automatically latched or "locked in" at control panel until operated device is returned to normal and control panel is manually reset. When used for sprinkler flow, "SIGNAL SILENCE" switch may be bypassed, if required by AHJ.
 8. Electrically Supervised:
 - a. Each SLC and NAC circuit shall be electrically supervised for opens, shorts, and ground faults. Occurrence of fault shall activate system trouble circuitry, but shall not interfere with proper operation of other circuits.
 - b. Yellow "SYSTEM TROUBLE" LEDs shall light and system audible sounder shall steadily sound when trouble is detected in system. Failure of power, open or short circuits on SLC or NAC circuits, disarrangement in system wiring, failure of microprocessor or any identification module, or system ground faults shall activate this trouble circuit. Trouble signal shall be acknowledged by operating "TROUBLE ACKNOWLEDGE" switch. This shall silence sounder. If subsequent trouble conditions occur, trouble circuitry shall resound. During alarm, all trouble signals shall be suppressed with exception of lighting yellow "SYSTEM TROUBLE" LEDs.
 9. Drift Compensation – Analog Smoke Sensors: System software shall automatically adjust each analog smoke sensor approximately once each week for changes in sensitivity due to effects of component aging or environment, including dust. Each sensor shall maintain its actual sensitivity under adverse conditions to respond to alarm conditions while ignoring

- factors which generally contribute to nuisance alarms. System trouble circuitry shall activate, display "DIRTY DETECTOR" and "VERY DIRTY DETECTOR" indications and identify individual unit that requires maintenance.
10. Analog Smoke Sensor Test: System software shall automatically test each analog smoke sensor a minimum of 3 times daily. Test shall be recognized functional test of each photocell (analog photoelectric sensors) and ionization chamber (analog ionization sensors) as required annually by NFPA 72. Failure of sensor shall activate system trouble circuitry, display "Test Failed" indication, and identify individual device that failed.
 11. Off-Premises Connection:
 - a. Fire Alarm System: Connect via Digital Alarm Communicator Transmitter (DACT) and telephone lines to central station or remote station. Panel shall contain disconnect switch to allow testing of system without notifying fire department.
 12. Central Station Option: Fire alarm control panel shall provide integral Digital Alarm Communicator Transmitter (DACT) for signaling to central station. DACT shall contain "Dialer-Runaway" feature preventing unnecessary transmissions as result of intermittent faults in system and shall be Carrier Access Code (CAC) compliant, accepting up to 20-digit central station telephone numbers. Fire department shall be consulted as to authorized central station companies serving municipality. Fire alarm system shall transmit both alarm and trouble signals, with alarm having priority over trouble signal. Contractor shall be responsible for all installation charges and Owner will be responsible for line lease charges.
 13. Network Annunciator Option: Each ILI-MB-E3 or ILI95-MB-E3 and associated display shall provide option of being configured as network annunciator. Options for annunciation shall default as regional annunciator with capability of selecting global annunciation to provide system-wide protection and Acknowledge, Silence, and Reset capabilities.
 14. Redundant History Log: Each ILI-MB-E3 or ILI95-MB-E3 shall contain full 4100 event history log supporting local and network functions. If a main processor or network node is lost the entire log shall be accessible at any other Loop Interface board. This shall be demonstrated by removing power from INCC Command Center followed by extraction of history log from any loop driver location, including INCC Command Center or Transponder.
 15. LEDs Indicator and Outputs: Each ILI-MB-E3/ILI95-MB-E3 Loop Interface shall incorporate as a minimum the following diagnostic LED indicators:
 - a. Power: Green.
 - b. Alarm: Red.
 - c. Supervisory: Yellow.
 - d. General Trouble: Yellow.
 - e. Ground Fault: Yellow.
 - f. Transmit: Green.
 - g. Receive: Green.
 16. Auxiliary Power Outputs: Each ILI-MB-E3/ILI95-MB-E3 Loop Interface shall provide the following supply outputs:
 - a. 24 VDC non-resettable, 1 amp. maximum, power limited.
 - b. 24 VDC resettable, 1 amp. maximum, power limited.
 17. Microprocessor: Loop interface shall incorporate 32-bit RISC processor. Isolated "watchdog" circuit shall monitor microprocessor and upon failure shall activate system trouble circuits on display. Microprocessor shall access system program for all control-by-event (CBE) functions. System program shall not be lost upon failure of both primary and secondary power. Programming shall support Boolean logic including AND, OR, NOT, TIME DELAY functions for maximum flexibility.
 18. Auto Programming: System shall provide for all SLC devices on any SLC loop to be pre-programmed into system. Upon activation of auto programming, only devices that are present shall activate. This allows for system to be commissioned in phases without need of additional downloads.

19. Environmental Drift Compensation: System shall provide for setting Environmental Drift Compensation by device. When detector accumulates dust in chamber and reaches unacceptable level but yet still below allowed limit, control panel shall indicate maintenance alert warning. When detector accumulates dust in chamber above allowed limit, control panel shall indicate maintenance urgent warning.
 20. NON-FIRE Alarm Module Reporting: Non-reporting type ID shall be available for use for energy management or other non-fire situations. NON-FIRE point operation shall not affect control panel operation nor shall it display message at panel LDC. Activation of NON-FIRE point shall activate control by event logic, but shall not cause indication on control panel.
 21. 1-Man Walk Test:
 - a. System shall provide both basic and advanced walk test for testing entire fire alarm system. Basic walk test shall allow single operator to run audible tests on panel. All logic equation automation shall be suspended during test and while annunciators can be enabled for test, all shall default to disabled state. During advanced walk test, field-supplied output point programming shall react to input stimuli, such as CBE and logic equations. When points are activated in advanced test mode, each initiating event shall latch input. Advanced test shall be audible and shall be used for pull station verification, magnet activated tests on input devices, input and output device, and wiring operation/verification.
 - b. Test feature is intended to provide for certain random spot testing of system and is not intended to comply with requirements of testing fire alarm systems in accordance with NFPA 72, as it is impossible to test all functions and verify items such as annunciation with only 1 person.
 22. Signaling Line Circuits: Each ILI-MB-E3 module shall provide communication with analog/addressable (initiation/control) devices via 2 signaling line circuits. Each signaling line circuit shall be capable of being wired Class B, Style 4 or Class A, Style 6. Circuits shall be capable of operating in NFPA Style 7 configuration when equipped with isolator modules between each module type device and isolator sensor bases. Each circuit shall communicate with a maximum of 159 analog sensors and 159 addressable monitor/control devices. Unique 40-character identifier shall be available for each device. Devices shall be of the Velocity series with capability to poll 10 devices at a time with a maximum polling time of 2 seconds when both SLCs are fully loaded.
 23. Notification Appliance Circuits: 2 independent NAC circuits shall be provided on ILI-MB, polarized and rated at 2 amperes DC per circuit, individually over current protected and supervised for opens, grounds, and short circuits. They shall be capable of being wired Class B, Style Y or Class A, Style Z.
 24. Alarm Dry Contacts: Provide alarm dry contacts (Form C) rated 2 amps at 30 VDC (resistive) and transfer whenever system alarm occurs.
 25. Supervisory Dry Contacts: Provide supervisory dry contacts (Form C) rated 2 amps at 30 VDC (resistive) and transfer whenever system supervisory condition occurs.
 26. Trouble Dry Contacts: Provide trouble dry contacts (Form C) rated 2 amps at 30 VDC (resistive) and transfer whenever system trouble occurs.
- H. Auxiliary Switch Module (ASM-16):
1. Each ASM-16 has 16 programmable push-button switches.
 2. Each push-button switch has 3 associated status LEDs (red, yellow, and green), configurable to indicate any combination of functions.
 3. Flexible switch configurations to allow flexible set-up of phone, speaker, and auxiliary function circuits.
 4. An insertable label to identify function of each switch and LEDs combination.
 5. Provide capability to communicate with up to 16 ASM-16 modules locally, up to 3,000 feet from INCC Command Center.
 6. Specialty modules that only perform 1 task such as speaker, phone, or auxiliary shall not be acceptable.

- I. Telephone Assembly: Include the following items:
 - 1. Mounting cabinet which occupies 2 module locations on inner door of INCC.
 - 2. Standard phone operating on piezo effect with integral 6-foot cord.
 - 3. Interconnect cable for connection of phone to Command Center.
- J. Microphone Assembly: Include the following items:
 - 1. Mounting cabinet which occupies 1 module location on inner door of INCC.
 - 2. Interconnect cable for connection of microphone to INI-VG.
 - 3. 1 noise canceling microphone with push-to-talk button.
- K. Addressable Node Expander (ANX):
 - 1. Addressable Node Expander shall provide interconnection between the Fire Alarm Control Panel networks.
 - 2. ANX-MR-FO (Addressable Node Expander Multi-Ring with Fiber Optic connectors) and ANX-MR-UTP (Addressable Node Expander Multi-Ring with Fiber Optic and Twisted Pair connectors) shall expand the E3 Series network from 64 nodes to 122 nodes. ANX-SR (Addressable Node Expander Single Ring) will function in single 64 node systems.
- L. Network Repeater Module (RPT-E3):
 - 1. Intelligent Network Interface shall provide interconnection and protection of remote INCC Command Centers and Transponders. Repeater shall regenerate and condition token passing, 625 K baud signal between units. Repeater shall be available in wire, or wire/fiber configurations as determined by field conditions.
 - 2. Interface shall have jumper to allow selection of ground detection of wiring when used in wire mode. Interface shall have integral LEDs to display current status of board.
 - 3. Fiber configurations shall use:
 - a. Multi-Mode ST-type connectors with a maximum attenuation of 8db with 62.5/125 micron cable.
 - b. Single-Mode LC-style connector with a maximum attenuation of 30db with 9/125 micron cable.
- F. Network Graphic Annunciator (NGA): Network able, 1/4 VGA, touch-screen annunciator with the following characteristics:
 - 1. Custom Graphics: Panel shall permit uploading of custom bit-mapped graphic to display screen. Graphic shall display when all systems are normal.
 - 2. Intuitive Functions: In alarm or trouble condition, annunciator shall display only information pertaining to event, including control switches.
 - a. Trouble Condition: Display shall indicate cause of trouble. Only controls available to operator shall be Acknowledge and Reset functions.
 - b. Alarm Condition: Display shall indicate cause of alarm. Only controls available to operator shall be Acknowledge, Silence, and Reset functions.

2.04 INTELLIGENT NETWORK TRANSPONDER (INX)

- A. System shall be of multiprocessor design to allow maximum flexibility of capabilities and operation. INX shall receive, transmit, and regenerate voice, fire fighter phones, and data over single pair of wire or fiber optic cable.
- B. INX shall provide full multi-channel distributed voice messaging, with integrated switching amplification, and SLC and extended phone riser. INX shall communicate with network system in true peer-to-peer fashion operating at 625 K baud over any combination of fiber or wire media. INX shall consist of the following units and components.

- C. System Cabinet: System cabinet shall be surface or semi-flush mounted with texture finish and shall consist of 4 parts, back box, back plate, inner door, and outer door. System cabinet houses INI-VG, PM-9 power supply, up to 4 - AM50, microphone, and related circuitry.
- D. Intelligent Network Interface Voice Gateway (INI-VG): INI-VG shall be a multi-function board interchangeable in both INCC and INX. Functions of board shall include the following features as a minimum:
 - 1. Network interface operating at 625 K baud configurable with any combination of wire and/or fiber topologies. Interface shall communicate with up to 122 total INCC, INX, and E3 and S3 control panels in peer-to-peer fashion.
 - 2. Fire Fighter Phone Riser: INI-VG shall generate local phone riser for use with AOM-TEL phone modules for connection to fire fighter phone. INI-VG shall mix its local phone riser to network in true Style 7 fashion.
 - 3. Signaling Line Circuit (SLC): INI-VG shall generate local SLC to communicate with and control up to 16 AOM-TEL modules and 32 AOM-2S or AOM-MUX circuits for fire phone interfacing and additional split-speaker circuits.
 - 4. RS-485: Provide capability to communicate with up to 16 ASM-16 modules, when used in INX mode up to 3,000 feet.
 - 5. Advanced Processing: INI-VG shall incorporate latest in digital signaling processing technology with supporting Boolean logic including AND, OR, NOT, TIME DELAY functions.
 - 6. Voice Generation: INI-VG shall incorporate all processing to allow for 16 distinct pre-recorded messages used in priority fashion with message 1 as highest priority. Total length for 1 to 16 messages shall be up to 3 minutes.
- E. Power Supply Module (PM-9): PM-9 power supply shall supply all power necessary under normal and emergency conditions. Power supply shall provide capacity to charge up to 55 amp-hour batteries while under full load. Technology used shall be of power-saving switching configuration, eliminating need of stepping transformer.
- F. Audio Amplifier (AM-50): Include as a minimum, the following features:
 - 1. 50-watt switching audio amplifier:
 - a. AM-50-25 amplifier produces 25V_{RMS} at 50 watts digital audio output.
 - b. AM-50-70.7 amplifier produces 70V_{RMS} at 50 watts digital audio output.
 - 2. 2 individually addressable speaker circuits, each with capability of handling part or all of 50-watt supplied power.
 - 3. Power shall be 24 VDC supplied via terminal block from local PM-9 power supply.
 - 4. Ability to select from 1 of 16 pre-programmed messages in INI-VG, and paging from locally or from INCC Command Center.
 - 5. Back-up amplification configurable so 1 AM-50 can perform back-up or 3, or perform 1-to-1 back-up if configured to do so in programming.
 - 6. Status LEDs to indicate normal operation and trouble condition.

2.05 PRINTERS

- A. Printers: Automatic type, printing code, time, date, location, category, and condition.
 - 1. Provide hard-copy printout of all changes in status of system and time-stamp such printouts with current time-of-day and date.
 - 2. Standard carriage with 80 characters per line.
 - 3. Use standard pin-feed paper.
 - 4. Enclose in separate enclosure suitable for placement on desktop or table.
 - 5. Communicate with control using interface complying with EIA-232-D.
 - 6. Power: 120 VAC at 60 Hz.

2.06 SUPPLEMENTAL NOTIFICATION APPLIANCE CIRCUIT (HPF24)

- A. Supplemental Notification Appliance Circuit (HPFF) shall be Model [HPFF8] [HPFF12] offering

[up to 8.0 amps (8.0 amps continuous)] [12.0 amps (12 amps continuous)] of regulated 24-volt power. HPFF shall include the following features:

1. Integral Charger: Charge up to 18.0 amp-hour batteries and support 60-hour standby.
2. 2 Input Triggers. Input trigger shall be Notification Appliance Circuit (from fire alarm control panel) or relay.
3. Surface-mount back box.
4. Ability to delay AC fail delay in accordance with applicable NFPA requirements.
5. Power limited circuitry in accordance with applicable UL standards.
6. Operates as sync follower or a sync generator.

2.07 SYSTEM PERIPHERALS – APOLLO XP95

A. ILI95-MB-E3 and ILI95-S-E3 Addressable Devices – General:

1. Provide address-setting means using card inserts which are built into the base or module.
2. Use simple to install and maintain binary-type (numbered 1 to 64) address switches by using breaking the tabs to set address.
3. Detectors: Analog and addressable. Connect to fire alarm control panel's Signaling Line Circuits.
4. Addressable Thermal and Smoke Detectors: Provide 1 status LED. The LED shall flash under normal conditions, indicating detector is operational and in regular communication with control panel, and the LED shall be placed into steady illumination by control panel, indicating alarm condition has been detected. If required, flashing mode operation of detector LED can be programmed off via fire control panel program.
5. Fire Alarm Control Panel: Permit detector sensitivity adjustment through field programming of system. Sensitivity can be automatically adjusted by panel on time-of-day basis.
6. Using software, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. Detectors shall be listed by UL as meeting calibrated sensitivity test requirements of NFPA 72, Chapter 7.
7. Detectors shall be ceiling-mounted and shall include separate twist-lock base with tamper-proof feature.
8. Following bases and auxiliary functions shall be available:
 - a. Standard base with remote LED output.
 - b. Sounder base rated at 85 dBA minimum.
 - c. Form-C relay base rated 30 VDC, 2.0 A.
 - d. Isolator base.
9. Detectors shall provide test means whereby they will simulate alarm condition and report that condition to control panel. Such test shall be initiated at detector itself by canned smoke or initiated remotely on command from control panel.
10. Detectors shall store internal identifying type code that control panel shall use to identify type of device (ION, PHOTO, THERMAL).

B. Addressable Manual Stations (MS95-L):

1. Manual Fire Alarm Stations: Non-code, non-break glass type, equipped with key lock so they may be tested without operating handle.
2. Operated Station: Visually apparent, as operated, at a minimum distance of 100 feet (30.5 m) from front or side.
3. Stations shall be designed so after actual activation, they cannot be restored to normal except by key reset.
4. Manual stations shall be constructed of Lexan with clearly visible operating instructions provided on cover. The word FIRE shall appear on front of stations in raised letters, 1.75 inches (44 mm) or larger.
5. Addressable manual stations shall, on command from control panel, send data to panel representing state of manual switch and addressable communication module status.

- C. Intelligent Thermal Detectors (XP95-T): Intelligent addressable devices rated at 194 degrees F (90 degrees C) and have rate-of-rise element rated at 15 degrees F (9.4 degrees C) per minute. Connect via 2 wires to fire alarm control panel signaling line circuit.
- D. Intelligent Photoelectric Smoke Detectors (XP95-P): Use photoelectric (light-scattering) principal to measure smoke density and shall, on command from control panel, send data to panel representing analog level of smoke density.
- E. Intelligent Ionization Smoke Detectors (XP95-I): Use dual-chamber ionization principal to measure products of combustion and shall, on command from control panel, send data to panel representing analog level of products of combustion.
- F. Intelligent Multi-Criteria Detectors (XP95-M):
 - 1. Addressable device designed to monitor a minimum of photoelectric and thermal technologies in single-sensing device. Include ability to adapt to its environment by utilizing built-in microprocessor to determine its environment and choose appropriate sensing settings. Allow wide sensitivity window, with no less than 1 to 4 percent per foot obscuration. Utilize advanced electronics that react to slow smoldering fires and thermal properties within single sensing device.
 - 2. Microprocessor: Capable of selecting appropriate sensitivity levels based on environment type it is in, such as office, manufacturing, or kitchen, and then have ability to automatically change setting as environment changes, as when walls are moved or as occupancy changes.
 - 3. Intelligent multi-criteria detection device shall include ability to combine signal of thermal sensor with signal of photoelectric signal to react hastily in event of fire situation. Include inherent ability to distinguish between fire condition and false alarm condition by examining characteristics of thermal and smoke sensing chambers and comparing them to database of actual fire and deceptive phenomena.
- G. Intelligent Duct Smoke Detectors (SL-DAA-P/SL-DAA-N):
 - 1. In-Duct Smoke Detector Housing: Use on-board intelligent photoelectric or ionization detector, which provides continuous analog monitoring and alarm verification from panel.
 - 2. When sufficient smoke is sensed, alarm signal is initiated, and appropriate action taken to shut down or change over air handling systems to help prevent rapid distribution of toxic smoke and fire gases throughout areas served by duct system.
 - 3. Duct Smoke Detectors Mounted Above Ceiling or Otherwise Obstructed from Normal View: Provide with remote alarm indicator.
 - 4. Each Detector: Install in either supply side or return side duct in accordance with local mechanical code.
- H. Addressable Dry Contact Monitor Modules (PID-95/PID-95P):
 - 1. Provide to connect 1 supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to 1 of the fire alarm control panel SLCs.
 - 2. Mount in standard deep electrical box or plastic plate.
 - 3. IDC Zone: Suitable for Style B operation.
- I. Addressable Dry Contact Monitor Modules (CZI-95):
 - 1. Provide to connect 1 supervised IDC zone of conventional 2-wire smoke detectors or alarm initiating devices (any N.O. dry contact device) to 1 of the fire alarm control panel SLCs.
 - 2. Mount in 4-inch (102-mm) square, 2-1/8-inch (54-mm) deep electrical box.
 - 3. IDC Zone: Suitable for Style B, C, D or Style E operation.
 - 4. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.
- J. Addressable Control Modules (SCE-95):

1. Provide to supervise and control operation of 1 conventional NAC of compatible, 24-VDC powered, polarized audio/visual notification appliances or UL-listed polarized relays for fan shutdown and other auxiliary control functions.
 2. Mount in standard 4-inch (101.6-mm) square, 2-1/8-inch (54-mm) deep electrical box or to surface-mounted back box.
 3. Control Module NAC: Wire for Style Z or Style Y (Class A/B) with 2 amps of resistive signal operation. Relay coil shall be magnetically latched to reduce wiring connection requirements and to ensure 100 percent of all auxiliary relay or NACs shall be energized at same time on same pair of wires.
 4. Audio/Visual Power: Provide by separate supervised power circuit from main fire alarm control panel or from supervised, UL-listed remote power supply.
- K. Addressable Relay Modules (RCE-95):
1. Available for HVAC control and other building functions. Relay shall have 1 Form C set of contacts and are rated for a minimum of 2.0 amps resistive. Relay coil shall be magnetically latched to reduce wiring connection requirements and to ensure 100 percent of all auxiliary relay or NACs shall be energized at same time on same pair of wires. The device shall provide positive feedback of the controlled equipment's status annunciating upon activation.
 2. Mount in standard 4-inch (101.6-mm) square, 2-1/8-inch (54-mm) deep electrical box or to surface-mounted back box.
- L. Addressable Building Control Modules (BCE-95):
1. Available for building functions that require three position (On/Off/Auto) control capability. Relay shall have 1 Form C set of contacts and are rated for a minimum of 2.0 amps resistive. Relay coil shall be magnetically latched to reduce wiring connection requirements and to ensure 100 percent of all auxiliary relay or NACs shall be energized at same time on same pair of wires. The device shall provide positive feedback of the controlled equipment's status annunciating upon activation.
 2. Mount in standard 4-inch (101.6-mm) square, 2-1/8-inch (54-mm) deep electrical box or to surface-mounted back box.
- M. Isolator Modules (XP95-LI):
1. Provide to automatically isolate wire-to-wire short circuits on SLC Class A or Class B branch. Isolator module shall limit number of modules or detectors that may be rendered inoperative by short-circuit fault on SLC loop segment or branch. At least 1 isolator module shall be provided for each floor or protected zone of building. No more than 20 devices shall be connected to 1 isolator module.
 2. If wire-to-wire short occurs, isolator module shall automatically open-circuit (disconnect) SLC. When short-circuit condition is corrected, isolator module shall automatically reconnect isolated section.
 3. Does not require address-setting, and its operations shall be totally automatic. Not necessary to replace or reset isolator module after normal operation.
 4. Mount in unique base, eliminating addressable sensors from being installed incorrectly.
 5. Single LED: Flash to indicate isolator is operational and illuminate steadily to indicate short-circuit condition has been detected and isolated.
- N. Conventional Heat Detectors:
1. Combination rate-of-rise and fixed temperature rated at 135 degrees F (57.2 degrees C) for areas where ambient temperatures does not exceed 100 degrees F (37.7 degrees C), and 200 degrees F (93.3 degrees C) for areas where temperature does not exceed 150 degrees F (65.5 degrees C).
 2. Low profile, ceiling-mount type with positive indication of activation.

3. Rate-of-Rise Element: Air chamber, flexible metal diaphragm, and factory-calibrated, moisture-proof, trouble-free vent, and operate when rate of temperature rise exceeds 15 degrees F (9.4 degrees C) per minute.
 4. Fixed-Temperature Element: Fusible-alloy retainer and actuator shaft.
 5. Smooth Ceiling Rating: 2,500 square feet (762 m²).
- O. Conventional Photoelectric Area Smoke Detectors:
1. 24-VDC, 2-wire, ceiling-mounted, light-scattering type using LEDs light source.
 2. Each Detector: Remote LEDs output and built-in test switch.
 3. Provide on twist-lock base.
 4. Perform calibrated sensitivity and performance test on detector without need for generation of smoke. Test method shall test all detector circuits.
 5. Visual Indication of Alarm: Provide by dual-latching LEDs on detector, seen from ground level over 360 degrees. LEDs shall flash every 10 seconds, indicating power is applied to detector.
 6. Detector shall not go into alarm or trouble when exposed to air velocities of up to 3,000 feet (914.4 m) per minute.
 7. Detector Screen and Cover Assembly: Easily removable for field cleaning of detector chamber.
 8. Field-Wire Connections: Made to base through use of clamping plate and screw.
- P. Conventional Ionization-Type Smoke Detectors:
1. 2-wire, 24-VDC type using dual uni-polar chamber.
 2. Each Detector: Remote LEDs output and built-in test switch.
 3. Provide on twist-lock base.
 4. Perform calibration sensitivity and performance test on detector without need for generation of smoke.
 5. Visual Indication of Alarm: Provide by dual-latching LEDs over 360 degrees, on detector, seen from ground level. LEDs shall flash every 10 seconds, indicating power is applied to detector.
 6. Detector shall not alarm or trouble when exposed to air velocities of up to 1,200 feet (365.76 m) per minute.
 7. Detector Screen and Cover Assembly: Easily removable for field cleaning of detector chamber.
 8. Field-Wire Connections: Made to base through use of clamping plate and screw.

2.08 SYSTEM PERIPHERALS – E3 SERIES

- A. Graphic Annunciator (Uses ANU-48 Serial Driver Board):
 - 1. Communicate to fire alarm control panel via EIA-485 (multi-drop) 2-wire communications loop. Up to 16 annunciator drivers, each configured up to 48 points, shall be connected per SLP panel locally, or up to 3,000 feet from the Control Panel.
 - 2. ANU-48: Provide interface to approved UL-listed graphic-style LED annunciator and provide each of the features specified.
- B. Auxiliary Switch Module (ASM-16):
 - 1. Each ASM-16 has 16 programmable push-button switches.
 - 2. Each push-button switch has 3 associated status LEDs (red, yellow, and green), configurable to indicate any combination of functions.
 - 3. Flexible switch configurations to allow auxiliary functions.
 - 4. An insertable label to identify function of each switch and LEDs combination.
 - 5. Provide capability to communicate with up to 16 ASM-16 modules locally, or up to 3,000 feet from the Control Panel.
- C. LCD Display Annunciator:
 - 1. Furnish and install as indicated on the Drawings a remote serial annunciator, Model LCD-7100. Annunciator shall provide 80-character display, which shall duplicate all information on basic system display, including any network nodes its host panel is annunciating, with exception of menus. Contain the following function keys:
 - a. Alarm Acknowledge.
 - b. Trouble Acknowledge.
 - c. Signal Silence.
 - d. System Reset/Lamp Test.
 - e. System Drill Test.
 - 2. Key Lock: Enable switches only when placed in "ON" position, with exception of Trouble Acknowledge, which is used to silence local trouble audible sounder. Annunciator shall contain the following LEDs:
 - a. Alarm.
 - b. Supervisory.
 - c. System Trouble.
 - d. Power Fault.
 - e. System Silenced.
 - 3. Mount on standard 3-gang surface or flush electrical box.
 - 4. Each ILI-MB-E3/ILI95-MB-E3: Accommodate up to 5 remote LCD-7100 annunciators which shall be located up to 3,000 feet from control panel.
- D. NGA Network Graphic Annunciator
 - 1 Main Menu

- a. Configure allows Auto-configuration of ILI-MB-S/ and ILI95-MB-E3/ILI95-S-E3 and NGA or ANX.
 - b. Walk/Drill enables Walk Test and Fire Drill function.
 - c. I/O Allows enable/disable input and output devices.
 - d. Clock system real-time clock.
 - e. View system configuration information
 - f. NGA log displays, stores, prints and clears the 4100 event history log.
 - g. Service provides Network Query functions.
 - h. (More spec items – Text messaging, custom logo, custom screensaver, max amount of text on screen at one time)
- E. Portable Emergency Telephone Handset Jacks:
 - 1. Flush mount on stainless steel plates as indicated on the Drawings.
 - 2. Approved for emergency telephone system application.
 - 3. Insertion of remote handset plug into jack shall send signal to fire INCC Command Center which shall audibly and visually indicate on-line condition and sound a ring indication in handset.
 - 4. 2-Way Emergency Telephone System: Support a minimum of five (5) handsets on line without degradation of signal
 - 5. Cabinet: Provide in fire control room to house 10 portable handsets.
- F. Fixed Emergency Telephone Handsets:
 - 1. Telephone Cabinets:
 - a. Paint red and clearly label emergency telephone.
 - b. Locate as indicated on the Drawings.
 - c. Key same as INCC Command Center, INX Transponders, and manual stations.
 - 2. Handset Cradle: Cam-operated microswitch connection such that lifting handset off cradle sends signal to fire INCC Command Center which shall audibly and visually indicate on-line (off-hook) condition. Open blade finder contacts shall not be acceptable.
 - 3. 2-Way Emergency Telephone System: Support a maximum of five 5 handsets on line (off hook) without degradation of signal.
- G. Speakers:
 - 1. Operate on 25 VRMS or 70.7 VRMS with field-selectable output taps from 0.5 to 2.0 watts.
 - 2. Speakers in Corridors and Public Spaces: Produce nominal sound output of 84 dBA at 10 feet (3 m).
 - 3. Frequency Response: Minimum of 400 Hz to 4,000 Hz.
 - 4. Back of Each Speaker: Sealed to protect speaker cone from damage and dust.
- H. Strobes:
 - 1. Compliance: ADA and UL 1971.
 - 2. Maximum Pulse Duration: 0.2 second.
 - 3. Strobe Intensity: UL 1971.
 - 4. Flash Rate: UL 1971.
 - 5. Strobe Candela Rating: Determine by positioning selector switch on back of device.
- I. Speaker/Strobes:
 - 1. Operate on 25 VRMS or with field-selectable output taps from 0.5 to 2.0 watt
 - 2. Speakers in Corridors and Public Spaces: Produce nominal sound output of 84 dBA at 10 feet (3 m).
 - 3. Frequency Response: Minimum of 400 Hz to 4,000 Hz.
 - 4. Back of Each Speaker: Sealed to protect speaker cone from damage and dust.

5. Audibility: NFPA 72.
6. Maximum Pulse Duration: 0.2 second.
7. Strobe Intensity: UL 1971.
8. Flash Rate: UL 1971.
9. Strobe Candela Rating: Determine by positioning selector switch on back of device.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas and surfaces to receive fire alarm system.
 1. Notify Architect of conditions that would adversely affect installation or subsequent use.
 2. Do not begin installation until unacceptable conditions are corrected.

3.02 INSTALLATION

- A. Install fire alarm system in accordance with NFPA 72, NFPA 70, state and local codes, manufacturer's instructions, and as indicated on the Drawings.
- B. Conceal conduit, junction boxes, and conduit supports and hangers in finished areas. Conceal or expose conduit, junction boxes, and conduit supports and hangers in unfinished areas.
- C. Do not install smoke detectors before system programming and test period. If construction is ongoing during this period, take measures to protect smoke detectors from contamination and physical damage.
- D. Flush-mount fire detection and alarm system devices, control panels, and remote annunciators in finished areas. Flush-mount or surface-mount fire detection and alarm system devices, control panels, and remote annunciators in unfinished areas.
- E. Ensure manual stations are suitable for surface mounting or semi-flush mounting as indicated on the Drawings. Install not less than 42 inches, nor more than 48 inches, above finished floor measured to operating handle.

3.03 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Provide service of competent, factory-trained technician authorized by manufacturer to technically supervise and participate during pre-testing and acceptance testing of system.
- B. Testing:
 1. Conduct complete visual inspection of control panel connections and test wiring for short circuits, ground faults, continuity, and insulation before energizing cables and wires.
 2. Close each sprinkler system control valve and verify proper supervisory alarm at INCC Command Center.
 3. Verify activation of flow switches.
 4. Open initiating device circuits and verify that trouble signal actuates.
 5. Open signaling line circuits and verify that trouble signal actuates.
 6. Open and short notification appliance circuits and verify that trouble signal actuates.
 7. Ground initiating device circuits and verify response of trouble signals.
 8. Ground signaling line circuits and verify response of trouble signals.
 9. Ground notification appliance circuits and verify response of trouble signals.
 10. Check alert tone and prerecorded voice message to alarm notification devices.

11. Check installation, supervision, and operation of intelligent smoke detectors.
12. Introduce on system each of the alarm conditions that system is required to detect. Verify proper receipt and proper processing of signal at INCC Command Center and correct activation of control points.
13. Consult manufacturer's manual to determine proper testing procedures when system is equipped with optional features. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality, and similar.

C. Acceptance Testing:

1. Before installation shall be considered completed and acceptable by AHJ, a complete test using as a minimum, the following scenarios shall be performed and witnessed by representative approved by Engineer. Monitoring company and/or fire department shall be notified before final test in accordance with local requirements.
2. Contractor's job foreman, in presence of representative of manufacturer, representative of Owner, and fire department shall operate every installed device to verify proper operation and correct annunciation at control panel.
3. Open signaling line circuits and notification appliance circuits in at least 2 locations to verify presence of supervision.
4. Completely disconnect INCC Command Center from rest of network, including Voice INCC Command Center. Activate initiating device from transponder. All speaker circuits activated from each transponder shall transmit the correct evacuation or alert message. These messages shall be same messages transmitted with INCC Command Center activated. Default tones or messages shall not be acceptable.
5. Completely disconnect INCC Command Center from rest of network. Activate initiating device. All control outputs supported by transponder SLC circuits shall operate under project programming mode. Default or degrade mode programming shall not be acceptable.
6. Fire fighter phone riser shall be directly shorted between INCC Command Center and first transponder, followed by test of fire phones between INCC Command Center and farthest transponder. Phones shall operate in normal fashion.
7. All audio risers shall be directly shorted between INCC Command Center and first audio transponder, followed by activation of alarm initiating device. Correct pre-recorded messages shall transmit from all speakers, including evacuation and alert channels. Default or degrade messages shall not be acceptable.
8. When testing has been completed to satisfaction of both Contractor's job foreman and representatives of manufacturer and Owner, a notarized letter co-signed by each attesting to satisfactory completion of said testing shall be forwarded to Owner and fire department.
9. Leave fire alarm system in proper working order and, without additional expense to Owner, replace defective materials and equipment provided within 1 year (365 days) from date of final acceptance by the owner.

3.04 DEMONSTRATION

- A. Provide instruction as required for operating fire alarm system.
- B. Provide hands-on demonstrations of operation of fire alarm system components and functions.

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, shrub, ground cover and turf 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 turf and landscape areas shall be planted and that turf areas shall show an even, healthy stand of "sod-like" turf which shall have been mown twice. 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.
- F. Access to fields by District in each project area may be required prior final acceptance of turf. Softball and baseball fields are anticipated to be used by District for games or practice. Multi-purpose fields may also be utilized for games and practice. Contractor shall coordinate its mowing schedule and other maintenance schedules with District. School use will have priority over maintenance.

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. Tree "rings" in Turf Areas: Remove turf from around each tree to create a 4 foot diameter turf free area.
- E. 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.
- F. Staking: Stakes 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.
- G. 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 turf areas for the entire length of Landscape Maintenance Period.

- H. Trash: Remove trash in all project areas plus adjacent pedestrian walkways and parking areas.
- I. Replacement: Refer to the Article "Guarantee" in Part 1.
- J. Fertilizing: Turf shall be fertilized on day 45 and 85 after initial seeding or installation with 20 pounds of fertilizer per 1,000 square feet.

3.02 ATHLETIC "MULTI-USE" FIELD TURF MAINTENANCE AND ACCEPTANCE

- A. Current cultural management practices may be modified in accordance with tissue test results or environmental conditions. Fertilizer composition, rate, or source may be adjusted based on current soil and tissue test results and existing environmental conditions.
- B. The following list represents the minimum required data that must be recorded in a field operations log:
 - 1. Chemical Application Logs: All labels, application rates, equipment used to apply chemicals shall be kept in the maintenance log. Chemicals shall include all fertilizers, bio-stimulants, growth regulators, and pesticides.
 - 2. Cultural maintenance activities such as mowing, sample collection, and seeding shall be recorded.
 - 3. Irrigation Applications: Use of the irrigation system shall be documented as to zones used, duration of application, and any problems with coverage or system components.
 - 4. System repair logs for each system shall be maintained. Record replaced or repaired items such as irrigation heads and valves, or any drainage components in the appropriate system repair log.
- C. The Contractor shall be responsible for the performance and operation of the playing field system during the construction, maintenance periods and until final acceptance. The Contractor shall keep a technically qualified supervisor on site and maintain adequate labor, equipment and supplies in reserve to immediately repair the system or components in the event of any deficiency or failure, during the interim maintenance period.
- D. Contractor shall provide all operations necessary to maintain the field throughout the Maintenance Period. The following list of items represents the minimum operations necessary to maintain the fields. Maintenance items should, at the minimum, include:
 - 1. Mowing: Turf shall be cut with a dedicated mower. Cutting height will be determined by environmental conditions, condition of sod, and time of year or activities. Turf height shall be maintained using only sharp, clean equipment capable of cutting heights of 1 to 2-1/4 inches. The initial cutting or subsequent cuttings shall remove not more than 1/3 of the grass leaf. Turf shall be maintained to a neat appearance. Remove cuttings from site. Turf shall not be allowed to exceed 2-1/4 inches in height and shall not be mown shorter than one and one half 1-1/2 inches in height.
 - 2. Turf shall be established to be turned over with a 1-1/2 inch height for mowing.
 - 3. Weed and Pest Control: The Contractor shall maintain the turf free from disease and infestation.
 - a. Required treatments shall be made according to the needs of the field as determined by the District's Representative.
 - b. Comply with applicable requirements of Federal, State, and Local laws, regulations and codes having jurisdiction over chemical treatments.
 - c. The Contractor shall apply suitable preventative or post infection fungicides to protect the quality of the turf.
 - d. Special attention shall be required during the seedling establishment period for damping off diseases.
 - 4. Turf areas shall be allowed to dry out sufficiently so that mower wheels do not skid, tear, or mark the surface.
 - 5. Edges shall be trimmed as needed for neat appearance but at least twice monthly. Clippings shall be removed and disposed of off-site.
- E. Turf Acceptance: Final acceptance will follow final approval by the District's Representative of the punch list and the following criteria:

1. Turf has rooted into the rootzone mix to a depth of 6 inches and has formed a mature sod mat. This will be determined by random samples being pulled from the rootzone with the District's Representatives in attendance. If less than 80 percent of the random tests pass after not less than 15 samples will be pulled from the field areas, then the fields will not be considered acceptable. If any tests are below 5 inches, then the field in question will not be accepted.
2. The playing field surface is in a safe and playable condition.
3. Turf is free of dead or bare spots in excess of 3 square inches.
4. Maintenance log is complete and all equipment manuals and documentation delivered to the District.

3.03 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.

3.04 INFIELD MAINTENANCE (PER BID ALTERNATE)

- A. Infield fines shall be maintained during maintenance period. This includes warning tracks, bullpens, mounds, home plate area, and similar features.
- B. Areas shall be kept free of weeds and trash.
- C. Pitching mound and home plate areas shall be covered during rains. Cover shall be removed after rains.
- D. Mound area and home plate shall be turned over being firm and finished in accordance with the Drawings.
- E. Eroded or otherwise lost material shall be replaced.

3.05 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 10 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 distortion 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 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 10 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, por 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

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-foot x 4-foot 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 "Sonofom" 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 restraighen 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 17 23

PAVEMENT MARKINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. Furnish all labor, materials, equipment, facilities, transportation and services to complete all striping and related work shown on the Drawings and/or specified herein.
- B. Scope of Work: The general extent of the striping work is shown on the Drawings and can include, but is not necessarily limited to the following:
 - 1. Curb painting
 - 2. Accessible parking striping, lettering, and symbols
 - 3. Parking lot striping
- C. Related sections can include, but may not be limited to the following:
 - 1. Section 32 12 16 - Asphalt Paving
 - 2. Section 32 13 13 – Concrete Paving

1.02 REFERENCES AND REGULATORY REQUIREMENTS

- A. State of California Department of Transportation Standard Specifications, current edition.

1.03 SUBMITTALS

- A. Conform to requirements of Section 01 33 00 Submittals and/or applicable Division One and Division Two specifications, General Conditions and Special Provisions.

1.04 PROJECT/SITE CONDITIONS

- A. Work shall not be performed during wet, or other adverse conditions as determined by the Owner's Representative and/or paint manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Unless otherwise specified, all striping shall be two coats of solvent borne, rapid dry paint (of the colors indicated in the Drawings) in conformance with Section 84 of the Standard Specifications.
- B. Colors shall be as follows:
 - 1. Parking stalls - white
 - 2. Accessible parking – blue.
 - 3. No parking and emergency access – red.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Contractor shall make provisions and take all necessary precautions to protect existing improvements and surrounding property from overspray or damage due to pavement marking work.
- B. Contractor shall layout all striping (with chalk-lines or other acceptable method) prior to start of work for review and acceptance by the Owner's Representative. Adjust layout as directed by the Owner's Representative.

3.02 APPLICATION

- A. No striping shall be installed until the pavement surface has fully cured and/or has been properly stripped, cleaned and prepped per the paint manufacturers' instructions.
- B. Paint shall be applied at rates approximately as follows:
 - 1. First Coat: 360 square feet per gallon of paint
 - 2. Second Coat: 150 square feet per gallon of paint

3.03 PROTECTION

- A. The contractor shall provide appropriate barriers, warning signs, and/or other acceptable arrangements to protect all painted surfaces until project Final Acceptance.

END OF SECTION

SECTION 32 18 00

MISCELLANEOUS PAVING AND SURFACING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Miscellaneous paving surfacing as shown on the Drawings including, but is not limited to, the following:
 - 1. Infield fines mix with sports field conditioner.
 - 2. Infield fines mix.
 - 3. Infield clay mix; bag and brick material.
- B. Related Requirements:
 - 1. Section 32 33 00 - Site Furnishings
 - 2. Section 31 20 00 - Earth Moving
 - 3. Section 32 11 00 - Base Courses

1.02 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. Coordinate applicable subgrade preparations, installations of base course materials, and all other work with work of this Section to insure a proper, timely installation.

1.03 ACTION SUBMITTALS

- A. Samples:
 - 1. Unless otherwise specified, submit 1-quart size samples of the following:
 - a. Infield fines mixture.
 - b. Infield clay mixture.

1.04 QUALITY ASSURANCE

- A. Materials Source: Sources of materials specified herein shall not be changed during course of work without review and written acceptance by the Owner's Representative.

1.05 WARRANTY

- A. Manufacturers: Provide Owner with the manufacturers extended warranties, where applicable.

PART 2 - PRODUCTS

2.01 CLAY MATERIALS

- A. Supplier: TMT Enterprises, Inc., San Jose, CA, 408-432-9040 as specified and the basis of design unless otherwise noted, or equal. Contact: Matt Moore.
- B. Infield Fines and Clay Mix for Warning Track: "Candlestick Park Infield Mix."

1. Mix shall be free of rocks, debris, vegetation, clay balls, foreign materials, etc. Infield mixes shall be sterilized to eliminate the possibility of any growth of vegetation.
2. The composition of the mix shall be achieved using mechanical blending equipment prior to delivery to the site and shall be as follows:

Sieve Size	Percent Passing
9 mm	100
5 mm	97-100
2 mm	85-100
1 mm	70-90
0.5 mm	60-80
0.05 mm	25-40
<0.05 mm (silt and clay)	25-40%

3. Pitchers' Mound Mix: 100 percent, high-density pure virgin clay; "Turface Professional Mound Clay" by PROFILE Products LLC, or equal.
 - a. Color: As noted on the Drawings or, if not indicated, as selected by Owner's Representative.
 - b. Size: 50 pound bags.
4. Home Plate and Bases Clay: 100 percent pure virgin clay blocks; "Turface MoundMaster" by PROFILE Products LLC, or equal.
 - a. Color: As noted on the Drawings or, if not indicated, as selected by Owner's Representative.
5. Bases Clay: "TMT Pro-Grade Screened Clay."

C. Sports Field Conditioner: "Turface MVP" by PROFILE Products LLC, or equal.

2.02 ADDITIONAL MATERIALS

- A. Aggregate Base: As specified in Section 32 11 00 - Base Courses.
- B. Brick and Bag Clay: "Pro-Mound" by Pros Choice, 800-648-1166, or equal.

PART 3 - EXECUTION

3.01 SAND

- A. Spread sand to depth specified on Drawings.
- B. Rake then roll sand with water roller to establish firm, even surface at specified elevation.

3.02 INFIELD CLAY MIX AT HOME PLATE AND BASES

- A. Home Plate: Excavate evenly designated infield areas and lay a 1/2 inch course of loose clay and compact. Lay clay bricks across entire area and alternate brick joints in courses. Bricks to be worked together to bond and hand tamp. Apply 1/2 inch layer of loose clay to cover and finish with fines layer.
- B. Bases: Excavate evenly designated infield areas and lay loose clay in 2 inch lifts and compact. Lay additional clay lifts to achieve 4 inches of clay and compact.

- C. Water lightly and compact with 1,000 to 3,000 pound roller.
- D. Spread additional material, roll and compact to establish even finished grade at specified elevation.

3.03 INFELD FINES AND WARNING TRACK MIX

- A. Spread infield fines mix evenly where shown in drawings and screed in 2-inch lifts. Thoroughly water each lift until the entire depth is moist.
- B. Roto-till specified sports field conditioner into the top 3 [2] inches of fines at a rate of 1.0 ton per 1000 square feet.
- C. Compact with a 1,000 to 3,000 pound roller after grading and wetting final lift.
- D. Allow material to dry, then spike and mat drag to establish finish grade at specified elevations.
- E. Water to settle.
- F. Finish grade of infield and warning track fines shall be flush with concrete edgebands. If edge condition is a tall curb set finish grade to finish grade established on the grading Drawings.

3.04 SPORTS FIELD CONDITIONER

- A. As specified for infield fines mix.

3.05 AGGREGATE BASE

- A. Install as shown on the Drawings and in accordance with Section 32 11 00 – Base Courses.

3.06 PITCHER'S MOUND MIX

- A. Apply the pitchers' mound clay mix at 2-inch lifts, tamp, compact, and repeat.
- B. Compact with a 1,000 to 3,000 pound roller after grading and wetting final lift.
- C. Fill in back and sides of sloping to the edge of the circle.

3.07 DECOMPOSED GRANITE

- A. Install base course as specified per Section 31 11 00 - Base Courses.
- B. Spread evenly and compact in 2 inch lifts in designated areas.
- C. Water lightly and compact with roller.
- D. Spread additional material, roll and compact to establish even finished grade at specified elevation.

3.08 POURED IN PLACE RUBBER RESILIENT SURFACING

- A. Install in accordance with manufacturers specifications at locations shown on the Drawings.

3.09 LOOSE FILL RESILIENT SURFACE WOOD CHIP

- A. Install in accordance with manufacturers specifications at locations shown on the Drawings.

- B. System includes subdrains and felt that is placed on top of subgrade.
- C. Install wear mats under play equipment at slides and swing belt locations. Mats shall be installed above filter fabric.
- D. Install loose wood fill material to specified thickness and with top surface at grade elevation as indicated on the Drawings.

3.10 TOLERANCES

- A. Vertical deviation from specified lines, grades, and detail cross sections shall not exceed 0.04 foot for all surfacing specified in this Section.

END OF SECTION

SECTION 32 18 13

SYNTHETIC TURF PLAYING FIELD

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Included: Synthetic grass playing field system consisting of, but not necessarily be limited to, the following:
 - 1. Apron, Infield Grass, and Outfield synthetic grass system consisting of 2 inch tall hybrid monofilament/slit-film polyethylene fiber.
 - 2. Infield Clay and Warning Track synthetic grass system consisting of 1.6" slit-film polyethylene fiber with a texturized thatch layer.
 - 3. A resilient infill system consisting of graded sand and organic infill.
 - 4. A resilient infill system consisting entirely of graded sand.
- 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."
 - 3. F355: "Standard Test Method for Shock-Absorbing Properties of Playing Surfaces."
 - 4. F1936: "Standard Test Method for Shock-Absorbing Properties of North American Football Field Playing Systems as Measured in the Field."
- B. Current National Federation of High School (NFHS) Rules, as applicable.

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. Field layout and striping plan including field colors, including field line layouts and colors.
 - 4. 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. Color samples of color and logo work including final electronic versions of artwork.
 - 4. One quart samples of the following:
 - a. Specified sand infill.
 - b. Specified organic 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*/10-year**, prepaid, non-prorated, third-party insured warranty and insurance policy information (*Turf type II and III, **Turf type I).
- 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.
- B. Field groomer and/or sweeper as specified.

1.07 QUALITY ASSURANCE

- A. The manufacturer shall have a representative on site to certify the installation and warranty compliance.
- B. Designs, markings, layouts, and materials shall conform to all current NFHS, standards as specified that may apply to this type of synthetic turf installation.
- C. 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 cork and sand are not determining factors 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. Playing 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*/10** year period (*Turf type II and III, **Turf type I). 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*/10** years from the date of Notice of Completion (*Turf type II and III, **Turf type I)..
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 batter's box, base paths, 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 2 replacement panels for each batter's box per field (8 total), 2 replacement catcher boxes per field (4 total) and 2 replacement strips for the pitcher's stride area per field (4 total) from the top of the pitching plate to the change of color in the home plate direction.
14. Turf system of 2" hybrid/monofilament turf with sand/cork infill over a manufactured porous closed-cell composite shall not exceed a field average GMax of 120, as tested according to the ASTM 1936 Standard Specifications, for the life of the system.
15. Turf shall maintain an ASTM F355 G-Max of less than 160 for the life of the warranty.

PART 2 - PRODUCTS

2.01 APPROVED PRODUCTS – INFILL SYNTHETIC TURF

A. Manufacturer:

1. Approved manufacturers are as follows:
FieldTurf USA Inc.
175 N. Industrial Blvd
Calhoun, GA 30701
P: 800-724-2969

B. System:

1. Turf Type I (Apron, Infield Grass, and Outfield - GREEN): FieldTurf Vertex Prime 2" Monofilament/Slit film (FTVTP-2-Core-Purefill) with sand/cork infill as specified as the basis of design has been pre-approved by the District.
2. Turf Type II (Infield Clay - BROWN): FieldTurf Doubleplay Speed Vintage 40 with PureSelect sand/olive infill as specified as the basis of design has been pre-approved by the District.
3. Turf Type III (Warning Track - BROWN): FieldTurf Doubleplay Speed Vintage 40 with sand infill as specified as the basis of design has been pre-approved by the District.

2.02 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. The synthetic turf shall be delivered in 15-foot wide rolls and of sufficient length to extend from sideline to sideline. Head seams, between the sidelines, will not be acceptable.
- C. Markings:
1. Field of play lines for baseball, shall be inlaid or tufted. The lines shall be white.

2.03 PRODUCT SPECIFICATIONS: TURF TYPE I (APRON, INFIELD GRASS, AND OUTFIELD - GREEN)

- A. FieldTurf Vertex Prime 2" Monofilament/Slit film (FTVTP-2-Core-Purefill) with sand/cork infill shall consist of the following:
1. Carpet made of hybrid polyethylene fibers tufted into a fibrous, non-perforated, porous backing. Both monofilament and slit-film fibers must be tufted into each individual stitch in the turf carpet. Alternating tufting row patterns of each yarn type is unacceptable. The monofilament fiber shall be 14,000 denier, low friction, UV-resistant. Each monofilament fiber is extruded with two layers of polyethylene polymers. A rigid polyethylene polymer as the inner core of the fiber for superior resilience and a soft yet extremely durable polyethylene polymer as the outer shell of the fiber for a realistic grass-like feel.
 2. Infill: Controlled mixture of graded sand and granulated cork that partially covers the carpet.
 3. Glue, thread, paint, seaming fabric and other materials used to install and mark the artificial grass hybrid FieldTurf.
- B. The installed artificial grass hybrid FieldTurf shall have the following properties:

STANDARD	PROPERTY	SPECIFICATION
	Yarn Structure - A	Slit-Film
ASTM D1577	Fiber Denier	5,000
ASTM D1577	Yarn Structure - B	Monofilament
ASTM D1577	Fiber Denier	14,000
ASTM D5823	Pile Height	2"
ASTM D5793	Stitch Gauge	3/4"
ASTM D5848	Pile Weight	39oz/square yard
ASTM D5848	Primary Backing	7+oz/square yard
ASTM D5848	Secondary Backing	16+oz/square yard
ASTM D5848	Total Weight	62+oz/square yard
ASTM D1335	Tuft Bind (Without Infill)	8+ lbs
ASTM D5034	Grab Tear (Width)	>200 lbs/force
ASTM D5034	Grab Tear (Length)	>200 lbs/force
ASTM D4491	Carpet Permeability	>40 inches/hour
ASTM F1936	Impact Attenuation (Gmax)	<200
	Sand Infill Component	4.5 lbs/square foot
	PureFill Cork	1.4 lbs/square foot

Variation of +/- 5% on above listed properties is within normal manufacturing tolerances

A separate shockpad is required for this system.

- C. Carpet shall consist of hybrid fibers tufted into a primary backing with a secondary backing.
- D. Carpet Rolls shall be 15' wide rolls.
 - 1. Rolls shall be long enough to go from field sideline to sideline.
 - 2. Where the playing field is for football, the perimeter white line shall be tufted into the individual sideline rolls.
- E. Backing:
 - 1. Primary backing shall be a double-layered polypropylene fabric
 - 2. Secondary backing shall consist of an application of porous, heat-activated urethane to permanently lock the fiber tufts in place.
 - 3. Perforated (with punched holes), backed carpet are acceptable.
- F. Infill materials shall be approved by the manufacturer.
 - 1. Infill shall consist of a resilient layered granular system, comprising selected and graded sand and granulated cork. Organic infill must be comprised of materials that do not require irrigation to be installed around the field.
 - 2. Artificial Grass products without silica sand and granulated cork as its sole infill components will not be acceptable.
 - 3. Granulated cork must have a bulk density of 0.25 g/cm³ +/- 15%
- G. Non-tufted or inlaid lines and markings shall be painted with paint approved by the synthetic turf manufacturer.
- H. Thread for sewing seams of turf shall be as recommended by the synthetic turf manufacturer.
- I. Glue and seaming fabric for inlaying lines and markings shall be as recommended by the synthetic turf manufacturer.

2.04 PRODUCT SPECIFICATIONS: TURF TYPE II (INFIELD CLAY - BROWN)

- A. Turf Type II: FieldTurf Doubleplay Baseball Speed Infield 1.6" with PureSelect sand/olive infill shall consist of the following:
 - 1. Carpet made of polyethylene fibers tufted into a perforated backing.
 - 2. Infill: Controlled mixture of graded sand and olive cores which partially cover the carpet.
 - 3. Glue, thread, paint, seaming fabric and other materials used to install and mark the artificial grass FieldTurf.
 - 4. Removable home plate area and pitcher's mound landing strip, if desired. Velcro must be adhered onto the perimeter of each removable piece in addition to each removable piece having a strengthened backing layer designed to improve cleat puncture resistance.
- B. The installed artificial grass slit-film FieldTurf shall have the following properties:

STANDARD	PROPERTY	SPECIFICATION
ASTM D1577	Yarn Structure – A	Slit-Film
	Yarn Denier - A	10,800
	Yarn Structure – B	Thatch
	Yarn Denier – B	5000
ASTM D5823	Pile Height	1.6"
ASTM D5793	Stitch Gauge	3/8"
ASTM D5848	Pile Weight	50oz/square yard
ASTM D5848	Primary Backing	7+oz/square yard
ASTM D5848	Secondary Backing	20+oz/square yard
ASTM D5848	Total Weight	77+oz/square yard

ASTM D1335	Tuft Bind (Without Infill)	8+ lbs
ASTM D5034	Grab Tear (Width)	200 lbs/force
ASTM D5034	Grab Tear (Length)	200 lbs/force
ASTM D4491	Carpet Permeability	>40 inches/hour
	Sand Infill Component	3.5lbs/square foot
	Olive Cores Infill Component	1.5lbs/square foot
	Total Product Weight	797oz/square yard

Variation of +/- 5% on above listed properties is within normal manufacturing tolerances

- C. Carpet Rolls shall be 15' wide rolls.
- D. Backing:
 - 1. Primary backing shall be a double-layered polypropylene fabric.
 - 2. Secondary backing shall consist of an application of porous, heat-activated urethane to permanently lock the fiber tufts in place.
 - 3. Perforated (with punched holes), backed carpet are acceptable.
- E. Infill materials shall be approved by the manufacturer.
 - 1. Infill shall consist of a resilient layered granular system, comprising selected and graded sand and olive cores.
 - 2. Artificial Grass products without granulated olive cores and sand will not be acceptable.
- F. Non-tufted or inlaid lines and markings shall be painted with paint approved by the synthetic turf manufacturer.
- G. Glue and seaming fabric for inlaying lines and markings shall be as recommended by the synthetic turf manufacturer.

2.05 PRODUCT SPECIFICATIONS: TURF TYPE III (WARNING TRACK - BROWN)

- A. Turf Type II: FieldTurf Doubleplay Baseball Speed Infield 1.6" with PureSelect sand infill shall consist of the following:
 - 1. Carpet made of polyethylene fibers tufted into a perforated backing.
 - 2. Infill: Controlled mixture of graded sand which partially covers the carpet.
 - 3. Glue, thread, paint, seaming fabric and other materials used to install and mark the artificial grass FieldTurf.
- B. The installed artificial grass slit-film FieldTurf shall have the following properties:

STANDARD	PROPERTY	SPECIFICATION
ASTM D1577	Yarn Structure – A	Slit-Film
	Yarn Denier - A	10,800
	Yarn Structure – B	Thatch
	Yarn Denier – B	5000
ASTM D5823	Pile Height	1.6"
ASTM D5793	Stitch Gauge	3/8"
ASTM D5848	Pile Weight	50oz/square yard
ASTM D5848	Primary Backing	7+oz/square yard
ASTM D5848	Secondary Backing	20+oz/square yard
ASTM D5848	Total Weight	77+oz/square yard
ASTM D1335	Tuft Bind (Without Infill)	8+ lbs
ASTM D5034	Grab Tear (Width)	200 lbs/force
ASTM D5034	Grab Tear (Length)	200 lbs/force
ASTM D4491	Carpet Permeability	>40 inches/hour
	Sand Infill Component	10lbs/square foot
	Total Product Weight	797oz/square yard

Variation of +/- 5% on above listed properties is within normal manufacturing tolerances

- C. Carpet Rolls shall be 15' wide rolls.
- D. Backing:
 - 1. Primary backing shall be a double-layered polypropylene fabric.
 - 2. Secondary backing shall consist of an application of porous, heat-activated urethane to permanently lock the fiber tufts in place.
 - 3. Perforated (with punched holes), backed carpet are acceptable.
- E. Infill materials shall be approved by the manufacturer.
 - 1. Infill shall consist of a resilient layered granular system, comprising selected and graded sand and olive cores.
 - 2. Artificial Grass products without granulated olive cores and sand will not be acceptable.
- F. Non-tufted or inlaid lines and markings shall be painted with paint approved by the synthetic turf manufacturer.
- G. Glue and seaming fabric for inlaying lines and markings shall be as recommended by the synthetic turf manufacturer.

2.06 SYNTHETIC TURF MAINTENANCE EQUIPMENT (GROOMER AND SWEEPER)

- A. Contractor shall supply one field groomer and one sweeper. Sweeper shall have a debris collection attachment that shall pick up 1/4 inch diameter and larger material, but leave sand and rubber infill material. The groomer shall have plastic brushes and metal tines that are adjustable.
- B. Grooming Product: Synthetic Turf Groomer with Greens Slicer Spring Tine Rake manufactured by Greens Groomer Worldwide, 888-298-8852, or acceptable equivalent product.
- C. Field Sweeper: "Agri-Fab" sweeper by Agri-Fab Inc., 800-724-2969, in model and size as recommended by manufacturer and appropriate for size of installation.

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. The turf rolls are to be installed directly over the properly installed manufactured base material.
 - 1. No equipment with loads greater than 35 pounds per square inch shall be allowed on the field. Contractor is responsible for altering operations in order to adhere to this requirement.
 - 2. Contractor and synthetic turf installer shall strictly adhere to the written instructions provided by the manufactured base manufacturer for installing turf on top of their product.
 - 3. Contractor is responsible to assure vehicles being used on the manufactured base are equipped with pneumatic (air-filled) tires, preferably turf tires, designed to spread loads and minimize damage to surface. Foam filled or solid tires and tires with aggressive lug patterns shall not be used on the manufactured base without synthetic turf installed.
 - 4. Use of an A-frame for unrolling of the synthetic turf as recommended by the base manufacturer.
- F. 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.
- G. The full width rolls shall be laid out across the width of the field.
- H. Utilizing standard state of the art sewing procedures each roll shall be attached to the next. After all of the rolls of the playing surface have been installed, the sideline areas shall be installed at right angles to the playing field turf.
- I. The synthetic turf field shall utilize sewn seams. Minimum gluing will only be permitted to repair problem areas, corner completions, and to cut in any logos or inlaid lines as required by the Specifications.
 - 1. Seams between turf panels shall be sewn. Seams shall be sewn using double stagger stitches and polyester thread. Seams shall be flat, tight, and permanent with no separation or fraying.
 - 2. Inlaid markings that cannot be tufted into the fabric shall be installed by means of shearing out the existing green fiber and laying in a new piece of colored fabric into a bed of suitable "hot melt" adhesive placed directly on the original turf backing material.
 - a. Inlaid markings shall not be installed by means of cutting through the fabric and adhering the colored turf to a separate reinforcing tape or cloth.
- 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. After completion of the synthetic turf installation, and prior to Substantial Completion of the project, the Contractor shall have installation tested for shock absorbency.
 - 1. Site testing shall be at ambient shaded air temperature of 40–100 degrees F.
 - 2. Field test measurements shall be made at a minimum of 6 locations and shall avoid areas where 2 seams cross.
 - 3. Testing shall be made, at the Contractor's expense, by an independent testing laboratory accredited for such tests and pre-approved by the District.
 - 4. Testing and analysis by the testing laboratory shall provide the necessary data to the District that verifies the finished field meets or exceeds shock attenuation of between 95 and 170 as determined by the ASTM F355A and F1936 test procedures.
- B. Test results that do not meet the specified shock attenuation, or if any one test value is 10 percent greater in variance than the specified values, then the Contractor's field installer shall address the failed test area, be required to retest the entire field as stated above, and conform to these requirements prior to acceptance by the District.
- C. 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

- A. Manufacturer shall be responsible for the testing of the G-max levels of the installed synthetic turf at the completion of years 2, 4, 6, and 1 month prior to the completion of year 8*/10** of the warranty period (*Turf type II and III, **Turf type I).
- B. Testing shall be completed by an independent testing laboratory accredited for such tests, and shall be pre-approved by the District. Testing and analysis of findings shall be completed by testing laboratory's qualified persons utilizing the required techniques outlined in the ASTM F355 test standard.
- C. If tests results indicated turf playing field does not fall within the G-max range specified, the manufacturer will be required under terms of its warranty to modify the field composition to the sole satisfaction of the District so that it falls within the target G-max range. A failed test shall be retested to verify that the field meets the specifications.
- D. Costs associated with testing and corrective work shall be at no cost to the District.

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, and substrate for porous drainage composite.
 - 3. Manufactured porous drainage composite.
- 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 Playing Field

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, filter fabric, and porous drainage composite 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 $1 < \frac{D_{25}^2}{D_{10} * D_{60}} < 3$
Fragmentation shall be 100%.

"x" is the size of the sieve (in millimeters) that lets pass "x" percent of the stone. For example, D_{60} 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.

1.12 POROUS CLOSED-CELL COMPOSITE GUARANTY

- A. The manufacturer of the porous closed cell composite base shall provide a guaranty, in writing, that for a period of twenty five (25) years, the porous closed cell composite base shall be a part of a turf system that will not exceed a field average GMax of 120 g's as tested according to the ASTM 1936 Standard Specification.

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

Mesh size	Percent Passing
#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 MANUFACTURED BASE MATERIAL

- A. Manufactured Porous Closed Cell Composite Base: Resilient, interlocking, polypropylene panels specifically engineered for sports fields; "PowerBase YSR" by Brock International, 303-544-5800, or equal.
 - 1. Panel Size: Approximately 73.5 x 49.0 inches.
 - 2. Thickness: 1.0 inches, (25 mm).
 - 3. Weight: 5.56 lbs per panel

2.06 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
Permittivity	ASTM D 4491	

2.07 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 engineered permeable rock base 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.

3.04 INSTALLATION OF MANUFACTURED DRAINAGE MATERIAL

- A. Upon successful completion of installing the base, the porous drainage composite shall be installed in accordance with the Drawings and in strict compliance with the manufacturer installation instructions. Contractor to exercise extreme care in order to avoid disturbing the crushed stone base.
- B. Contractor to take measures to ensure that the product is not exposed to the outdoor elements longer than the manufacturer's recommendations. Product that exceeds this exposure time duration shall be removed from the project site immediately and not used on the project.
- C. Sections of the material shall be interlocked and/or connected to adjacent pieces of the drainage material in strict conformance with the manufacturer's written installation instructions.
- D. Provide geotextile filter fabric in the areas designated on the Drawings. Fabric shall be laid in shingle fashion overlapping 12 inches minimum following direction of slope with upslope fabric laying atop the down slope fabric.

END OF SECTION

SECTION 32 31 13

CHAIN LINK FENCING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: chain link fencing improvements as shown on the Drawings including, but not necessarily limited to, the following:
 - 1. Galvanized chain link fabric, posts, gates, and hardware.
 - 2. Thermally fused and bonded PVC coated ("vinyl coated") galvanized chain link fabric with painted posts, gates, hardware, and related appurtenances.
 - 3. Batting cage(s) with chain link roof and interior netting.
 - 4. Concrete footings and mow bands.
- B. Related Requirements:
 - 1. Section 01 33 00 - Submittal Procedures
 - 2. Section 32 33 00 - Site Furnishings
 - 3. Section 32 32 15 - Landscape Concrete
 - 4. Section 32 90 00 - Planting
 - 5. Structural Drawings

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 2. A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 3. A392 - Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric.
 - 4. F567 - Standard Practice for Installation of Chain-Link Fence."
 - 5. F1043 - Standard Specification for Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework.
 - 6. F1083 - Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.
- B. American Welding Society (AWS):
 - 1. A2.4: "Symbols for Welding, Brazing and Nondestructive Examination."
- C. Chain Link Fence Manufacturers Institute (CLFMI): Product Manual CLF-PM0610.
- D. Industrial Steel Guide for Fence, Rails, Posts, Gates and Accessories.
- 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. Sequence and Scheduling: Contractor shall coordinate construction timing of chain link fencing and related work with installation of concrete work specified in Section 32 32 15 – Landscape Concrete and all other work.

1.04 ACTION SUBMITTALS

- A. Shop Drawings: To scale drawings showing all different types and sizes of batting cages, gates, and fencing systems.
 - 1. Shop Drawings shall include, but may not be limited to:
 - a. All information regarding clearances, connections, components and any miscellaneous related appurtenances (such as wood baseboards at backstops, locking mechanisms etc.).
 - b. Concrete footing and reinforcement information.
 - 2. Indicate materials, dimensions, sizes, weights and finishes of components. Include plans, elevations, sections and other required installation and operational clearances, connections, components and miscellaneous related appurtenances and locking devices.
 - 3. Show required field measurements and interface with work of other Sections. Provide details showing interface and anchorage of fencing and gates with adjacent construction, both new and existing.
 - 4. Details showing post anchorage, attachment and bracing. Provide setting drawings, templates, instructions, and directions for installation of anchorage devices.
 - 5. Details of gates and hardware.
 - 6. Welds, both shop and field, shall be indicated by AWS "Symbols for Welding, Brazing and Nondestructive Examination," A2.4.
- B. Product Data: Manufacturer's descriptive literature for materials and components of the chain link fencing system including coatings, fittings, and hardware.
 - 1. Include the manufacturer's name and catalog number for each item where applicable.
 - 2. Clearly identify which portions of the information on the printed literature are applicable if more than one product is shown.
- C. Samples:
 - 1. Chain-link fabric, approximately 12 inches square, if requested by District's Representative.
 - 2. Hardware and fittings District's Representative.
 - 3. Color selections for finishes of vinyl coated or powder coated fencing system.
 - 4. Sample of Windscreen.
 - 5. Color selection for backstop baseboards.

1.05 INFORMATIONAL SUBMITTALS

- A. Installation Instructions and/or Drawings: Submit as applicable.

1.06 QUALITY ASSURANCE

- A. Welding:
 - 1. Qualifications: Certified and qualified in accordance with AWS D1.1.
 - 2. Procedures and operations shall comply with AWS "Standard for Welding Procedure and Performance Qualifications," B2.1.
 - 3. Comply with AWS publication "Welding Zinc Coated Steel" for galvanized products.
 - 4. Welding inspector's qualifications shall be in accordance with AWS D1.1. All looks good.

PART 2 - PRODUCTS

2.01 DESIGN AND PERFORMANCE CRITERIA

- A. It is intended that all fencing, by area, receive the same finish coating wherever possible. Nuts, bolts, applicable moving portions of hinges etc. shall be painted to match with PVC touch-up paint in vinyl or powder coated systems.

- B. Except as otherwise specified, comply with Chain Link Fence Manufacturers Institute (CLFMI) Product Manual.
- C. Industry Standards: Materials and installation shall conform to the requirements of the Chain Link Fence Manufacturers Institute (CLFMI) "Product Manual."
- D. Regulatory Requirements: Pedestrian gates and related hardware shall comply with applicable codes, including provisions for accessibility required by CBC Chapters 10 and 11B, Part 2; and the Americans with Disabilities Act (ADA) Standards for Accessible Design.
- E. Bottom 10 inches of pedestrian gates shall have a smooth uninterrupted surface.

2.02 MATERIALS

- A. Fabric: Galvanized steel wire complying with ASTM A392, Class 1, with not less than 1.2 ounce zinc coating per square foot.
 - 1. Selvage: Knuckled finish top and bottom.
 - 2. Steel Fabric: Comply with Chain Link Fence Manufacturers Institute (CLFMI) Product Manual. Furnish one-piece fabric widths for fencing up to 16 feet high. Wire sizes includes zinc coating.
 - 3. Mesh Opening: 2 inches.
 - 4. Wire Diameter: 9-gauge (0.148 inch diameter), unless noted otherwise.
 - 5. Polymer Coating: Thermally fused and bonded polyvinyl chloride (PVC) complying with ASTM F668 Class 2b, 7mil (0.18 mm) thickness thermally fused over zinc-coated wire.
 - a. Color: Black and in compliance with F934.
- B. Framework: Posts and rails shall be Schedule 40 pipe complying with conforming to ASTM F1083, Regular Grade, 30,000 psi Yield Strength, or ASTM F1043, Group 1-C, High Strength Grade 50,000 psi Yield Strength, galvanized with no less than 1.8 ounces of zinc coating per square foot of surface area complying with ASTM A123.
 - 1. Strength requirements for posts and rails shall conform to ASTM F1043 or F1083 as noted below.
 - 2. Pipe shall be straight, true to section, material, and sizes specified, and shall conform to the following weights per foot:

NPS in inches	Outside Diameter (OD) in inches	Type I Steel ASTM F1083 (30 KSI)	Type II Steel ASTM F1043 (50 KSI)
1	1.315	1.68	1.35
1.25	1.660	2.27	1.84
1.5	1.900	2.72	2.28
2	2.375	3.65	3.12
2.5	2.875	5.79	4.64
3	3.500	7.58	5.71
3.5	4.000	9.11	6.56
4	4.500	10.79	---
6	6.625	18.97	---
8	8.625	28.55	---

- C. Fittings and Accessories:
 - 1. Unless specified otherwise, steel fence fittings and accessories shall comply with ASTM F626 and be galvanized in accordance with ASTM A53, with zinc weights per Table 1 of ASTM A153.

2. Tension Wire: 7-gauge (0.177 inch diameter) coil spring steel with finish to match fabric.
 3. Tie Wires: 9 gauge (0.148 inch diameter) steel with finish to match fabric.
 4. Caps: Provide weather tight closure cap for each post and exposed ends of framing. Provide line post caps with loop to receive wire or top rail with finish to match fabric.
 5. Tension Bars: Hot-dip galvanized steel with minimum length 2 inches less than full height of fabric, minimum cross-section of 3/16 inch by 3/4 inch and minimum of 1.2 ounce zinc coating per sq. ft. of surface area.
 6. Tension Clips: Minimum 3/4 inch wide 12-gauge (.105 inch) thick with finish to match fabric.
 7. Truss Rods: Hot dipped galvanized steel rods with a minimum diameter of 5/16 inch (7.9 mm).
- D. Hardware for Swinging Gates:
1. General:
 - a. Hardware shall be of adequate size and strength to provide proper operation of gates.
 - b. Provide hinges, latching and locking devices, and other hardware as shown on the Drawings or required for a complete operable installation.
 2. Hinges: Master Halco heavy duty, or acceptable equal.
 3. 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 1/2 -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.
 4. Panic Hardware:
 - a. Panic bar requiring maximum 5 lbs of operating force per CBC 11B-309.4; "Corbin-Russwin 8200 series" push pads, strike plates, and receiver brackets or accepted equal.
 - b. Pull Handle, Strike Plate, Guard Plate, and Mounting Plate shall be compatible with panic bar system, and be provided by Corbin-Russwin, or accepted equal.
 5. Accessible Pull Handle:
 - a. Operable parts shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist, requiring maximum 5 lbs of operating force per CBC 11B-309.4.
 - b. Pull handle shall be one of the following, to be reviewed by District Representative:
 - 1) Passage Latch: Corbin-Russwin 698F438, Newport N-6 Lever handle with IC core
 - 2) Night Latch: Corbin-Russwin 698F458, Newport N-6 Lever handle with IC core
- E. Batting Cage Netting and Accessories: Sportsfield Specialties, Delhi, NY (408) 728-0428; or equal.
1. Refer to Section 32 33 00 – Site Furnishings for netting information.
 2. #36 black nylon net, 1-3/4" square mesh with rope bound perimeter.
 3. Netting shall be affixed to eyebolts with 1/4 inch minimum vinyl-coated stainless steel aircraft cable.
 4. Galvanized Thimbles, wire rope clamps, carabineer clips, hog rings and jaw and jaw turnbuckles.
 5. Black vinyl encased 1/4" galvanized chain ground weight.
 6. Fencing shall be provided with concrete edgebands unless otherwise noted.
 - a. Edgebands shall have a minimum 4 inch clearance from edge of post to edge of concrete.
 - b. Gates shall have the same edgeband width as adjacent fencing.
- F. Protective Netting with Nylon Net and Cable System: Sportsfield Specialties, Delhi, NY (408) 728-0428; or equal.
1. Refer to Section 32 33 00 – Site Furnishings for protective netting system information.
 2. Refer the plan sheets SFS1 for additional specifications and information.

2.03 ADDITIONAL MATERIALS AND COMPONENTS

- A. Concrete: Minimum Class B, 28-day compressive strength of 2,500 psi as specified in Section 32 32 15 - Landscape Concrete.

- B. Privacy Slats: not-applicable.
- C. 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, "Cold Galv Primer" by Valspar, or equal.
- D. Distance Banners, Wind Screen, Signage and all other Applicable Attachments:
 - 1. Refer to Section 32 33 00, "Site Furnishings" for product information. Windscreen shall be affixed to chain-link fencing as indicated on Drawings with galvanized "hog rings" or acceptable equal. Install hog ring in each corner of windscreen and at 4 feet o.c. maximum spaced evenly along top and bottom of fence fabric. Other products shall be attached at each grommet location and per manufacturers recommendations. Grommets shall be located in thicker seamed areas. No attachment grommets in a single layer of fabric will be allowed.
- E. Top of Fence Protective Cap: Attach with heavy duty zip ties, color matched.
- F. Backstop Base Boards: Refer to plans

2.04 FABRICATION

- A. Welding: Welds shall be shop fabricated prior to galvanizing unless otherwise acceptable to District's Representative and where field welding is unavoidable.
- B. Repair zinc coating damaged after fabrication with specified repair paint in accordance with ASTM A780, AHDGA publication, "Recommended Practice for Touch-up of Damaged Galvanized Coatings," and manufacturer's recommendations for application of repair paint.
- C. Steel Framework: System shall comply with the following minimum requirements and as noted on the Drawings.
 - 1. Posts, Rails, Braces, and Gate Frames: Type I galvanized steel pipe as specified.
 - 2. End, Corner, and Pull Posts for the Following Fabric Heights: As noted on the Drawings.
 - 3. Line or Intermediate Posts for the Following Fabric Heights: As noted on the Drawings.
 - 4. Top, Bottom and Horizontal Intermediate Rails: 1.66 inch outside diameter (1-5/8 inch outside diameter).
 - 5. Gate Posts: Single gate leaf, and one leaf of a double gate installation, for nominal gate widths as follows: As noted on the Drawings.
 - 6. Gate Frames: Single or double gate for nominal gate widths as follows:
 - a. 6 Feet to 10 Feet: 1.90 inch outside diameter (1-7/8 inch outside diameter).
 - b. Under 6 Feet: 1.66 inch outside diameter (1-5/8 inch outside diameter).
 - 7. Batting Cage Roof: As noted on the Drawings.
- D. Finishing: At fencing with vinyl coated fabric, posts and railings shall be painted with exterior grade paint, System as specified in Section 09 91 15 – Exterior Site Painting.
 - 1. Color: Black, to match vinyl.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Prior to excavation, layout all fencing locations for review and acceptance by District's Representative.
- B. Do not begin installation and erection before final grading is completed, unless otherwise permitted.

3.02 ERECTION

- A. General: Erect chain link fence and related items in accordance with ASTM F567, in strict conformance with reviewed and accepted shop drawings, and manufacturer's recommendations.
- B. Set all posts straight, plumb, and true to line.
 - 1. Set line posts at equal spacing not to exceed 10 feet on centers, in concrete footings not less than 10 inches around and 36 inches deep.
 - 2. Set terminal posts at corners, ends, and gates, in concrete footings not less than 12 inches around and 36 inches deep.
 - 3. Slope tops of concrete footings so as to provide drainage away from posts.
- C. Excavation: Drill or hand-excavate holes for posts to diameter and spacing indicated in firm, undisturbed or compacted soil.
 - 1. Unless noted otherwise, excavate holes for each post to minimum diameter recommended by fence manufacturer, but not less than 4 times largest cross section of post.
 - 2. Unless noted otherwise, excavate hole depths approximately 3 inches lower than post bottom, with bottom of posts set not less than 36 inches below finish grade surface.
- D. Setting Posts: Center and align posts in holes 3 inches above bottom of excavation. Space chain link posts maximum 8 feet on center unless noted otherwise. Surface mount posts with mounting plates where indicated. Fasten with lag bolts and shields.
- E. Top Rails: Run rail continuously through line posts caps, bending to radius for curved runs and at other posts termination into rail end attached to posts or post caps fabricated to receive rail. Provide expansion couplings as recommended by fencing manufacturer.
- F. Bottom Rails: Install bottom rails between posts with fittings and accessories as shown in Drawings, as applicable.
- G. Brace Assemblies: Install braces so posts are plumb when diagonal rod is under proper tension.
- H. Tension Wire: As applicable, install at bottom of fabric (and at top if top rail is not specified) as shown in Drawings. Install tension wire before stretching fabric and attach to each post with ties. Secure wire to fabric with 12.5 gauge hog rings at 24 inches on center maximum.
- I. Fabric: Leave approximately 2 inches between finish grade and bottom selvages (1 inch at backstops) unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Install fabric on infield or primary use side of fence, unless noted otherwise, and anchor to framework so that fabric remains in tension after pulling force is released.
- J. Tension Bars: Provide one bar for each gate and end post, and two for each corner and pull post, except where fabric integrally woven into post. Thread through fabric, and secure to end, corner, pull, and gate posts with tension clips spaced not over 15 inches on center.
- K. Tie Wires: Use U-shaped wire of proper length to secure fabric firmly to posts and rails with ends twisted at least 2 full turns. Bend ends of wire to minimize hazard to persons or clothing. Tie fabric to line posts 12 inches maximum on center and to rails and braces 24 inches maximum on center.
- L. Fasteners: Install nuts for tension clips and hardware bolts on side of fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts. Cut all bolts within three threads of nut or less.
- M. Field Welding:
 - 1. Field welds shall be completed by a Certified Structural Welder.
 - 2. 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.

3. Repair zinc coating damaged by field welding as specified for shop welding.

N. Bolts shall be cut back to within three threads of the nut.

3.03 GATE INSTALLATION

A. Install gates as shown on the Drawings in accordance with reviewed submittals.

B. Cut, drill, and fit as required for installation.

C. Set work accurately in location, alignment, and elevation; plumb, level, and true; and free of rack; measured from established lines and levels.

D. Adjust items prior to securing in place so as to ensure proper matching of components and correct alignment.

E. Field weld all gate hinges in place once gates are aligned and approved by Districts representative.

3.04 ADJUSTMENT AND TOUCH-UP

A. Inspect installed work. Verify that gates, controls, and hardware operate properly. Correct deficiencies.

B. Restore products and finishes damaged during installation and construction period so that no evidence of correction work remains.

END OF SECTION

SECTION 32 32 00

LANDSCAPE CONCRETE MASONRY

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Concrete unit masonry for dugouts.
 - 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 disfigurement 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 11 00 - Base Courses
 - 3. Section 32 13 13 - Concrete Paving
 - 4. 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 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. 4 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 restraighen 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. Pitcher's rubber
 - b. Home plate
 - c. Base Pads w/ Anchors
 - d. Storage (Bat & Helmet)
 - e. Storage (Helmet & Coat)
 - f. Two-tier Team benches
 - g. Foul pole set
 - h. Windscreens
 - i. Fence Cap
 - j. Guard Rail System
 - k. Drinking fountain (pedestal mount)
 - l. Drinking fountain (wall mount)
 - m. Com boxes
 - n. Litter Receptacle
 - o. Recycle Bin
 - p. Bike Rack
 - q. Picnic Bench
 - r. Discus Cage
 - s. Discus Throw Ring
 - t. Soccer goals
 - u. Soccer corner flags
 - v. Batting Cage Netting
 - w. Pole to Pole Tension Netting System
 - x. Tree Grates
 - y. (Bid Alternate 1) Covers for Bullpens, Batting Cage, Home plate and Pitcher's Mound
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 00 – Miscellaneous Paving and Surfacing
5. Section 32 18 13 – Synthetic Turf Playing Field
6. Section 32 31 13 – Chain Link Fencing

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 District'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 District's Representative.

1.05 INFORMATIONAL SUBMITTALS

- A. Statement of qualifications for manufacturers and installer if requested by the District'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 District's Representative at the time of Final Acceptance.
- C. Field Samples and Mockups: As requested by the District'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 District'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 District.
- 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 District'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 District 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.

2.03 BIKE RACKS

- A. Product and Manufacturer: Welle Multi Bend Round Pipe Racks: Steel pipe loop with 7-bike capacity; 2-3/8 inch outside diameter Stainless steel pipe; H3607-IG-SS by Bikeparking.com, Palmer Group, LLC, T: 415.333.6428, T: 888.764.2453, or equal.
 - 1. Finish: Stainless Steel
 - 2. Mounting: Embedded in concrete.

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 District'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 District'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 District's Representative prior to beginning the work.
- A. Install level and plumb in accordance with manufacturer's instructions at locations indicated on the Drawings.
- B. Concrete footings shall conform to requirements of Section 32 32 15 – Landscape Concrete unless noted otherwise.
- C. 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.

1.02 CLEANING AND ADJUSTMENT

- A. Protect furnishings from damage until acceptance of work. Do not remove protective wrappings from furnishings until so instructed by the District's Representative.
- B. Clean soiled site furnishings prior to acceptance by District.
- C. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by the District's Representative.
- D. Replace damaged items to the satisfaction of the District's Representative. Replace missing accessories at no cost to District.

1.03 SITE FURNISHINGS MATRIX

ITEM	DESCRIPTION	MANUFACTURER	MODEL NO.	QTY.	FINISH/COLOR	DISTRIBUTOR/CONTACT
A.	Pitcher's Rubber	Schutt 4 Sides Pro Pitching Rubber	SHBBPB	5	STD	Sportsfield Specialties Alex Fletcher (408) 659-6055
B.	Home Plate	Schutt Bury All Home Plate	SHSRHP	7	STD	Sportsfield Specialties Alex Fletcher (408) 659-6055
C.	Base Pads w/ Anchors	Schutt Pro-Style Hollywood Bases	SHBBPL w/ SHAFIT	1 3	STD	Sportsfield Specialties Alex Fletcher (408) 659-6055
D.	Bat & Helmet Standup Storage Cubby	SportsField Specialties	SUWHCBSS	2	STD	Sportsfield Specialties Alex Fletcher (408) 659-6055
E.	Helmet & Coat Rack Overhead Storage Cubby	SportsField Specialties	SUWHCCRWM	8	STD	Sportsfield Specialties Alex Fletcher (408) 659-6055
F.	Two-Tier Team Benches	SportsField Specialties	PTBTTWM8 (LG-TTPY-08)	8	Polyboard= Ivory Powder Coat= Vulcan Black	Sportsfield Specialties Alex Fletcher (408) 659-6055
G.	Foul Pole set	SportsField Specialties	FPW420	2	Yellow	Sportsfield Specialties Alex Fletcher (408) 659-6055

ITEM	DESCRIPTION	MANUFACTURER	MODEL NO.	QTY.	FINISH/COLOR	DISTRIBUTOR/CONTACT
H.	Windscreens	Aer-Flo, Inc.	Closed Mesh	Per Plans	Black	Aer-Flo, Inc., Bradenton, FL 1-800-823-7356
I.	Fence Cap	Aer-Flo, Inc.	Premium fence cap	Per Plans	Yellow	Aer-Flo, Inc., Bradenton, FL 1-800-823-7356
J.	Guard Rail System	SportsField Specialties	GRS42, 42' L section	2	Custom size Black	Sportsfield Specialties Alex Fletcher (408) 659-6055
K.	Drinking Fountain (pedestal mount)	Most Dependable	10145 SMFA w/ recessed hose bib	2	Stainless Steel	Most Dependable Fountains angela@mostdependable.com (800) 552-6331
L.	Drinking Fountain (wall mount)	Most Dependable	440 WM w/ recessed hose bib	2	Stainless Steel	Most Dependable Fountains angela@mostdependable.com (800) 552-6331
M.	Com Boxes with infill retainer system lid	SportsField Specialties	CBIT1830, CBNG1830	Per Plans	STD	Sportsfield Specialties Alex Fletcher (408) 659-6055
N.	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
O.	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
P.	Bike Rack	Bikeparking.com	H3607-IG-SS, inground	2	stainless	Bikeparking.com Palmer Group, LLC, (415) 333-6428
Q.	Picnic Table	Wabash Valley	SG207P	4	Black	Wabash Valley Silver Lake, IN (260) 352-2102
R.	Discus Cage	SportsField Specialties	DCHS	1	STD	Sportsfield Specialties Alex Fletcher (408) 659-6055
S.	Discus Throw Ring	SportsField Specialties	TFDAA	1	STD	Sportsfield Specialties Alex Fletcher (408) 659-6055
T.	*Soccer Goal (with Nets & Mobility Kit)	SportsField Specialties	SG824R SGWK	4	STD	Sportsfield Specialties Alex Fletcher (408) 659-6055
U.	*Soccer Corner Flags (Qty 4)	Kwik Goal	SG6B1404	2 set	STD	Sportsfield Specialties Alex Fletcher (408) 659-6055
V.	Batting Cage Netting	SportsField Specialties	BTNS	2	Black	Sportsfield Specialties Alex Fletcher (408) 659-6055
W.	Pole to Pole tension netting system	SportsField Specialties	TNPPUC	1	Powder-coated black steel poles w/ black netting	Sportsfield Specialties Alex Fletcher (408) 659-6055

ITEM	DESCRIPTION	MANUFACTURER	MODEL NO.	QTY.	FINISH/COLOR	DISTRIBUTOR/CONTACT
X.	Tree Grate	Urban Accessories	6' COHO Square	Per plans	Brushed Aluminum	Mark Anderson (760) 690-4030
Y.	*^Covers for Bullpens, Batting Cage, Home plate and Pitcher's Mound	Aer-Flo, Inc.	Wind weighted rain cover and/or Custom Fit	Per Plans	Green	Aer-Flo, Inc., Bradenton, FL 1-800-823-7356
*Items not shown on plans shall be turned over to the District ^Items shown shall be included only for Bid Alternate 1						

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) Ramp handrails.
 - 2) Drinking fountain rails.
 - b. 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. Exterior Site Painting: Section 09 91 15; field applied coatings.
 - 3. Chain Link Fencing: Section 32 31 13.

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) Ramp handrails.
 - 2) Drinking fountain rails.
 - 3) Ornamental fencing and gates.
 - 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.
- 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/or other applicable items 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 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. Ornamental Metal Gates.
 - d. Ornamental 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: Master Halco heavy duty, or acceptable equal.
 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 1/2 -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. Panic Hardware:
 - a. Panic bar requiring maximum 5 lbs of operating force per CBC 11B-309.4; "Corbin-Russwin 8200 series" push pads, strike plates, and receiver brackets or accepted equal.
 - b. Pull Handle, Strike Plate, Guard Plate, and Mounting Plate shall be compatible with panic bar system, and be provided by Corbin-Russwin, or accepted equal.
 4. Accessible Pull Handle:
 - a. Operable parts shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist, requiring maximum 5 lbs of operating force per CBC 11B-309.4.
 - b. Pull handle shall be one of the following, to be reviewed by District Representative:
 - 1) Passage Latch: Corbin-Russwin 698F438, Newport N-6 Lever handle with IC core
 - 2) Night Latch: Corbin-Russwin 698F458, Newport N-6 Lever handle with IC core

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.
- G. Stainless Steel: Use electrochemical or mechanical methods or abrasive cleaners to remove weld discoloration on exposed surfaces. Welded area shall match appearance of adjacent surface after cleaning.

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. 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. Automatic irrigation controls and systems.
 - 3. Low voltage control wiring from controllers to remote control valves.
- B. Work Included Under Other Sections:
 - 1. Irrigation water stub-out.
 - 2. 120 Volt A.C. electrical stub-out for irrigation controller.
 - 3. 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 10 00 - Water Utilities-Low Pressure Domestic

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. [Ductile Iron Fittings: Ductile Iron Fittings shall be Gasketed Push Joint with deep bells for IPS pipe by The Harrington Corporation (HARCO) or approved equal. Transition gaskets are not permitted. Ductile Iron shall be per ASTM A536. Restraints, reducers, plugs and adapters shall be restrained to fitting bells equipped with only two lugs by means of restraining links. The use of screws to retain connections is not permitted.]
- D. 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.

E. PVC fittings used with UVR pipe shall be Schedule 40 UVR PVC type.

2.04 SWING JOINTS

A. Swing joints for Rotator and pop-up heads shall be as detailed on the Drawings.

B. Swing Joints for rotors shall be by LASCO Fittings, Inc. with ASTM F2768 Standard for Swing Joint ACME Threads, or equal.

C. [Swing Joints for Water Cannons shall be Ductile Iron by The Harrington Corporation (HARCO) or approved 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 PLASTIC VALVE BOXES – FOR USE IN LANDSCAPE AREAS ONLY

A. General:

1. Color of plastic boxes shall be green, unless the irrigation system is designed for recycled water, in which case boxes shall be purple.

2. If black or green valve boxes are required by the District for use on recycled water systems, the lids shall be purple or shall have a warning label or nameplate permanently molded into or attached onto the lid with rivets, screws, or bolts.

3. Warning labels shall be as specified on Drawings.

4. Valve boxes shall have locking or bolt down type lids.

5. Markings on valve box covers shall be "heat branded" onto the cover in 1 inch high letters.

6. Manufacturer: Carson Industries as specified and the basis of design, Applied Engineering Inc., NDS, Christy, or equal.

B. Ball Valves and Ball Valves, Round:

1. Model equivalent to Carson 910-10 with 910-T locking lid.

2. Boxes shall be labeled as "Irrigation – BV" on lid.

- C. Gate Valves and Ball Valves, Round:
 - 1. Model equivalent to Carson 910-10 with 910-T locking lid.
 - 2. 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 Carson 1419-12 with 1419-T locking lid.
 - 2. Valves 2 inches and larger: Model equivalent to Carson 1730-12 with 1730-T locking lid.
 - 3. Boxes shall be labeled as "Irrigation – RCV" on lid.
- E. Quick Coupling Valves, Round:
 - 1. Model equivalent to Carson 910-10 with 910-T locking lid.
 - 2. Boxes shall be labeled as "Irrigation – QC" on lid.
- F. Valve Boxes shall have locking or bolt down type lids. Approved box manufactures as equals: Applied Engineering Inc., NDS, Christy, Carson Industries, or equal.

2.07 CONCRETE VALVE BOXES – FOR USE IN PAVED AREAS ONLY

- 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.

2.08 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 SPRINKLER HEADS

- A. Rotors, Rotators and Spray Heads: As specified on the Drawings.
- B. Install with purple rotor covers or head caps if system is designed for recycled water.

2.11 TREE AND SHRUB BUBBLERS

- A. Bubbler Nozzle Assemblies: As specified on the Drawings.

2.12 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. 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.
- B. 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.
- C. 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.
- D. 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. Two Wire decoder cable up to 10,000 feet from controller to decoder shall be 14 gauge.
 11. Two Wire decoder cable over 10,000 and up to 15,000 feet from controller to decoder shall be 12 gauge.
 12. Distance between Two Wire Decoder and Solenoid shall be in accordance with manufacturer's specifications.
 13. 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.
 14. Install Two Wire Lightning Diffusers per manufacturer's details and recommendations.
- E. Rotor, rotator and Spray Heads:
1. Install as shown in Drawings.
 2. Install plumb with finish grade.
 3. Thoroughly flush all lines prior to installing nozzles.
- F. 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.
- G. Shrub Bubbler Assemblies
1. Install as shown on the Drawings.

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. Turf planting.
 - 4. Plant material.
 - 5. Turf Establishment Period.
 - 6. 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 TURF ESTABLISHMENT PERIOD

- A. Turf Establishment period shall include complete rooting of turf and at least 2 mowings as specified herein, prior to the commencement of the specified Landscape Maintenance Period.

1.10 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

Sieve Designation	Percent Passing
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 Contractors 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 SEED MIXES

- A. Seed mixes and seed from which sod was grown shall be, or shall have been:
 1. From current or latest seasons crop.
 2. Free of all noxious weed seed and have producers "Statement of Analysis Guarantee."
 3. Kentucky Blue varieties shall be 97 percent pure and 85 percent germination.
 4. 98 percent pure by weight with a 90 percent germination rate.
 5. Weed seed shall be less than .25%
 6. Labeled in conformance to State and U.S.D.A. laws and regulations.
- B. Mix: Turf seed mix subject to acceptance by the District's Representative, shall be as follows:

1. Sports Field Turf: "Sportsclub 60/40 Tournament Blue/Rye Mix" from Pacific Coast Seed, Inc., 800-733-3462, or equal, in the following percentages and applied at a rate of 305 pounds per acre:

Percentage	Grass
20%	Kentucky Blue – Midnight
20%	Kentucky Blue – Bedazzle
20%	Kentucky Blue – Waterworks
13.3%	Perennial Rye – Academy III
13.3%	Perennial Rye – Apple SGL
13.3%	Perennial Rye – Blackstone

2.07 TURF SOD VARIETIES

- A. Harvest and Delivery:
 1. Harvest from source and deliver to project site within 24 hours.
 - a. Deliver only as much sod as can be installed in one day's work.
 - b. Sod not transplanted within this time period shall be reviewed prior to installation.
 2. Comply with requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in Turfgrass Producers International's (TPI) "Guideline Specifications to Turfgrass Sodding."
 3. Protect sod from breakage and drying.
- B. Biofiltration sod
 1. Biofiltration sod shall consist of a combination of dryland and wetland species with the following species:
 - a. Purple needlegrass
 - b. California Barley
 - c. Meadow Barley
 - d. Molate Fescue
 2. Source: Biofiltration Sod™ by Delta Bluegrass, or equal
- C. No-Mow Blend sod
 1. No-Mow blend sod shall consist of a combination of the following species:
 - a. Idaho Fescue
 - b. Molate Fescue
 - c. Western Mokelumne Fescue
 2. Source: Native Mow-Free™ Delta Bluegrass, or equal

2.08 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.

2.09 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 Stakes and Ties: 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.

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 TURF SEED INSTALLATION

A. General:

1. Soil preparation and fine grading shall be as specified.
2. Prior to seed installation, irrigation shall be tested, coverage test approved and be fully operational.
3. The turf bed shall be reviewed and accepted by the District's Representative prior to seed installation.

B. Seed to be installed using a mechanical drill seeder; Brillion type or equal.

C. Provide and install temporary fencing around completed seeded areas. Using 6 foot tall construction fencing as specified for project.

D. Refer to Section 31 01 90 – Landscape and Site Maintenance for mowing and maintenance procedures. As applicable, the Contractor shall remove turf, re-grade any areas that have been rutted from mowers or otherwise damaged, and replace turf to the satisfaction of the District's Representative.

E. Until project Final Acceptance, should it become evident that certain areas have not grown, re-seed the areas immediately with seed of the same type as originally used and maintain as specified.

3.05 SOD INSTALLATION

A. General:

1. Soil preparation and fine grading shall be as specified.
2. Prior to sod installation, roll turf bed until a smooth, firm surface with uniform grade has been produced.
3. The turf bed shall be reviewed and accepted by the District's Representative prior to sod installation.

B. Placement:

1. Sod shall be unrolled into place with careful attention to tight joints with no overlapping or stretching.

2. Stagger the joints in each new row like rows of bricks with a minimum 18 inch minimum stagger. Use a sharp knife for shaping around trees, flower beds or borders. Immediately after placement, soak sod areas with water.
 3. Roll sod after watering to smooth out bumps and air pockets, and roll again if sod is not even.
 4. Water frequently for the first 10 to 14 days with enough water to saturate soil to a depth of 4 inches.
 5. Do not allow sod dry out.
- C. Provide and install temporary fencing around completed sod areas if not protected by other fencing. Use 6 foot high temporary fence for protection.
- D. Refer to Section 31 0190 – Landscape and Site Maintenance for mowing and maintenance procedures. As applicable, the Contractor shall remove sod, re-grade any areas that have been rutted from mowers or otherwise damaged, and replace sod to the satisfaction of the District's Representative.
- E. Until project Final Acceptance, should it become evident that certain sod areas have not grown, re-sod the areas immediately with sod of the same type as originally used and maintain as specified.

3.06 TURF ESTABLISHMENT PERIOD

- A. Prior to commencement of specified maintenance period, turf shall be completely germinated and established, and a minimum of 2 mowings shall have taken place as follows:
1. First mowing shall take place when turf has reached a height of 3 inches and turf shall be mown to 2 inches. Submit written request to the District's Representative for acceptability of initiating first mowing.
 2. Thereafter, turf shall be mown weekly until turf is sod-like in appearance and quality, and all other contract requirements shall be fulfilled prior to allowing the maintenance period to commence.
 3. Contractor will receive a written notice of acceptance of turf establishment and to commence with landscape maintenance period.
 4. District's Representative will approve any phasing of turf areas to commence into the maintenance period. Areas may be approved in stages but will require contiguous areas of turf that are completely established.

3.07 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 washed plaster sand.
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 sand 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.

3.08 TREE STAKING

- A. Stake trees as shown in the Drawings.
- B. Set stakes plumb, 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.

3.09 HERBICIDE APPLICATION

- A. Apply in accordance with manufacturers' recommendations.
- B. Apply pre-emergent herbicide to soil prior to placement of bark mulch top-dress.

3.10 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.

3.11 INSTALLATION OF ADDITIONAL MATERIALS

- A. Header Board: Install as shown on the Drawings.
- B. Root Barriers: Install as shown on the Drawings.

3.12 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 10 10 - 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.
- G. Drywell: "Flo-Well" Model FWAS24 WH by NDS, Inc., 888-825-4716, or equal.

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. Backwater valves.
 - 6. Cleanouts.
 - 7. Drains.
 - 8. Encasement for piping.
 - 9. Channel drainage systems.
 - 10. Catch basins.
 - 11. Stormwater inlets.
 - 12. Stormwater detention structures.
 - 13. Pipe outlets.
 - 14. Bioretention Areas.
 - 15. 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. Overflow Risers:
 - 1. General:
 - a. Grates shall conform to plans/details.
 - b. Overflow risers to have locking mechanism or screw down grate to frame.
 - 2. Structures:
 - a. Precast frame: 24-inch Overflow Risers: "RBT 2412" as supplied by Oldcastle Precast, 888-965-3220, or equal.
 - b. Reinforced Concrete Pipe: 24-inch Standard reinforced class III concrete pipe, cut to size per plans
 - c. Grating: Manhole Ring and lockable Beehive Grate MH25BH by Olympic Foundary, or approved equal.
- D. 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.
- E. 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.
- F. Clean Outs: As shown or noted in the Drawings.
- G. French Drain: As shown or noted in the Drawings.
- H. Atrium Drains: 3-inch round, flat-top structural foam polyolefin with UV inhibitor; Part No. 70 by NDS, Inc., 888-825-4716, or equal.
- I. Drop Inlet: 12 inches, Model #1240 by NDS, Inc., 888-825-4716, or equal.

- J. 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.
- K. Perforated Vertical Drains: Multi-Flow Drainage System by Varicore Technologies, Inc., 800-978-8007, and distributed by Reed & Graham, 888-381-0800.
 - 1. Fittings, adaptors, and couplers shall be Multi-Flow components.
- L. Precast Highway Drainage Inlet: Standard precast drop inlet type; Model CDOT Type G-O as supplied by Central Precast Products, 408-262-1091, or equal.
 - 1. Size: 36 inches by 36 inches.
 - 2. Inlets: Square grates with locking mechanism or screw down to secure grate to frame.
 - 3. Grates in paved areas shall comply with ADA Standards for Accessible Design.
- M. 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.
- N. Drywell: "Flo-Well" Model FWAS24 WH and FWBP24 "Flo-Well Bottom" by NDS, Inc., 888-825-4716, or equal.

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, cleaned and washed, 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. Bioretention soil mixture in bioretention areas shall have the following general characteristics:
 - 1. Biotreatment soil mix (Approved Supplier – TMT Enterprises – Matt Moore (408) 432-9040):
 - a. 60-70% Compost by volume
 - b. 30-40% Sand by volume
 - c. Permeability of at least 5 in/hr
- E. French drains and Vertidrain shall have a backfill with one of the following general characteristics:
 - 1. USGA Greens Mix by TMT Enterprises. Contact: Matt Moore 408-432-9040:
 - a. 65 percent USGA sand meeting specified material requirements.
 - b. 15 percent Coir.

- c. 15 percent Lassenite.
- d. 5 percent Worm Castings.
- F. Filter Fabric for French Drain: Mirafi 140N, or equal.
- G. Filter Fabric Fasteners: Metal clip type staple.
- H. Mortar: A 1:2 portland cement to sand mixture with a minimum of water conform to the applicable sections of the Standard Specifications.
- I. 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.
- J. Structural Adhesives for Manholes, Catch Basins, and Junction Boxes: "Ram-Nek" by Henry Company, 800-523-0268, or equal as available.
- K. Reinforcing Bars: As specified in Section 32 32 15 – Landscape Concrete.
- L. 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. French Drains and Cleanouts: Install as shown in the Drawings.
- E. Trench Drains: Install as shown in the Drawings and in accordance with the manufacturer's written recommendations.
- F. Drywells, 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