LODI HIGH SCHOOL
ATHLETIC FIELD IMPROVEMENTS

LODI UNIFIED SCHOOL DISTRICT
3 S PACIFIC AVE
Lodi, CA 95242

PROJECT SPECIFICATIONS
100% DSA Submittal
December 17, 2025

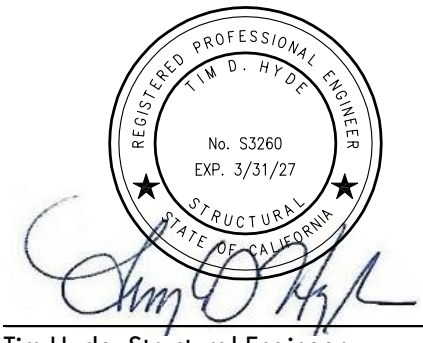
PREPARED BY:

VERDE DESIGN

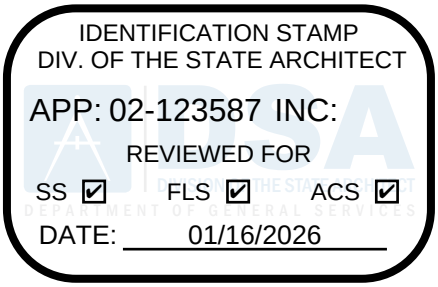
Project No. 250270
DSA No. 02-123587

Lodi High School – Athletic Field Improvements

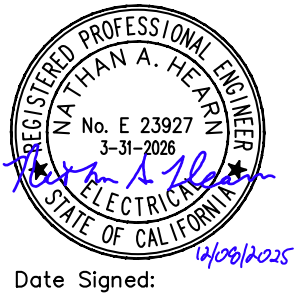
SPECIFICATIONS SIGNATURE PAGE



Tim Hyde, Structural Engineer
AKH Structural Engineers, Inc.



Division of the State Architect
State of California



Date Signed:

Nathan Hearn, Electrical Engineer
Capital Engineering



Mark Baginski, Landscape Architect
Verde Design, Inc.

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 Lodi High School Athletic Field Improvement including, but not necessarily limited to, the following:
   1. Removal of existing varsity baseball and softball backstops, fencing, and dugouts.
   2. Relocation of dedicated baseball and softball fields with natural grass outfield and synthetic turf infield.
   3. New sport field lighting.
   4. Improvements at the baseball and softball fields include construction of new 30' tall chain link backstops, dugouts, bullpens for home and visitor sides.
   5. Two new scoreboards, foul poles and one shared flagpole
   6. Perimeter fencing at each field
   7. Installation of associated hardscape, fencing, site furnishing improvements, and utility upgrades.
   8. Path of travel and parking lot upgrades for accessibility requirements
   9. New fire hydrant and access road.

B. The Work specifically includes all work as represented by the Drawings and Specifications issued for construction and subsequent approved revisions and addenda.

C. If certain features are not fully shown or called for on the Drawings, their construction shall be of the same character, quality and level of performance as for similar conditions that are shown, called for, or reasonably inferred.

1.02 RELATED REQUIREMENTS

A. Section 01 42 00 - References.

1.03 PROJECT LOCATION

A. 3 S Pacific Ave, Lodi, CA 95242.

B. The general nature and extent of the work and the appurtenant facilities are shown on the Drawings under the title: Lodi High School Athletic Field Improvements.

C. Perform work within the Limit of Work line indicated on the Drawings and per the discretion of the Owner.

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 Owner.

C. In the event that discrepancies arise over dimensions, product references, omissions, or written statements, these conflicts shall be immediately brought to the Owner'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 Owner, 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 Owner acceptance shall be the Contractor's sole responsibility and shall be removed, repaired, replaced, and/or reinstalled per the Owner's direction at no additional cost to the Owner 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 Owners Representative as verified by the Contractor, utilities which are in place and/or are in use by the Owner 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 Owner 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 Owner, 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 Owner's Representative or the contractor, shall become a part of the Contract Documents and shall be adhered to by the contractor.

C. Comply with latest adopted edition of the governing building code (2022 California 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 Owner's Representative.

E. Promptly submit written notice to the Owner's Representative of any observed variance in Contract Documents from legal requirements. Appropriate modifications to Contract Documents will be performed by the Owner'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 Owner'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 Owner'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 Owner to provide a safe and secure job site to the satisfaction of the Owner'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 Owner'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 Owner'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 Owner'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 Owner.

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 Owner's Representative.

B. When connecting new utilities to existing, and similar operations, the contractor shall time and coordinate with Owner'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 Owner'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 Owner'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 Owner's, or any other property.

C. The Contractor shall comply with all applicable non-point source pollution regulations required by the Owner.

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 Owner'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 Owner 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 Owner'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 Owner'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 Owner'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 Owner'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 Owner'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 Owner'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 Owner's Representative may, at any time during construction, order general clean-up of the site at no additional cost to the Owner.

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 Owner'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 Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

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 Owner'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 Owner's Representative.

C. Costs incurred due to requests, changes or revisions resulting from substitutions requiring Drawings or services of the Owner'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 Owner'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 Owner'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 Owner's Representative that the proposed substitute is equal in quality, operating efficiency, and durability of the material specified.
    c. Statement indicating why specified product, 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 owners.
    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, from ICC-ES.
    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. Prior to Bidding:
    a. A request for substitutions will be considered if received within 10 calendar days from the bid opening date.
    b. Approval of substitutions shall be accepted or denied by the City at least 3 calendar days before bid opening.
    c. If a decision on use of a substitute cannot be made within these time limits, the product specified shall be used.
2. Following Award of Contract:
    a. 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.
    b. Substitutions for Convenience: Submit within 20 days after the Notice of Award. 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 Owner's representative shall review such proposed substitutions and determine if a substitution is acceptable. If the following conditions are not satisfied, Owner'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 Owner'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: Owner's Representative will consider Contractor's request for substitution for cause when the following conditions are satisfied. If the following conditions are not satisfied, Owner'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: Not allowed, except as otherwise specified Owner'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 Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation for redesign and evaluation services, increased cost of other construction by Owner, 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 Owner's Representative:
   1. Substitutions shall be favorably reviewed and accepted by the Owner'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, Owner's Representative will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution.
   3. Owner'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 Owner'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 Owner'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 Owner'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 using 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 Owner's representative within time limit specified.

(Remainder of this Page is Blank)

SUBSTITUTION REQUEST FORM

DATE: _____

TO: OWNER'S REPRESENTATIVE

PROJECT NAME: _____

_____

_____

SPECIFIED ITEM: Section _____ Page _____ Item Number_____ Paragraph _____

DESCRIPTION:

_____

_____

_____

_____

_____

_____

_____

_____

S A M P L E

The undersigned requests consideration of the following:

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

Manufacturer: _____ Color:_____

Model Number: _____ Material: _____

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

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

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

1. The proposed substitution does not affect dimensions shown on Drawings. If, in fact, it does affect dimensions, the contractor shall provide shop drawings, accurately showing changes to documents.
2. The undersigned shall pay for changes to the design, including engineering design, detailing, and

construction costs caused by the requested substitution.

3. The proposed substitution shall not adversely affect other trades, the construction schedule, or specified warranty requirements.
4. Maintenance and service parts are locally available for the proposed substitution.

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

Submitted by:

Signature: _____ Title: _____

License Category: _____ License Number: _____

Firm: _____ Phone No.: _____

Address: _____ Fax No.:_____

Telephone: _____

OWNER'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 30 00

ALTERNATES

PART 1 - GENERAL

1.01 SUMMARY

A. Scope of work:
   1. Alternate Bids shall state the NET AMOUNT to be ADDED TO or DEDUCTED FROM the BASE BID PRICE or the CONTRACT SUM, as applicable.
   2. The changes described in each Alternate shall only become incorporated into the work if the Owner elects to proceed with one or more or any combination of the Alternative and amends the Owner-Contractor Agreement accordingly. Alternate selections may occur prior to the Contract Date, or may, by the Agreement, be deferred for possible selection at a subsequent date.
   3. Acceptance or Rejection: Acceptance or rejection of each Alternate Bid is at the discretion of the Owner. None, any, or all Alternate Bid item(s) may be accepted or rejected in any sequence by the Owner.
   4. Costs: Include under each Alternate Bid the net amount of all changes in costs, whether additive or deductive, resulting to the work affected by the Alternate Bid item(s).
   5. Modifications to the work shall require furnishing and installing the selected Alternate materials and labor to the satisfaction of the Owner's Representative at no additional cost to the Owner other than described in the applicable Alternate Bid.
   6. Extent of Alternate Bid Items: Bidders shall determine the full extent of work affected by each Alternate and shall make full and proper allowance for such extent in the preparation of the Alternate Bid.
   7. Furnish all labor, materials, equipment, facilities, transportation, and services to complete all work relating to each Alternate listed below.
   8. No increase in Contract days or extension of Contract completion schedule shall be made for work required by Alternate Bid improvements.

B. Related sections can include, but are not necessarily limited to:
   1. All applicable sections of the Specifications.

PART 2 - PRODUCTS

2.01 ADDITIVE ALTERNATE 01

A. Batting cages:
   1. Furnish all labor, materials, equipment, facilities, transportation, and services to complete all work relating to the construction of the baseball batting cage and softball batting cage as shown on the Drawings and further described by other applicable portions of the Contract Documents.

2.02 ADDITIVE ALTERNATE 02

A. 20' tall protective netting:
   1. Furnish all labor, materials, equipment, facilities, transportation, and services to complete all work relating to the construction of the 20' tall protective netting as shown on the Drawings and further described by other applicable portions of the Contract Documents.

PART 3 - EXECUTION

3.01 ADVANCE COORDINATION BY CONTRACTOR

1. Upon Owner acceptance of any Alternate, all personnel and material suppliers affected shall be immediately notified by the contractor as to the nature and extent of additional or lesser work implied by such acceptance.

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 Owner'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 Owner'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 Owner's Representative and appropriate consultant. Such portions of the Work shall be in accordance with reviewed submittals.

C. Shop drawings, product data, and samples are in no case to be considered Contract Documents but are to be treated only as instruments of convenience and facility to further the progress of the Work.

D. Shop drawings, product data, samples and supporting data shall be prepared by Contractor or its suppliers but shall be submitted to Owner'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 Owner'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 Owner'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 Owner's Representative.

E. Miscellaneous systems not specifically specified but installed to meet code requirements or for other reasons are subject to Owner'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 and with a new transmittal number.
   2. On resubmittals, reference the original submittal number.

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 Owner'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 Owner'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 Owner's Representative in a timely manner following receipt of the submittal by the Owner'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 Owner'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 Owner'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 Owner'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, Owner's Representative's review period may be longer than 10 days.

C. Dates on "Submittal Schedule" shall be agreed upon by both Owner'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 Owner'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 weekly of site and construction from beginning of demolition to completion of exterior work. Photographs shall be produced by the contractor in a manner deemed acceptable to Owner'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. Consult with Owner's Representative for instructions on views required.
   2. 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 Owner'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 Owner 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 digital files with dated folders and appropriate descriptions.
   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 Owner'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 Owner'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 Owner'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 Owner.

F. In case Owner determines, after consultation with Owner'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 Owner'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 Owner's Representative to use in its preparation of shop drawings. The Owner'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 Owner's Representative. Sign and return to the Owner's Representative.
   b. Requests for drawings prepared by consultant of Owner'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 Owner's Representative or it's 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 Owner 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 Owner'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 Owner'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 Owner'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 Owner's Representative.

F. No samples shall be incorporated into the Work, unless otherwise specified or specific approval is given by Owner's Representative.

2.09 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 Owner'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.

2.10 FIELD SAMPLES AND MOCKUPS

A. Comply with requirements specified in respective Specification Section.

2.11 ENVIRONMENTAL PLANS

A. Unless otherwise not required by governing authorities or waived by the Owner, within 21 days of the date of commencement as stated in the Notice to Proceed, prepare and submit the following items:
   1. A completed Storm Water Pollution Prevention Plan.

2. A completed Erosion Control Plan.

2.12 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 Owner's Representative. RFIs from contractors under separate contract with Owner, 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 Owner's Representative.

C. Each RFI shall be given a discrete, consecutive number such as "01," "02," "03," etc. Revisions or resubmittal of the same RFI shall maintain the original RFI number but be otherwise identified with a suffix such as "01R1" for first revisions, "01R2" 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 Owner'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 Owner'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 Owner'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 Owner's Representative. Submittal of shop drawings via e-mail attachment will be generally accepted, though when requested by Owner'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 Owner, unless specifically requested, or consultants of the Owner's Representative. Even if a submittal is reviewed and returned by a consultant of the Owner's Representative, such submittal shall be considered as not reviewed if not submitted through the Owner'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 Owner's Representative.

B. Unless otherwise agreed or requested, Owner 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. Owner'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 Owner'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 Owner'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 Owner'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 Owner's Representative:
1. General:
   a. Except for finish, color, and other aesthetic matters left to Owner's Representative's decision by Contract Documents, Owner'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 Owner'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 Owner's Representative does not indicate review of complete assembly in which it functions.
   d. Review comments of the Owner'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 Owner'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. Owner'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 Owner's Representative.
   b. Notations by Owner's Representative which increase Contract cost or time of completion shall be brought to attention of the Owner'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 Owner's Representative or its consultants shall be sent to the Owner's Representative. Owner'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 Owner's Representative for a clarification.
4. If returned submittal also includes stamp by the Owner's Representative, processing shall be in accordance with the Owner'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 Owner'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 Owner'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 Owner.

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 two paper copies of each submittal, unless otherwise indicated. Owner'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 DEFERRED SUBMITTALS

A. Deferred Approval submittals shall first be submitted to the Owner's Representative. If the Owner's Representative reviews the submittal with corrections noted, those corrections must be addressed and the submittal returned to the Owner's Representative. Once the Owner's Representative has no comments on a submittal, it will be returned and shall be resubmitted with approval by all government agencies having jurisdiction."

B. The Contractor shall then submit to these agencies and make revisions required by these agencies until approval by all government agencies having jurisdiction is obtained. See Section 01 11 00 - Summary of Work for further requirements.

C. When approval has been obtained by all governing agencies having jurisdiction, the approved submittal shall be resubmitted to the Owner's Representative for final approval. It is the responsibility of the Contractor to verify acceptability of government agency required revisions with the Owner's Representative. If the resubmittal to the Owner's Representative includes revisions that had not been previously approved by the Owner's Representative in writing, the Owner's Representative has the right to reject these revisions. It is then the Contractor's responsibility to resubmit to government agencies having jurisdiction to obtain approval of the Owner's Representative's noted corrections.

3.04 PROCEDURES FOR CLOSEOUT AND MAINTENANCE MATERIAL SUBMITTALS

A. Number of Copies: Two, unless otherwise directed by Owner's Representative.

B. Comply with additional Closeout Procedures specified for the Project.

3.05 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 1, California Building Code
         2) Part 2, California Building Code.
         3) Part 3, California Electric Code.
         4) Part 4, California Mechanical Code.
         5) Part 5, California Plumbing Code.
         6) Part 6, California Energy Code.
         7) 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. Sacramento Air Quality Management 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 including, but not necessarily limited to, the following:.
      a. City of Lodi

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 Owner's Representative for resolution.

END OF SECTION

SECTION 01 42 00

REFERENCES, ABBREVIATIONS, AND DEFINITIONS

1.01 SUMMARY

A. Section Includes:
   1. Requirements for standard references used in the various Specification Sections.
   2. Standard reference abbreviations used in the Project Manual.
   3. Definitions of terms used in the Project Manual.

B. Related Requirements:
   1. Section 01 41 00 - Regulatory Requirements

1.02 STANDARD SPECIFICATIONS

A. The Contract Documents contain references to various standard specifications, codes, practices, and requirements for materials, work quality, installation, inspections, and tests published and issued by the organizations, societies, and associations. Such references are hereby made part of the Contract Documents to the extent required.

B. When standard specifications are included by abbreviation and number only, it is assumed that the Contractor is familiar with and has ready access to the specified standards.

C. When the effective date of a reference standard is not given, it shall be understood that the current edition or latest revision thereof and any amendments or supplements thereto in effect on the date of original issue of these Contract Documents, as indicated on the cover, shall govern the Work.

D. Reference standards are not furnished with the Contract Documents, because the Contractor, subcontractors, manufacturers, suppliers, and the trades involved are assumed to be familiar with their requirements.

E. Contractor shall obtain its own copies of required specified referenced publications.

F. The specification or standard referred to shall have full force and effect as though printed in these Specifications.

G. In addition to those standards specifically referenced in the Specifications, comply with the accepted industry standards and trade association recommendations for the respective portions of Work.

H. In the case of difference between referenced standards and the Contract Documents, the most stringent requirements prevail.

1.03 STANDARD SPECIFICATION ABBREVIATIONS

A. In addition to abbreviations indicated on the Drawings, references in the Project Manual to trade associations, technical societies, recognized authorities, and other institutions may include the following organizations, which are sometimes referred to by only the corresponding abbreviations. Not all abbreviations are listed, and not all listed abbreviations are used.

B. Abbreviations:

1.	AA	Aluminum Association
2.	AAADM	American Association of Automatic Door Manufacturers
3.	AAMA	American Architectural Manufacturer's Association.
4.	AASHTO	American Association of State Highway and Transportation Officials

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

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

1.04 DEFINITIONS

A. Reference to Drawings: Where the words "shown", "indicated", "detailed", "noted", "scheduled". or words of similar import are used, it shall be understood that reference is made to the Drawings accompanying these Specifications, unless otherwise noted.

B. Addendum: The word "Addendum" shall mean written and/or graphic modifications to the Contract documents provided to holders of the Contract Documents prior to the opening of bids. Addenda shall be issued by the Owners 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 Owners 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 Owners 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 Owner 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 Owners 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 Owners 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 Owners 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 Owners 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 Owners Representative or a written order for a minor change in the work issued by the Owners Representative.

L. Notice To Proceed: The words "Notice to Proceed" shall mean the written notice issued by the Owners 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 their 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 Owner'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 their 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 Owner can occupy or utilize the work, or designated portion thereof, for the use for which it was intended, as evidenced by the Owner's Certificate of Substantial Completion. The Certificate of Substantial Completion shall set forth the date on which Substantial Completion is deemed by the Owners 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.

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 Owner 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 Owner. Employment by the Owner 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 Owner 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 Owner decides that testing is required, the Owner may require such testing be performed under current pertinent standards for testing. Payment for such testing will be by the Owner.
   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 Owner'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 Owner'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 Owner'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 Owner'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 Owner'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 are 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 Owner'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 those required by original design.
    4. Failure to properly notify the Owner'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 Owner's Representative. The Contractor shall be held strictly to the requirements of the Contract Documents regarding quality of materials, workmanship, and diligent execution of the Contract. Review by the Owner'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 Owner'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 Owner'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 Owner'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 the CBC and DSA 103 form.

B. Additional Tests and Inspections as described in the general structural notes.

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 Owner'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 Owner 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 Owner.

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 Owner'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 Owner's representative. No temporary water services shall be installed prior to meter installation without prior Owner 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 another acceptable internet access device.

2.05 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 Owner.

2.06 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.

2.07 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.

2.08 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.

2.09 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 Owner'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 Owner'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 Owner'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.

2.10 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.

2.11 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 Owner's Representative to the greatest extent possible. Coordinate location with the Owner's Construction Coordinator.
2. Contractor shall make arrangements for offsite parking, if required, with adjacent public parking facilities to accommodate vehicles of construction personnel. Cost of parking is the responsibility of the Contactor and/or its subcontractor.

D. Restore temporary vehicular access and parking areas to original or specified conditions prior to Project Final Acceptance.

E. Move and relocate traffic signs and signals, controls, power and light poles, and similar utility and public service items obstructed by Project barricades and operations.

F. Maintain accessibility from street at all times to fire hydrants within construction area.

G. Construction traffic shall be routed, whenever possible, to avoid noise impacts on the surrounding neighborhood.

H. Construction period for trucks hauling fill and piling materials shall be restricted to nonpeak hours to minimize impact to rush hour traffic and to avoid noise impacts on the surrounding existing residential areas.

I. Vehicles (wheels in particular) shall be cleaned before leaving site so as to minimize impact on City streets.

J. Clean and sweep all streets muddied or littered from construction activity to the satisfaction of the City.

2.12 HAUL ROUTES

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

2.13 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.

2.14 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.

2.15 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 Owner.

B. Project Sign:
1. Contractor shall provide a project sign as directed by the Owner.
2. Sign graphics shall include, as a minimum, the following:
   a. Project name.
   b. Owner'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 Owner.

2.16 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 Owner, 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.

2.17 SECURITY

A. All site security shall be the responsibility of the Contractor at its expense and no additional cost to Owner.

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 Owner.

D. If security personnel are used, provide Owner's Representative with the name and pager number or 24-hour telephone number of a contact person who shall have primary responsibility for security.

2.18 DUST CONTROL

A. Blowing dust shall be reduced by timing construction activities so that paving begins 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 Owner'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

STORMWATER POLLUTION PREVENTION PLAN

PART 1 - GENERAL

1.01 SUMMARY

A. Construction shall adhere with the requirements of the California State Water Resource Control Board, General Permit for Storm Water Discharges Associated with Industrial Activities (General Permit). Project construction is covered under the General Permit WDID#: _____.

B. The project Stormwater Pollution Prevention Plan (SWPPP) applies to operations within the limits of work and adjacent points of discharge that may be outside the limits of work. The SWPPP describes the proposed facilities, identifies potential sources of pollution and recommends appropriate Best Management Practices (BMPs) to reduce the discharge of pollutants. The contractor shall be strictly held to the requirements of the General Permit and shall provide the services of Qualified Stormwater Practitioner (QSP) as the agent to the District, who is the Legally Responsible Person (LRP).

C. Scope of work:
Provide such work to satisfy the requirements of the General Permit including but not limited to:
1. Qualified Stormwater Practitioner (QSP) services.
2. Install, adjust and maintain all necessary; BMPs, non-stormwater pollutants, safe storage, hazardous material controls and construction activities to protect discharge with best available technology.
3. Monitoring, testing and action plans as required by the project SWPPP Document.
4. Amend the SWPPP whenever there is a change in construction or operations that will affect the discharge of pollutants, or change in schedule delaying completion of grading activities beyond completion date identified in the project SWPPP.
5. All necessary data entry submit documentation to the Storm Water Multiple Application and Report Tracking System (SMARTS) during construction and closeout.

D. Related sections can include, but may not be limited to the following:
1. Section 01 50 00 - Construction Facilities and Temporary Controls
2. Section 02 41 00 - Site Clearing and Demolition
3. Section 31 20 00 - Earthwork
4. Section 33 40 00 - Storm Drainage

1.02 REFERENCES AND REGULATORY REQUIREMENTS

A. California State Board of Water Resources Construction General Permit Order 2022-0057-DWQ

A. SWPPP Document WDID#_____

B. California Stormwater Quality Association (CASQA) Industrial and Commercial BMP Handbook.

1.03 MONITORING AND TESTING:

A. Monitoring, testing, and action plans documentation required by the project SWPPP Document, and/or as required by the General Permit.

PART 2 - PRODUCTS – NOT APPLICABLE

PART 3 - EXECUTION

3.01 PREPARATION, MONITORING AND DOCUMENTATION

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.

B. Prior to grading and demolition operations, the contractor shall install and manage all necessary BMPs with best available technology, making all necessary adjustments for the duration of construction.

C. Contractor shall be responsible for all necessary, modifications and additions to the BMPs and site conditions to meet the requirements of the General Permit at no additional cost to the District.

D. Regardless of construction schedule or weather conditions, it shall be the contractor's responsibility to; provide all necessary measures, adjust BMPs, protect discharge from pollutants and take necessary actions should numeric action levels be triggered, at no additional cost to the District.

E. Contractor shall provide QSP to conduct all monitoring and testing and prepare action plans as required by the project SWPPP.

F. The contractor shall amend the SWPPP and prepare the COI whenever there is a change in construction or operations that will affect the discharge of pollutants or change in schedule that will delay completion of grading activities beyond completion date identified in the project SWPPP.

G. Contractor shall prepare, track and submit all necessary documentation to SMARTS during construction and closeout. This shall include filing all required Ad Hoc reports, Annual Reports, and the Notice of Termination on the SMARTS site.

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 Owner's Representative.

B. Upon request of the Owner'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 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 Owner's Representative.

C. Promptly advise the Owner's Representative when a reference point is lost, destroyed, or requires relocation because of other changes in the work. Upon direction of the Owner'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, benchmarks, 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 Owner before starting work. Notify the Owner'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 Owner's Representative of known discrepancies.
   2. Offsets will be as agreed upon, in writing, by the Contractor and the Owner'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 Owner'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 Owner's representative.

B. inspection Procedures: Upon receipt of a request for inspection or observation, the Owner's representative shall either proceed or advise the Contractor of unfilled requirements. The Owner'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 Owner's Representative.
   1. The Owner'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 Owner'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 Owner'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 Owner'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 Owner'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 Owner's representative showing all adjustments to the Contract sum.

1.05 MAINTENANCE MANUALS

A. Submit two (2) copies of proposed manual(s) to the Owner's representative for review and acceptance. All maintenance manuals shall be received and accepted by the Owner'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 Owner'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 Owner'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 Owner'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 Owner'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 Owner'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 Owner'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 Owner'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. Natural turf field construction.
   3. 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 Owner Representative shall identify any areas out of tolerance.

1.04 INFORMATIONAL SUBMITTALS

A. Name and address of Contractor's licensed surveyor to the Owner'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 Owner 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 Owner, the Owner 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 Owner 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 NEW SYNTHETIC TURF FIELD SUBGRADE AND BASE CONFORMANCE SURVEYING

A. 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 Owner Representative as specified. The survey shall be based on a 20-foot grid showing the field subgrade elevations and specifically needs to include the following items:
      a. field crown / high point,
      b. the centerline of the field low points, typically the subgrade elevation of the subdrain trenches,
      c. perimeter field edges, (both the adjacent finish surface and the field subgrade)
   3. The plan shall show the comparison of the design grades as interpreted from the design grades given on the construction drawings and/or the provided virtual 3D surface for the grading design versus the as-constructed grades at each surveyed location. The design versus as-constructed elevations shall be clearly delineated on the drawing through the use of an example label in the legend. The comparison shall also show the deviation between the two elevations next to the label.
   4. 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.

B. Completed Rock Base:
   1. Prior to acceptance of the rock base, a Conformance Survey will be prepared by the Contractor's Surveyor and submitted by the Contractor to the Owner's Representative as specified.
   2. The survey shall be based on a 20-foot grid and specifically need to include showing the field crown, perimeter of the field, adjacent curb edge. The plan shall show the comparison of the design grades versus the as-constructed grades at each surveyed location, with the design versus as-constructed

elevations clearly delineated on the drawing thru the use of an example label in the legend. The comparison shall also show the deviation between the two elevations next to the label.

3. 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 Owner's Representative.
    b. Delays and costs incurred due to grades out of conformance are the sole responsibility of the Contractor.
4. 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.
5. The top of field rock elevations shall not vary from the specified design 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.

C. 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 80-125 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 3-8 feet.
4. Areas of separation shall be outlined with marking paint and the depth of separation indicated.

3.03 NATURAL TURF (NATIVE SOIL) ATHLETIC FIELD CONFORMANCE SURVEYING REQUIREMENTS

A. Pre-Turf Installation:
1. Upon successful installation of the edges of the natural turf transition edges and the installation of irrigation, drainage, and other various utility systems, as well as the final soil amendment incorporation and fine grading, the Contractor shall verify the proper horizontal and vertical controls of the prepared rootzone. This quality control process shall be completed by a Licensed Surveyor.
2. The field natural turf area shall be shot on a maximum 20 foot spacing using laser surveying equipment capable of accuracy to 0.01 feet.
3. The survey results shall be deemed acceptable when the results show that the field has no field surveyed grade points greater than 3/4 inch (0.06 feet) outside its design grade elevation.
4. Areas where repairs and corrections are made after the survey has been completed shall be resurveyed at the Contractor's expense.

B. Post-Turf Installation:
1. Upon acceptance of the pre-turf installation conformance survey, Contractor shall install the specified turf material.
2. If directed by the Owner, the Contractor shall survey the turf prior to final acceptance as outlined above to ensure the turf areas are in compliance with the Contract and specified tolerances.

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 40 00 - Storm Drainage Utilities

1.02 DOCUMENT MAINTENANCE

A. Maintain one record copy of each of the following at the site for the Owner:
   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 Owner's Representative of changes and deviations made during construction.

D. Make documents available at all times for review by Owner'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 Owner 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 Owner.
   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 Owner'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 Owner's Representative and Owner's personnel at the Project site to determine which samples are to be transmitted to the Owner for record purposes. Comply with the Owner's instructions regarding delivery to the Owner'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 Owner'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, Owner 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 Owner.

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.
   7. Protection of existing plant material.
   8. Removal of designated trees and planting areas.

B. Related Requirements:
   1. Section 31 20 00 - Earth Moving
   2. Section 32 01 90 - Existing Tree Protection and Maintenance

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 timeline 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 Owner 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 Owner's Representative. Non-compliance

with proper dust control measures may be grounds for issuance of a "stop work" order by the Owner 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 Owner's approved chemicals list.

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 Owner'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 Owner and subject to the acceptance of the Owner'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 Owner.
   5. Notify Underground Service Alert (USA), (800) 640-5137, 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 Owner's Representative or governing authorities as applicable.
   3. Provide approved alternate routes around closed or obstructed traffic ways as required by the Owner'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 Owner'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 6-inch diameter, roots, or other organic matter. Meet fill and compaction requirements specified and recommended by the Owner's 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 Owner's Representative in written, accurate detail. Pending receipt of response from Owner'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 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 Owner.

F. Clear and strip vegetative material from soil surface and remove unless noted otherwise. Existing turf areas to be removed need not be stripped, but may be cross-ripped in two opposite directions and roto-tilled into the ground to a minimum 6-inch depth. Remaining clods of turf shall be no larger than 2 inches in diameter.

G. Clear/strip vegetative material from soil surface and remove unless noted otherwise. Existing turf areas to be removed need to be stripped to remove organic soil.

H. Contractor is responsible for stockpiling and protecting all topsoil needed for landscaping improvements. Refer to respective earthwork and landscape Specifications.

I. 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 Owner's Representative immediately, and re-direct work to avoid delay. The Owner'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 Owner's Representative.

J. 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 Owner.
2. Carefully remove items to be salvaged to avoid damage.
3. Irrigation heads, valves and existing controller shall be salvaged and provided to Owner. Contractor shall clean and box items. Items shall be returned to Owner in accordance with instructions provided by the Owner.

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 Owner's Representative at no additional cost to Owner.

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 Owner'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. Backstop Backboards

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. 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 Owner's Representative before beginning of application.

B. 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.

C. 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.

D. Field Samples:
   1. Request review, by the Owner'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 Owner's Representative, to achieve desired effect.
   4. Use first acceptable surface or item as the Project standard for each color scheme.

E. 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 Owner'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 Owner 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 Owner'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. 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.
   3. 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 Owner'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 Owner'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 Owner'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 Owner'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 Owner'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

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 at102 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

EXT 6.3V-5
Clear Alkyd Varnish on Dressed Lumber - Gloss Level 6

3 coats	Cabot 18040	Spar Varnish

EXT 6.3V-3
Cleary 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.

B. Related Requirements:
   1. Section 32 32 15 – Landscape Concrete.
   2. Section 32 32 20 – Landscape Concrete Masonry.

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 Owner's Representative.
3. Application shall not continue unless mockup is acceptable to Owner's Representative.

C. Do not apply specified coatings when surfaces or ambient air temperature is below 45-degree F, 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 Owner 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 Owner.

1.09 WARRANTY

A. Manufacturer: Provide Owner 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 to 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 00 00

SITE ELECTRICAL

PART 1 - GENERAL SITE ELECTRICAL

1.1 WORK INCLUDED:

A. This specification shall apply to all phases of work hereinafter specified, shown on drawings, or as required to provide a complete installation of electrical systems for this project. Work required under this specification is not limited to just the Electrical drawings. Refer to Architectural, Structural, Landscape, and Mechanical/Plumbing drawings as well as all other drawings applicable to this project, which designate the scope of work to be accomplished. The intent of the Drawings and Specifications is to provide a complete and operable electrical system that includes all documents that are a part of the Contract.
   1. Work Included: Furnish labor, material, services, and skilled supervision necessary for the construction, erection, installation, connections, testing, and adjustment of all circuits and electrical equipment specified herein, or shown or noted on Drawings, and its delivery to the Owner complete in all respects ready for use.
   2. The electrical Work includes installation or connection of certain materials and equipment furnished by others. Verify installation details, installation, and rough-in locations from the actual equipment or from the equipment shop drawings.

B. Electrical Drawings: Electrical Drawings are diagrammatic, and are intended to convey the scope of work, indicating intended general arrangement of equipment, conduit, and outlets. Follow Drawings in laying out Work and verify spaces for installation of materials and equipment based on actual dimensions of equipment furnished.

1.2 QUALITY ASSURANCE

A. Design, manufacture, testing, and method of installation of all apparatus and materials furnished under requirements of these specifications shall conform to latest publications or standard rules of the following:
   1. Institute of Electrical and Electronic Engineers - IEEE
   2. National Electrical Manufacturers' Association - NEMA
   3. Underwriter's Laboratories, Inc. - UL
   4. National Fire Protection Association - NFPA
   5. Federal Specifications - Fed. Spec.
   6. American Society for Testing and Materials - ASTM
   7. American National Standards Institute - ANSI
   8. National Electrical Code - NEC
   9. National Electrical Safety Code - NESC
   10. Insulated Cable Engineers Association - ICEA
   11. American Institute of Steel Construction - AISC
   12. State and Municipal Codes In Force In The Specific Project Area
   13. Occupational Safety and Health Administration (OSHA)
   14. Electronics Industries Association/Telecommunications Industry Association (EIA/TIA)
   15. California Electrical Code (where adopted)
   16. Local Authority Having Jurisdiction (AHJ)
   17. Published Electrical Standards and Codes (as applicable).

B. Perform Work in accordance with the California Electrical Code, applicable building ordinances, and other applicable codes, hereinafter referred to as the "Code." The Contractor shall comply with the Code including local amendments and interpretations without added cost to the Owner. Where Contract Documents exceed minimum requirements, the Contract Documents take precedence. Where code conflicts occur, the most stringent shall apply unless variance is approved.

1. Comply with all requirements for permits, licenses, fees, and codes. The Contractor, at Contractor's expense, shall obtain all permits, licenses, fees, special service costs, inspections and arrangements required for Work under this contract, unless otherwise specified.
2. Comply with requirements of the applicable utility companies serving this Project. Make all arrangements with utility companies for proper coordination of Work.

1.3 GENERAL REQUIREMENTS

A. Guarantee: Furnish a written guarantee for a period of one-year from date of acceptance.

B. Wherever a discrepancy in quantity or size of conduit, wire, equipment, devices, circuit breakers, etc., (all materials), arises on the Drawings and/or in the Specifications, the Contractor shall be responsible for providing and installing all material and services required by the strictest condition noted on Drawings and/or in Specifications to ensure complete and operable systems as required by the Owner and Engineer.

C. All Core Cutting, Drilling, and Patching:
1. For the installation of work under this Section, the aforementioned shall be performed under this Section of the Specifications and the Concrete section of the Specifications.
2. No holes will be allowed in any structural members without the written approval of the Project's Structural Engineer.
3. For penetrations of concrete slabs or concrete footings, the work shall be as directed in the Concrete Section of Specifications.
4. The Contractor shall be responsible for patching and repairing surfaces where he is required to penetrate for work under this contract.
5. Penetrations shall be sealed to meet the rated integrity of the surface required to be patched and repaired. The patched surface shall be painted or finished to match the existing surface.

D. Verifying Drawings and Job Conditions:
1. The Contractor shall examine all Drawings and Specifications in a manner to be fully cognizant of all work required under this Section.
2. The Contractor shall visit the site and verify existing conditions. Where existing conditions differ from Drawings, adjustment(s) shall be made and allowances included for all necessary equipment to complete all parts of the Drawings and Specifications.

E. Shop Drawings/Submittals:
1. Shop Drawings/Submittals, unless required otherwise by general project specifications or instructions to bidders, shall be submitted in electronic format (PDF) to include a Letter of Transmittal (PDF), which shall give a list of the drawings submitted with dates and/or sytem(s) components contained within the submittal. Drawings and material cut sheets shall be complete in every respect and edited/marked to indicate specific items being provided. Printed/Hard copies are not acceptable.
2. The shop drawings/submittals shall be marked with the name of the project, numbered consecutively, and bear the approval of the Contractor as evidence that the Contractor has checked the drawings. Any drawings submitted without this approval will be returned to the Contractor for resubmittal.
3. If the shop drawings show variations from the requirements of the Contract because of standard shop practice or other reasons, the Contractor shall make specific mention of such variations in the Contractor's letter of transmittal. If the substitution is accepted, the Contractor shall be responsible for proper adjustment that may be caused by the substitution. Samples shall be submitted when requested.
4. Only products listed as "Equal" within the contract documents, along with formally approved "Substitutions" will be reviewed. Products not conforming to these items will not be reviewed and will be returned to the Contractor for re-submittal.
5. Shop drawings shall be submitted on the following, but not limited to:
   a. Lighting fixtures, lamps and ballasts.

b. Switchgear, switchboards, distribution boards, motor control centers, panelboards, and bus ducts; complete with overcurrent device information.
c. Transformers.
d. Fire Alarm System/Central Monitoring System.
e. Wiring Devices.
f. Lighting control products/dimming system products.
g. Pull boxes and underground vaults.
h. Terminal cabinets.
i. Lighting inverters, UPSs, RDCs, PDUs, generators, transfer switches, SPD systems.
j. Cable tray, flexible cable tray and cable runway.
k. Power poles and floor boxes.
l. Arc flash, short-circuit, and coordination studies.
m. All other products called out on drawings that call for shop drawing submittal.

1.4 WORK IN COOPERATION WITH OTHER TRADES

A. Examine the Drawings and Specifications and determine the work to be performed by the electrical, mechanical, and other trades. Provide the type and quantity of electrical materials and equipment necessary to place this work in proper operation, completely wired, tested and ready for use. This shall include all conduit, wire, disconnects, relays, and other devices for the required operation sequence of all electrical, mechanical, and other systems or equipment.

B. Provide a conduit-only system for low voltage wiring required for control of mechanical and plumbing equipment described in this or other parts of the Contract Documents. Install all control housings, conduits, and backboxes required for installing conduit to the controls.

C. Install separate conduits between each heating, ventilating and air conditioning sensing device and its control panel and/or control motor. Before installing any conduit for heating, ventilating, and air conditioning control wiring, verify the exact requirements from the control diagrams provided with the equipment manufacturer's shop drawings.

1.5 TESTING AND ADJUSTMENT

A. Upon completion of all electrical work, the Contractor shall test all circuits, switches, light fixtures, lighting control and dimming systems including distributed systems, UPSs, generators, SPDs, lighting inverters, transfer switches, motors, circuit breakers, motor starter(s) and their auxiliary circuits and any other electrical items to ensure perfect operation of all electrical equipment.

B. Equipment and parts in need of correction, and discovered during such testing, shall be immediately repaired or replaced with all new equipment and that part of the system shall then be retested. All such replacement or repair shall be done at no additional cost to the Owner.

C. All circuit(s) shall be tested for continuity and circuit integrity. Adjustments shall be made for circuits not complying with testing criteria.

D. All test reports, including copies of any required Energy Code Acceptance Forms (e.g. CA Title 24 Acceptance For Code Compliance Forms) should be submitted to the Engineer at completion of project.

E. Component Tests:
1. Grounding systems, for resistance to earth. Provide additional grounding electrodes, if separately derived system ground resistance exceeds 25 ohms.
2. Prior to energizing equipment, check the insulation resistance of feeders sized larger than #2 AWG with a 1000 volt DC “Megger”. Minimum insulation resistance values shall not be less than 50 mega ohms.

F. Functional tests:
1. Perform all tests suggested by the equipment manufacturers.

2. Verify that everything installed as part of the scope of work functions properly. Verify that any work performed did not adversely affect existing systems or equipment (e.g., that after removing a device from a branch circuit that the remaining existing branch circuit continuity was maintained).

1.6 IDENTIFICATION

A. Install nameplates on electrical equipment including:
   1. Circuit breakers, disconnect switches and starters whether provided under this division or some other.
   2. Panelboards and transformers.
   3. Terminal cabinets and lighting control panels.
   4. Light switches for which the control functions are not evident.
   5. Where it is not obvious which piece of equipment is powered from a particular disconnect switch, provide nameplates for both disconnect switch and the powered equipment.

B. Describe item, control function, or sequence of operation on each nameplate.

C. Fabricate nameplates of laminated phenolic plastic, black front and back with white core for normal power equipment and signal. Provide red front and back with white core for emergency power equipment and fire alarm. Bevel edges. Engrave through outer layer to produce white letters and numerals. For control pilot devices, engraved metallic plates, filled with enamel, are acceptable. Fasten nameplates to equipment with no. 4 Phillips, round head, cadmium steel, self-tapping screws. Use 1/8-inch letters on circuit breakers, switches, and other control devices, and 1/4-inch letters on panelboards, switchboards, and other major electrical equipment. Submit label designations as part of corresponding equipment submittal.

D. Equipment identification is to indicate the following:
   1. Equipment ID abbreviation.
   2. Voltage, Phase and Wires.
   3. Normal, Emergency (indicate branch) or other system.
   4. Power source.

1.7 FINAL INSPECTION AND ACCEPTANCE

A. After all requirements of the Specifications and/or the Drawings have been fully completed, representatives of the Owner will inspect the work. Contractor shall provide competent personnel to demonstrate the operation of any item or system to the full satisfaction of each representative.

B. Final acceptance of the work will be made by the Owner after receipt of approval and recommendation of acceptance from each representative.

1.8 RECORD DRAWINGS

A. Drawings of Record: The Contractor shall provide, and keep up to date, a complete record set of drawings. These shall be corrected daily and show every change from the original Drawings. This set of prints shall be kept on the job site and shall be used only as a record set. This shall not be construed as authorization for the Contractor to make changes in the layout without definite instruction in each case. Upon completion of the work, a set of reproducible Contract Drawings shall be obtained from the General Contractor and all changes as noted on the record set of prints shall be incorporated thereon with black ink in a neat, legible, understandable, and professional manner. Refer to the Supplementary General Conditions for complete requirements.

1.9 MAINTENANCE, SERVICING, INSTRUCTION MANUALS AND WIRING DIAGRAMS

A. Prior to final acceptance of the job, the Electrical Contractor shall furnish to the Owner at least four (4) copies of operating and maintenance and servicing instructions, as well as four (4) complete wiring diagrams for the following items or equipment:
   1. Lighting control systems/dimming systems.
   2. Fire Alarm System.

3. Transformers.
4. Switchgear, switchboards, distribution boards, motor control centers, panel boards, and bus ducts; complete with overcurrent device information.
5. Lighting inverters, UPSs, PDUs, generators, transfer switches, SPD systems.

B. All wiring diagrams shall specifically cover the system supplied. Typical drawings will not be accepted. Four (4) copies shall be presented to the Owner.

1.10 INTERRUPTION OF SERVICES/SERVICE SHUTDOWN

A. Any interruption of electrical services, electrical circuits, electrical feeders, signal systems, communication systems, fire alarm systems, etc., required to perform work shall meet the specific prior-approval requirements of the Owner. Such work shall be scheduled with the Owner to be performed at the Owner's convenience.

B. Interruptions/outages of any of the Owner's systems and services mentioned above shall be scheduled to occur during other than the Owner's normal business hours. Any overtime costs shall be borne by the Contractor.

C. See drawings for any additional requirements regarding outages, interruption and any temporary services required.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials and Equipment: All electrical materials and equipment, including custom-made equipment, shall be new and shall be listed by Underwriter's Laboratories (UL) and bear their label or be listed and certified by a Nationally Recognized Testing Lab (NRTL) that is also recognized by the local Authority-Having-Jurisdiction (AHJ).

2.2 RACEWAYS

A. Galvanized Rigid Conduit (GRC) shall be full weight threaded type steel. Steel conduit shall be protected by overall zinc coating to inside and outside surfaces, applied by the hot dip, metallizing, or sherardizing process.

B. Intermediate Metal Conduit (IMC) shall be hot-dipped galvanized in accordance with UL 1242, and meet Federal Specification WWC-581 (latest revision).

C. Electrical Metallic Tubing (EMT) shall be zinc-coated steel with baked enamel or plastic finish on inside surfaces except as noted below. EMT shall be dipped in a chromic acid bath to chemically form a corrosion-resistant protective coating of zinc chromate over galvanized surface.

D. Flexible metal conduit shall be constructed of aluminum or hot-dipped galvanized steel strips wound spirally with interlocking edges to provide greatest flexibility with maximum strength. Interior surfaces shall be smooth and offer minimum drag to pulling in conductors. Used only as directed in writing by the Engineer.

E. Liquid-tight conduit (Seal-Tite) shall be galvanized steel flexible conduit as above except with moisture and oil-proof jacket, pre-cut lengths and factory-installed fittings. For outdoor installations and motor connections only unless otherwise noted on drawings.

F. Non-metallic Conduit:
1. Polyvinyl chloride (PVC) rigid conduit, Schedule 40, Type II for underground installation only with solvent welded joints, conforming to UL requirements, listed for exposed and direct burial application.

2. High-density polyethylene (HDPE) conduit, comply with UL 651A, Schedule 80 under parking and maintenance paths where vehicles may impose loads, Schedule 40 in other areas.
3. Conduit and fittings shall be produced by the same manufacturer.

2.3 FITTINGS

A. Condulet type fittings shall be smooth inside and out, taper threaded with integral insulating bushing and of the shapes, sizes and types required to facilitate installation or removal of wires and cables from the conduit and tubing system. These fittings shall be of metal, smooth inside and out, thoroughly galvanized, and sherardized cadmium plated.

B. Metallic condulet covers shall have the same finish as the fitting and shall be provided for the opening of each fitting where conductors do not pass through the cover.

C. Connector, coupling, locknut, bushings, and caps used with rigid conduit shall be steel, threaded and thoroughly galvanized. Bushings shall be insulated.

D. Unless otherwise noted, all interior EMT fittings, connectors and couplings installed in concealed locations, areas not considered to be wet or damp locations by the AHJ, or areas not subject to physical damage, shall be steel, zinc or cadmium plated, threadless, compression, steel locking ring type with insulated throat. Where suitable for use, steel set screw fittings are allowed for trade sizes of 2" and smaller. Insulated throat is not required for fittings, connectors, and couplings 1" and smaller.

E. All interior and exterior EMT fittings, connectors, and couplings, 2" and smaller, installed in exposed or concealed locations that are considered by the AHJ to be wet or damp locations, shall be raintight-listed, steel, zinc or cadmium plated, threadless, compression, steel locking ring type with insulated throat. If raintight-listed, EMT fittings, connectors and couplings are unavailable for a given trade size or if conduit is installed in an area subject to damage - provide rigid metallic or intermediate metallic conduits, fittings, connectors, and couplings as required.

F. Flexible steel conduit connectors shall be a malleable iron clamp or squeeze type or steel twist-in type with insulated throat. The finish shall be zinc or cadmium plating.

2.4 OUTLET, PULL, AND JUNCTION BOXES

A. Construction: Deep drawn or fabricated interlocked flat pieces with welded tabs, electrogalvanized sheet steel with electrogalvanized hardware. Do not use sectional or gangable boxes.

B. Size: Accommodate the required number and sizes of conduits, wires, splices, and devices, but not smaller than the size indicated or specified.

C. Plaster ring: Provide flush with wall or ceiling finish, except where otherwise indicated or specified.

D. Device boxes: For single switches and receptacles, provide boxes not less than 4 inches square by 1-1/2 inches deep. For 2 devices, provide boxes not less than 4-11/16 inches square by 1-1/2 inches deep.

E. Telecommunications boxes: No less than 4-11/16 inches square by 2-1/8 inches deep.

F. Special mounting: In cabinets, tile, concrete block, brick, stone, wood or similar material, provide rectangular boxes with square corners and straight sides. For single devices, provide boxes 4 inches high by 2-1/2 inches wide by 3-3/8 inches deep. For 2 or more devices, provide multi-gang, non-sectional box with tile or masonry ring.

G. Lighting fixtures: 4 inches octagon by 2-1/8 inches deep, minimum. Fit boxes for surface or pendant mounted fixtures with 3/8 inch malleable iron fixture stud.

H. Wet or damp locations, cast metal:

1. Box: Malleable iron.
2. Cover: Gasketed, weatherproof, malleable iron, with stainless steel screws.
3. Hubs: Threaded.
4. Lugs (cast mounting) manufacturers:
   a. Crouse-hinds: Type FD or FD, or equal
   b. Appleton: Type FS or FD, or equal

2.5 PULL AND JUNCTION BOXES OVER 300 CUBIC INCHES

A. General: For all pull and junction boxes over 300 cubic inches, provide code gauge, sheet steel boxes which meet NEMA 1 standards for panelboard and terminal cabinet box construction, with screw type covers.

B. Ground lug: Weld, before finish is applied, a grounding pad drilled for two bolted grounding lugs or two ground studs on the box interior.

C. Finish: Apply rust inhibiting prime coat and 2 coats of baked enamel, standard factory gray.

D. Hardware: Cadmium plated steel screws.

2.6 PRECAST CONCRETE BOXES

A. Provide high-density reinforced concrete pull and junction boxes with H-20 traffic rating. Boxes shall have end and side knockouts and be as manufactured by Christy, Brooks, or approved equal. Fabricate boxes with non-settling shoulders to facilitate maintaining grade during backfilling. Unless noted otherwise, provide galvanized steel checker plate covers with hold-down bolts, identified as follows:

System	Identification
Power - 100 volts to 600 volts	ELECTRICAL
Less than 100 volts	TEL, CABLE, FIRE ALARM, etc. as applicable

2.7 SUPPORTING DEVICES

A. Conduit supports:
   1. Wet locations:
      a. One hole galvanized malleable iron strap with galvanized malleable or cast iron clamp back, Oz/Gedney type 14-G.
   2. Dry locations:
      a. Galvanized steel straps, Oz/Gedney type 5-S and 14-S, T & B, Appleton or equal.
   3. Plumbers perforated strap is not acceptable.
   4. Hanger rod, 3/8 inch, minimum galvanized all thread rod or as detailed for specific use.

B. Conduit racks:
   1. Framing channel, steel, Kindorf, Unistrut, B-Line, or equal.
   2. Channel and hardware shall be hot-dip or electro-galvanized, except that channel used indoors in dry locations may be painted.
   3. Channels attached to building or structure surfaces, 14 gauge, 1-5/8 inch wide by 13/16 inch deep. Other channels, 12 gauge minimum, 1-5/8 inches wide by 1-5/8 inches deep, minimum.
   4. Construct racks to limit deflection to 1/360 of span.
   5. Load on trapeze, rod type hangers, concrete inserts, and beam clamps, not to exceed 700 pounds per hanger. Provide rigid frames if load exceeds 700 pounds per hanger.

C. Anchor methods:
   1. Hollow masonry: Toggle bolts or spider type expansion anchors.
   2. Solid masonry: Malleable iron expansion anchors or preset inserts.
   3. Metal surfaces: Machine screws, bolts, or welded studs.
   4. Wood surfaces: Wood screws, lag bolts.
   5. Concrete surfaces: Self-drilling anchors or powder driven studs.
   6. Raceway and fixtures shall not be supported solely from gypsum board ceilings.

2.8 CONDUCTORS – WIRE AND CABLE

A. All conductors shall be copper. Provide stranded conductor for #10 AWG and larger or when making flexible connections to vibrating machinery. Use compression "fork" type connectors or transition to solid conductors when connecting to switches, receptacles, etc.

B. Type THHN/THWN-2 thermoplastic, 600V, UL approved, dry and wet locations rated at 90 degrees Celsius, for conductors of all sizes from #12 AWG up to and including 1000 kcmil. RHH/RHW insulation is allowed only to provide an Electrical Circuit Protective System to comply with NEC, or CEC where adopted, Articles 695 and 700.

C. Wire and cable shall be factory color-coded by integral pigmentation with a separate color for each phase and neutral. Each system shall be color-coded and it shall be maintained throughout.

D. System Conductor Color Coding:

1. Power 120/208V
   a. Phase A = Black
   b. Phase B = Red
   c. Phase C = Blue
   d. Neutral = White
2. Power 120/240V
   a. Phase A = Black
   b. Phase B = Red
   c. Phase C = Orange
   d. Neutral = White
3. Power 277/480V
   a. Phase A = Brown
   b. Phase B = Orange
   c. Phase C = Yellow
   d. Neutral = Gray
4. Ground Conductors: Green
5. Isolated Ground Conductors: Green with continuous yellow stripe
6. Fire Alarm System: As recommended by manufacturer.

E. All color-coding for #12 through #6 AWG conductor shall be as identified above. Conductors #4 AWG and larger shall be identified by utilizing phase tape at each termination.

F. No conductors carrying 120V or more shall be smaller than #12 AWG.

G. Aluminum conductors shall not be used.

H. Wire-pulling compounds used as lubricants in installing conductors in raceways shall only be "Polywater J". No oil, grease, graphite, or similar substances may be used. Pulling of #1/0 or larger conductors shall be done with an approved cable pull machine. Other methods; e.g. using vehicles or block and tackle to install conductors are not acceptable.

2.9 WIRE CONNECTIONS

A. Connect wire to binding post screw, stud, bolt, or bus as follows:
   1. #10 AWG and smaller conductors, compression type, nylon, self-insulated grip spade lugs, T & B "Sta-Kon", 3m Scotchlok MNG, Panduit "Pan Term", or equal.
   2. #8 AWG to #750 MCM copper conductors, solderless copper lug type connectors, with hex head or Allen type compression set screws with configuration to suit application, T & B "Locktite", Burndy "GA", O-Z type "XL" or "XLH", or equal. Use two screw lugs for wire #4/0 and larger.

B. Wire splice:
   1. #10 AWG and smaller conductors, twist on solderless, insulated spring connectors, 3M "Scotchloks", T & B "Piggys" or equal.

C. Size, install and tighten wire terminal and splice connectors in accordance with manufacturer's recommendations.

2.10 Tape

A. Wire splices: vinyl plastic electrical tape, 8.5 mil and 4.0 mil, scotch 33.

B. Conduit wrapping: 10 mil vinyl wrapping tape, minnesota mining and manufacturing company (3m) scotchwrap 50, plymouth 4611, or equal.

2.11 WIRING ACCESSORIES

A. Identify conductors with self-adhesive vinyl cloth markers, sized to fit the conductor insulation, with machine printed black marking, W.H. Brady, Thomas and Betts, or equal.

B. Wire ties:
   1. Nylon, adjustable, and self-locking.

2.12 WIRING DEVICES

A. Provide UL listed wiring devices for the voltage and current ratings specified.

B. Identify each device with panelboard and circuit number, i.e., “A-15” indicated panel “A” circuit breaker “15”. Provide clear P-touch labels with black lettering for indoor wiring devices; phenolic laminated engraved labels for all outdoors installations.

C. For outdoor wiring devices, provide lockable, hinged metal cover suitable for wet locations, while-in-use, Taymac #MX3200, or equal.

D. Provide receptacles other than 120 volt single and duplex as indicated.

E. Listed manufacturers establish a standard of quality. Substitutions will be considered in accordance with this specification.

F. Key switches: equivalent to listed switches, activated with removable key.

G. Switch with pilot light: Leviton #5226, Bryant #6405, G.E. #7945, or equal.

H. Wall plates: type 302 stainless steel, satin finish, minimum 0.040 inch thick, single or multiple gang.

2.13 DISCONNECT SWITCHES

A. Non-fusible or fusible, heavy-duty, externally operated horsepower-rated, 600V A.C: Provide NEMA 3R, lockable enclosures for all switches located on roof tops, in wet or damp areas and in any area exposed to the elements.

B. Fusible switches shall be Class "R" when 600A or less, and Class "L" when greater than 600A.

C. Amperage, horsepower, voltage, and number of poles per drawings: All shall be clearly marked on the switch nameplate.

D. Provide the Owner's project manager with one (1) spare set of fuses and two (2) sets of fuse clips/fuses for every set of fuses on the project.

2.14 FUSES

A. Provide fuses at all locations shown on the Drawings and as required for supplemental protection:
   1. Fuses shall be manufactured by Bussmann, Shawmut or equal.
   2. All fuses shall be the product of a single manufacturer.

B. Main and Feeder Protection
   1. Protective devices rated greater than 600A: Provide Bussman Hi-Cap fuses, Class L, current-limiting, having an interrupting rating of 200,000A RMS.
   2. Protective devices rated 600A or less: Provide Bussman Class R fuses, Class RK series current-limiting fuses, having an interrupting rating of 200,000A RMS.

C. Motor Protection
   1. Where rating of protective device is greater than 600A: Provide Bussman Hi-Cap fuses, Class L, current-limiting, having an interrupting rating of 200,000A RMS.
   2. Where rating of protective device is 600A or less: Provide Bussman Class RK series current-limiting fuses, having an interrupting rating of 200,000A RMS.
   3. Where fuses feeding motors are indicated, but not sized: It shall be the responsibility of the Contractor to coordinate the fuse size with the motor to provide proper motor running protection.
   4. When rejection type fuses are specified (Class RK series) the fuse holder of all switches shall be suitable for the fuses provided.

2.15 PANELBOARDS

A. Provide products listed and labeled by Underwriters Laboratories inc. As suitable for the purpose indicated.

B. Construction:
   1. Cabinets: Code gauge steel cabinets, dead front panels, and doors. Fasten dead front panels to cabinets with concealed trim fasteners. Conceal front door hinges.
   2. Dimensions: 20 inches wide by 6 inches deep.
   3. Locks: Flush door locks, keyed alike for all panelboards.
   4. Access: Hinged door-in-door with double locks. Piano hinges preferred.
   5. Standards: Provide UL label where applicable and conform to No. 67 and 50 Underwriters Laboratories, Inc., and NEMA PB 1.

C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
   1. Altitude: less than 6,600 feet.
   2. Ambient temperature.

D. Short circuit current rating:
   1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.

E. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.

F. Branch overcurrent protective devices: Replaceable without disturbing adjacent devices.

G. Bussing: Sized in accordance with UL 67 temperature rise requirements.
   1. Provide solidly bonded equipment ground bus in each panelboard with a suitable lug for each feeder and branch circuit equipment grounding conductor.

H. Conductor terminations: Suitable for use with the conductors to be installed.

I.Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
   1. Environment type per NEMA 250 unless otherwise indicated.

2. Boxes: Galvanized steel unless otherwise indicated.
3. Provide wiring gutters sized to accommodate the conductors to be installed.
4. Lockable doors: All locks keyed alike unless otherwise indicated.

J. Future provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

K. Nameplates:
1. Provide a nameplate identifying panelboard in accordance with identification section. Provide a manufacturer's nameplate on the dead front interior panel indicating panelboard Type, Voltage Rating, Current Rating and manufacturer's name.
2. Directory: Provide a directory card which fits into slots in the back of the panelboard. Protect directory with non-yellowing clear plastic.

L. Manufacturer: Eaton, General Electric, Square D.

2.16 CIRCUIT BREAKERS

A. Provide bolted-type thermal magnetic, molded case, with inverse time current overload, and instantaneous magnetic trips, trip-free and trip-indicating. All poles of multi-pole device shall operate simultaneously during open, close and trip operations. Provide circuit breakers indicated with voltage and interrupting capacity not less than existing.

B. Arc Fault Interrupting Breakers: Provide with molded plastic case, air circuit breakers, similar to above with arc fault circuit interrupt capability, conforming to UL 1699. Provide on all dwelling-unit circuits supplying bedrooms, sleeping quarters, etc., as required to comply with NEC, or CEC where adopted, Article 210.12.

C. Tandem or half-sized circuit breakers are not permitted.

D. When it is not specifically mentioned in the plans, or any part of construction documents series rated circuit breakers are not allowed. Circuit breakers shall be fully rated for the available short circuit current.

E. Circuit breaker handle accessories shall provide provisions for locking handle in the on or off position.

F. Temperature compensating circuit breaker(s) shall be provided when located in outdoor enclosure(s) or when located in an enclosure subject to high ambient heat due to nearby industrial processes, etc.

G. Provide 75 degree Celsius-rated conductor lugs/lug kits as required on all circuit breakers to accept conductor quantities and sizes shown on drawings.

H. All circuit breaker terminations shall be suitable for use with 75 degree Celsius ampacity conductors. Listed, dual-rated pin terminals, straight or offset, are acceptable for use to in accommodating oversized or parallel conductor installations.

I. Circuit breakers serving Fire Alarm or Central Monitoring panels and power supplies shall be red in color and lockable in the "ON" position.

2.17 LIGHTING FIXTURES

A. General: Provide fixtures as indicated, factory wired, ready for field connection.

B. Provide recessed fixtures with complete mounting hardware and trims to suit the type of ceiling in which they are installed. Provide access to lamps and ballasts in recessed fixtures through the lensed door or fixture opening, without requiring removal of fixture.

C. Equip pendant mounted fixtures with stems, ball aligners, canopies, swivel hangers, safety cable and all mounting hardware required to conform to state of California seismic safety standards.

D. Equip chain suspended fixtures with chain hangers, safety cable and all mounting hardware required to conform to state of California seismic safety standards.

E. For surface mounted fixtures provide all blocking, mounting channels required and hardware for mounting.

F. Provide fixtures UL approved for installation against low density ceilings where applicable. Do not use spacers.

2.18 LED LUMINAIRES

A. Components: UL 8750 recognized or listed as applicable.

B. Tested in accordance with IES LM-79 and IES LM-80.

C. LED estimated useful life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

D. 75 CRI minimum outdoor lighting, 90 CRI minimum indoor.

E. Kelvin temperature as specified.

2.19 LIGHTING CONTROL DEVICES

A. Provide lighting control devices (e.g., automatic time switch control device, motion sensor, occupant-sensor, photosensor, automatic daylighting control device) that meet the state of California, Title 24, State Building Standards, Part 6, California Energy Code, current edition, and that have been certified to the commission.

B. Provide dimmers that are compatible with the provided LED drivers.

2.20 TERMINAL CABINETS

A. General: Provide terminal cabinets flush or surface mounted as indicated on plans.

B. Construction:
   1. Cabinets: Code gauge steel cabinets, dead front panels and doors. Fasten dead front panels to cabinets with concealed trim fasteners and concealed front door hinges. Provide 1/2 inch plywood backboard, painted white, covering entire back of cabinet. Provide all signal system terminal cabinets with steel back panel.
   2. Locks: Flush door locks keyed to match panelboards.
   3. Dimensions: As indicated on drawings. Mounting height same as panelboards.

C. Finish: Degrease, clean, phosphatize prime and finish cabinets, dead front panels and doors with baked enamel, color ASA 61 or standard factory gray. Galvanized cabinets are acceptable for flush cabinets.

D. Nameplates:
   1. Provide nameplate identifying terminal cabinet in accordance with Identification section of this specification.
   2. Provide a manufacturers nameplate on the dead front interior panel.
   3. Identify with printed labels the function of the corresponding wires.

E. Wire markers: Provide permanent fixed identification numbers of the printed wire marker type beside each terminal on the backboard. All wires shall have corresponding wire markers.

2.21 SWITCHBOARDS

A. Construction:

1. Enclosure: Rigid, dead front, metal enclosed, free standing, bussed structures, bolted together. Provide removable, 12 gauge sheet steel, minimum, screw-on access plates at front, top and rear.
2. Quality control: Provide each vertical section which is composed of UL listed devices with a UL label. Provide switchboard which conforms to applicable NEMA standards. Test switchboard at factory before delivery.

B. Bussing:
1. Phase bus: Full-size, silver-plated copper, rated 1,000 amperes per square inch cross sectional area maximum, braced for 50,000 rms amperes minimum.
2. Neutral bus: Full-size, aluminum, copper, with lugs for connection of neutral conductors.
3. Ground bus: Half-size, copper, with lugs for connection of ground conductors.
4. Spacing: Maintain code separation between phases and between phase and ground.

C. Shipping:
1. Provide lifting eyes for handling switchboard.
2. Provide shipping splits, if required and main bus-splice plates for reconnection at job site.

D. Finish: Degrease, clean, phosphatize, prime, and finish all interior, and exterior surfaces with baked enamel, color American National Standards Institute (ANSI) 61, or standard factory gray.

E. Nameplates: Provide nameplates for all circuit breakers and manufacturers' nameplate indicating voltage and current rating, switchboard type and shop order number.

F. Padlocking devices: Provide for all breakers and switches.

G. Circuit breakers: Provide circuit breakers in frame sizes 100 through 800 amperes with thermal-magnetic trip units. Provide circuit breakers in frame sizes 1200 through 2000 amperes with electronic trip units that are insensitive to changes in ambient temperature within the circuit breaker's normal operating temperature range. Provide facility in 400 through 800 ampere frame circuit breakers for either thermal-magnetic or electronic interchangeable trip units. Provide circuit breakers with toggle-type handles which are trip-free and trip-indicating. All poles of multi-pole device shall operate simultaneously during open, close, and trip operations.

H. Short circuit current rating: Provide switchboard with listed short circuit current rating not less than the available fault current at the installed location as indicated by the serving utility company.

I.Acceptable manufacturer: Square D, General Electric, Eaton, Westinghouse.

2.22 PEDESTAL TYPE DISTRIBUTION AND CONTROL CABINETS

A. Construction:
1. Enclosure: Fabricate pedestals from sheet steel, twelve (12) gauge exterior, fourteen (14) gauge interior. Weld the entire enclosure assembly, with all welds ground smooth. Conform to NEMA 3R and NEMA 12 standards. Provide dust-tight doors, with neoprene gasketing.
2. Provide exterior door with lensed window for utility meter viewing a three-point latching assembly with a heavy-duty pad-lockable handle. Provide dead front, free standing assemblies, for mounting to an anchor bolt base. Hinge exterior door and dead front interior pedestal with a continuous piano type, stainless steel hinge, with a minimum three_thirty-seconds (3/32) inch pin. Provide no screws, rivets, or bolts visible outside the enclosure. All screws, bolts, nuts, and washers shall be stainless steel.
3. Incoming line: Bottom, with lugs for termination of electric service conductors.
4. Provide meter socket to allow for utility meter.
5. Finish: Degrease, clean, phosphatize, prime and finish all interior and exterior surfaces with an electrostatically applied baked enamel, white interior, ranch green exterior.
6. Wiring: Factory connect all interior wiring to terminal blocks. Provide terminals for field connections. Harness wiring with cable ties and fan wiring at terminals to facilitate identification. Terminate conductors from the interior dead-front hinged pedestal to terminal blocks in the pedestal interior,

harnessed, and relieved from strain to permit a minimum of 90 degree door swing. Provide #14 AWG type MTW interior control wiring.

7. Nameplates:
   a. Provide an engraved laminated nameplate identifying pedestal and all breakers.
   b. Provide a manufacturer's nameplate on the dead front interior pedestal indicating pedestal type, voltage rating, current rating, and manufacturer's name.

B. Bussing:
1. Phase bus: Copper cable bus type sized in accordance with the National Electric Code or tin plated copper, with a maximum current density not to exceed one thousand (1,000) amperes per square inch of bus cross sectional area. Brace bussing for twenty two thousand (22,000) RMS amperes, minimum, short circuit duty.
2. Neutral bus: Full size, copper with lugs for connection of neutral conductors.
3. Ground bus: Half size, copper, with lugs for connection of ground conductors.
4. Spacing: Maintain code separation between phases and between phase and ground.
5. Directory: Provide a directory card which fits into slots in the back of pedestal door. Protect directory with non-yellowing clear plastic.

C. Circuit breakers
1. Provide circuit breakers for miscellaneous branch circuits with frame sizes and ratings as shown on the plans.
2. Bolt-on, thermal magnetic, molded case, with inverse time current overload, and instantaneous magnetic trips, trip-free, and trip-indicating. All poles of multi-pole device shall operate simultaneously during open, close, and trip operations. Provide circuit breakers indicated with the following ratings:

Pedestal Circuit Type	Breaker Frame	Trip Rating (Amperes)	Voltage (AC Rating)	Symmetrical AC Interrupt Capacity
1	100/1 Pole	15-100	120	10,000 Min
	100/2 and 3 Poles	15-100	240	10,000 Min
	150/2 and 3 Poles	110-150	240	18,000 Min
	225/3 Poles	125-225	240	22,000 Min

Pedestal Circuit Type	Breaker Frame	Trip Rating (Amperes)	Voltage (AC Rating)	Symmetrical AC Interrupt Capacity
2	100/1 Pole	15-100	277	14,000 Min
	100/2 and 3 Poles	15-100	480	14,000 Min
	150/2 and 3 Poles	110-150	480	25,000 Min
	225/3 Poles	125-225	480	25,000 Min

D. Mount motor circuit protectors and branch circuit breakers to standoffs on the pedestal backpan, with the handles protruding through the interior dead front pedestal.

E. Factory test each pedestal assembly for continuity, shorts, grounds, and each function prior to shipment.

2.23 TRANSFORMERS

A. Description: Provide factory-assembled, dry type transformers for 60 hz operation designed and manufactured in accordance with NEMA ST 20 and listed and labeled by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

B. Transformers shall be designed for continuous operation at rated kVA, for 24 hours a day, yearly operation, with normal life expectancy as defined in American National Standards Institute (ANSI) C57.96.

C. Core: High grade, non-aging silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Keep magnetic flux densities substantially below saturation point (including at 10 percent

primary overvoltage). Tightly clamp core laminations to prevent plate movement and maintain consistent pressure throughout core length.

D. Impregnate core and coil assembly with non-hydroscopic thermo-setting varnish to effectively seal out moisture and other contaminants.

E. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.

F. Isolate core and coil from enclosure using vibration-absorbing mounts.

G. Nameplate: Include transformer connection data, ratings, wiring diagrams, and overload capacity based on rated winding temperature rise.

H. Shipping: Provide lifting holes, accessible without removal of any of the enclosure components.

I.Insulation:
1. Smaller than 30 kVA: 180 degrees C, UL insulation system with maximum 115 degrees C rise above 40 degrees C ambient temperature.
2. 30 kVA and larger: 220 degrees C, UL insulation system with maximum 150 degrees C rise above 40 degrees C ambient temperature.

J. Base temperature rating and hot spot allowances in the above table on a 40 degrees C maximum ambient temperature and 30 degrees C average ambient temperature.

K. Overload capacity: 10 percent above full load rating continuously in an ambient not exceeding 40 degrees C.

L. Case temperature: maintain no more than a 35 degrees c rise above a 40 degrees c ambient.

M. Taps:
1. 3 kVA and smaller: none.
2. 7.5 kVA to 24kVA: One 5% tap above one 5% tap below normal capacity.
3. 25 kVA and larger: Two 2.5% taps above and two 2.5% taps below normal capacity.

N. Provide conduit knockouts for line and load conduit entrance.

O. Enclosure:
1. Units rated 30 kVA and below, the encapsulated enclosure construction shall be totally enclosed, non-ventilated, NEMA 3R, with lifting eyes.
2. Units rated 15 kVA and above, the enclosure construction shall be ventilated, NEMA 2, drip-proof, with lifting holes. All ventilation openings shall be protected against falling dirt.
3. Outdoor units rated 15 kVA or above, provide suitable weather-shields over ventilation openings.

P. Finish: degrease, clean, phosphatize, prime, and finish all interior and exterior surfaces with baked enamel, color ANSI 61 or standard factory gray.

Q. Connect a grounding strap from the secondary neutral to a grounding lug on the enclosure.

R. Terminals: solderless lug type connectors, with hex-head or Allen type compression set screws with configuration to suit application T & B "Locktite", Burndy "GA", oz type "XL" or "XLH" or equal.

S. Manufacturer: Cutler-Hammer, General Electric, Square D.

PART 3 - EXECUTION

3.1 RACEWAY SYSTEMS

A. Install all wiring in raceways. Install raceway systems, including conduits, hangers, hooks, and support channels parallel or perpendicular to structural members. Coordinate location of raceway systems with other divisions prior to commencing installation.

B. Rigid steel conduit: suitable for use in all locations. For underground installations tape wrap conduit completely with tape suitable for underground installations, double lap of Calpico 10 mil or equal.

C. Electrical metallic tubing: suitable for use in concealed dry locations, not in concrete, masonry, or underground, or suitable exposed, minimum 8 feet above finished floor. Use 4 inch conduit sleeves to penetrate technology equipment room floors projecting 6 inches above finished floor without a bend. Provide bushings at both end of conduit.

D. Flexible metal conduit: suitable for connection of recessed lighting fixtures or other devices requiring flexible connections in dry locations. Flexible metal conduit may be fished into existing walls as allowed by the CEC. Length shall not exceed 6'-0".

E. Liquid tight flexible metal conduit: suitable for connection of equipment in damp or wet locations.

F. PVC conduit: suitable for use underground, with a minimum of 18 inches of cover. Fabricate field bends with an approved thermal bender and jig. For underground emergency systems encase conduit in concrete, minimum of 2" all around. Maintain separation between conduits using plastic spacers specifically designed for the purpose.

G. Clean and mandrel all under floor/ground raceways before wire is installed.

H. Conduit supports:
1. Support all conduits at intervals not to exceed 10 feet.
2. Support individual conduits with conduit hangers or clamp back and nest back, if required for entrance into the equipment.
3. Support multiple conduits, 2 or more in parallel, with framing channel and pipe clamps.
4. Support all electrical equipment located in the ceiling space in accordance with CBC sections 1613A and 1614A. Firmly attach items weighing less than 20 pounds to main cross runners. Two 12 gauge support wires to the ceiling system hangers or structure shall be included for items from 20 to 56 pounds. Directly support items over 56 pounds from the structure above with approved hangers.
5. Fire stop penetrations of conduits, sleeves and cable trays in walls requiring protected openings. Provide fire stop material which is a tested assembly approved by the California state fire marshal.
6. Cut ends of framing channel installed outdoors or in wet locations shall be painted with zinc rich paint.

I.Conduit bends:
1. Electrical conduits: provide no more than (3) 90 degree conduit bends or the equivalent number of smaller radius bends in any conduit run between boxes or equipment.
2. Telecommunications conduits: provide no more than (2) 90 degree bends or the equivalent number of smaller radius bend in any conduit run between boxes or stub, with radius 10 times the diameter of the conduit.
3. Length of run: 400 feet maximum, less 100 feet for each equivalent 90 degree bend.
4. Fabricate bends and offsets with a hickey or conduit bender designed specifically for use with the type of conduit to be bent, or use factory made bend.
5. Radius of underground bends: minimum 10 times conduit radius.

3.2 BOXES AND CABINETS

A. Place outlet boxes in a location as close to that shown on the plans as possible. Coordinate location of boxes with other divisions.

B. Install wall mounted outlet boxes so that the distance from the centerline of the box to finished floor is as listed or indicated on plan:
   1. Receptacles, + 18 inches
   2. Switches, + 45 inches

C. Install junction boxes with covers accessible after installation. Do not install junction boxes flush with finish walls or ceilings unless specifically approved by the engineer.

D. Attach surface boxes with:
   1. Steel or malleable iron expansion anchors in concrete or solid masonry.
   2. Wood screws in wood.
   3. Toggle bolts in hollow walls or masonry.
   4. Machine screws, bolts, or welded studs in steel.

E. Attach flush boxes with adjustable bar type hangers screw fastened to two studs and on both sides of the box.

F. For all surface mounted boxes or cabinets mounted in wet or damp locations provide weatherproof enclosures and at least 1/4 inch air space between box and mounting surface, per CEC 312.2.

3.3 INSULATED CONDUCTORS AND CABLES

A. Exercise extreme care when pulling conductors and cable into conduits to avoid kinking, twisting, nicking, or scratching of the insulation or the placement of extreme stress on the conductors or cable. When required, utilize UL approved pulling compounds to assist in pulling conductors.

B. Color code conductors by phase sequence A-B-C when looking into the front of the equipment from left-to-right, top to bottom or front-to-back. Provide conductors with the appropriate phase color or mark conductors with a minimum of 6 inches of phase tape on ends connected to terminals. Phase code conductors as listed:

VOLTAGE	PHASE A	PHASE B	PHASE C	NEUTRAL	GROUND
120/208	BLACK	RED	BLUE	WHITE	GREEN
120/240	BLACK	RED	ORANGE	WHITE	GREEN
277/480	BROWN	ORANGE	YELLOW	GRAY	GREEN

C. Identify each conductor with its respective circuit number at each box or terminal.

D. Connections:
   1. Utilize twist-on solderless connectors for splicing receptacle and lighting circuits #10 AWG wire size and smaller.
   2. Splices and taps will not be permitted for other than receptacle and lighting circuits, or for wire larger than #10.
   3. Terminate conductors at motors with bolted connections, insulated with plastic tape.

3.4 DRY TYPE POWER TRANSFORMER

A. Mount transformer on floor or wall as indicated or detailed.

B. Provide one (1) vibration isolating mount, minimum 1 inch thick with 1 inch static deflection, for each mounting point on the transformer.

C. Connect transformer with flexible metal conduit. Provide an insulated grounding bushing on conduit and bond to transformer case.

3.5 PANELBOARDS

A. Mount panelboard so that the top is 6 feet-6 inches above the finished floor.

B. Neatly terminate conductors onto breaker, ground bus, and neutral bus. Group conductors in an organized manner with conductors fanning out at the circuit terminals, bundled in the wireways and laced with plastic ties.

C. Identify all conductors with a circuit number and phase color.

D. Type all panelboard directories.

E. Provide a minimum of three (3) 3/4 inch empty conduits into accessible ceiling space.

F. Provide insulated grounding bushings on all conduits which enter the cabinet and bond to ground bus.

G. Install conduits in a vertical line, perpendicular to the cabinet.

3.6 WIRING DEVICES

A. Connect wiring devices to circuits indicated using side or back wiring terminals.

B. Connect green grounding pigtail from receptacles to outlet box with screw.

C. Install wiring devices flush with the device plate fronts.

D. Align plates plumb with wall, and cover opening, without use of "jumbo" plates.

E. Install receptacles with grounding terminal up.

3.7 DISCONNECT SWITCHES

A. Install disconnect switches where indicated. Provide all mounting hardware and accessories.

B. Provide a flexible connection from the disconnect switch to the motor unless otherwise indicated.

C. Attach disconnect switches with specified anchors.

D. Phase tape and identify circuit numbers as specified.

E. Install fuses where indicated.

3.8 GROUNDING

A. Permanently and effectively ground all raceway systems, supports, cabinets, switchboards, control equipment, motor frames, lighting fixtures and other utilization apparatus.

B. Provide a ground wire in each conduit carrying circuits operating at 100 volts or higher bonded at each end to equipment. Size as shown on the drawings or per CEC.

C. Compression connectors shall be unplated copper, manufactured by Burndy, or approved equal, designed specifically for the intended connection.

D. Exothermic weld-type connectors shall be 'Cadweld' manufactured by Erico Products, or approved equal, designed specifically for the intended connection.

E. Mechanical connectors shall not be used.

3.9 ELECTRICAL WORK FOR EQUIPMENT

A. Provide all connections to equipment requiring electrical supply.

B. Review division 23 mechanical scope requirements for additional work required.

3.10 LIGHTING FIXTURES

A. Install lighting fixtures complete with lamps, ready for operation.

B. Secure fixtures to the structure with brackets, flanges, and other mounting hardware suited for the fixtures and type of installation.

C. Connect recessed fixtures with flexible metal conduit and fixture tap wire.

D. Secure surface mounted fixtures with a minimum of (2) 1/4 inch bolts into structure or as detailed.

E. Secure recessed fixtures with a minimum of (2) #12 AWG hanger wires, independent of ceiling hangers.

F. Clean lighting fixtures prior to final acceptance.

3.11 LIGHTING CONTROL DEVICES

A. Install in accordance with the manufacturer's instructions and the state of California, Title 24, state building standards, part 6, California Energy Code, latest edition.

B. Program system for proper operation and per owner's representative schedule of operation, maintaining compliance with Title 24.

C. Instruct owner's representative personnel in reprogramming and scheduling and maintenance of devices and lighting control panel.

3.12 EQUIPMENT MOUNTING CRITERIA

A. Support all electrical equipment located in the ceiling space in accordance with latest edition of CBC. Firmly attach items weighing less than 20 pounds to main cross runners. Two 12 gauge support wires to the ceiling system hangers or structure shall be included for items from 20 and 56 pounds. Directly support items over 56 pounds from the structure above with approved hangers.

B. Anchorage of all equipment to be installed, as a part of this project shall be detailed on the appropriate plans, except for the following:
   1. Equipment weighing less than 400 pounds supported directly on the floor or roof.
   2. Furniture (non-fixed and movable as exempted by the CBC).
   3. Temporary and movable equipment (non-fixed and movable as exempted by the CBC).
   4. Equipment weighing less than 20 pounds supported by vibration isolators.
   5. Equipment weighing less than 20 pounds suspended from a roof or floor or hung from a wall.

C. Permanent equipment in items 1, 4 and 5 must be supported and anchored to resist the forces prescribed by chapter 13 of ASCE 7 as modified by the CBC and the anchorage shall be approved by the appropriate design professional of record as a part of field reviews/observations. The inspector of record shall assure that the above requirements are enforced.

D. Anchorage pre-approval: where contract drawings reference anchorage pre -approval numbers (OPM) for specific pieces of equipment the engineer shall verify that the pre-approval is appropriate. If the installation varies in any way from the shown in the anchorage pre-approval document, the engineer shall provide complete calculations for anchorage and bracing of the component and system.

E. Pre-approvals for the seismic bracing of raceways, ducts, and conduits: all of the pre-approved systems require that the seismic lateral force, FP including consideration of AP and RP be determined at each level

of the building so that brace spacing can be calculated. Structural engineer of record shall provide all parameters required to compute FP (such as seismic zone, Ip and hr provide hx for each floor where pre-approved is used) on the contract drawings.

F. The contractor shall provide and the structural engineer of record shall verify adequacy of any supplementary framing that is needed to resist the loads, maintain stability and/or is required for the installation of the pre -approved system.

G. A copy of the chosen bracing system(s) installation guide/manual shall be on the jobsite prior to starting the installation of hangers and/or braces.

H. Do not mix components of two or more pre -approved bracing systems. Only one pre-approved bracing system may be used for a run of pipe, duct or conduit.

3.13 TELECOMMUNICATION BACKBOARDS

A. Provide 3/4 inch thick, fire resistant plywood backboard from the floor level to 8 feet 0 inches high, 4 feet wide minimum or size indicated in the drawings. Attach backboard to studs with #10 x 2 inch sheet metal screws on metal studs; or #10 x 2 inch wood screws on wood studs. Provide one screw at 24 inch maximum horizontal distance and 16 inch maximum vertical distance and within 2 inch of top and bottom. Paint with (2) coats minimum, matte white, fire-retardant paint. Do not paint over mill fire label stamp. Ensure that one mill stamp is exposed from paint on each backboard sheet. Provide copy of mill certificate to owner at project completion.

3.14 SWITCHBOARDS, PEDESTAL TYPE DISTRIBUTION EQUIPMENT, AND CONTROL CABINETS

A. Protect switchboards, pedestals, cabinets from damage, abuse, dirt, and debris during construction. Keep equipment free from dirt, scratches, nicks, blisters, and other marks not part of the factory finish. Make touch-ups to the finish with factory enamel.

B. Unless noted on drawing, anchor free standing panels to concrete slabs with 1/2 inch or larger anchor bolts fastened to malleable iron or steel expansion shields in the slab. Submit a detail indicating anchor method.

C. Coordinate all required conduit openings, blockouts, stubs, and conduit entrance requirements.

D. Identify conductors with circuit numbers and phase tape.

E. Neatly arrange wiring within the equipment. Bundle and wrap conductors #8 AWG and smaller with plastic wire ties.

F. Install an insulated grounding bushing on conduits which enter the equipment.

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 Owner'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 Owner'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 Owner's Representative. The Landscape Maintenance period shall, at the discretion of the Owner'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 Owner'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 Owner'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 Owner's Representative.

1.07 GUARANTEE

A. All work executed under this section shall be guaranteed against any and all poor, inadequate or inferior materials and/or workmanship, as determined by the Owner'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 Owner'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 Owner'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 Owner'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 this and 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 Owner'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 Owner's Representative. The Owner'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:

Percent	Chemical
14%	nitrogen
4%	phosphoric acid
9%	potash

C. Humus: Inactive, decomposed organic material approved by Owner'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 Owner'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 Owner'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 Owner'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 Owner.

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 for the entire length of Landscape Maintenance Period.

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 TURF MAINTENANCE

A. Mowing and Edging
   1. Turf shall not be allowed to exceed 2-1/2" inches in height and shall not be mown shorter than 1-1/2 inches in height. Turf shall be well established, free of bare spots and weeds, and of a "sod-like" quality to the satisfaction of the Owner's Representative prior to Final Acceptance.
   2. All grass clippings shall be picked up and removed from the site and premises.
   3. Let turf areas dry out enough so that mower wheels do not skid, tear, or mark the surface.
   4. Edges shall be trimmed at least twice monthly or as needed for neat appearance. Clippings shall be completely removed and disposed of off-site.

B. Watering: Turf shall be watered at such frequency as weather conditions require to replenish soil moisture below root zone and to establish healthy turf areas.

C. Disease Control: Control all turf diseases throughout the Landscape Maintenance Period with legally approved fungicides and herbicides.

D. Weed Control: Control broad leaf weeds with selective, legally approved herbicides. No herbicide shall be used without the prior consent of the Owner's Representative.

E. Replacement: At or near the end of specified Landscape Maintenance Period, a final observation of turf areas will be made jointly by the Owner's Representative and Contractor. Remove deceased areas and unhealthy stands of turf from the site; do not bury into the soil. Replant all applicable areas with materials and in a manner acceptable to the Owner's Representative.

3.03 BIORETENTION SOD MAINTENANCE

A. Mowing and Edging
   1. Sod shall be allowed to grow to develop a natural appearance with semi-annual mowing, or as determined by the Owner's Representative. During mowing, sod shall be trimmed gradually so that no more than 1/3 of the leaf blade is removed during a single trimming. Turf shall be well established, free of bare spots and weeds, and of a "sod-like" quality to the satisfaction of the Owner's Representative prior to Final Acceptance.
   2. All grass clippings shall be picked up and removed from the site and premises.
   3. Let sod areas dry out enough so that mower wheels do not skid, tear, or mark the surface.
   4. Edges shall be trimmed during semi-annual mowing, or as needed for neat appearance. Clippings shall be completely removed and disposed of off-site.

B. Watering: Bioretention sod shall be watered at short and frequent intervals during the first 7 to 14 days after installation. Thereafter site shall be watered with such frequency as weather conditions require to replenish soil moisture below root zone and to establish healthy turf areas.

C. Disease Control: Control all turf diseases throughout the Landscape Maintenance Period with legally approved fungicides and herbicides.

D. Weed Control: Control broad leaf weeds with selective, legally approved herbicides. No herbicide shall be used without the prior consent of the Owner's Representative.

E. Replacement: At or near the end of specified Landscape Maintenance Period, a final observation of bioretention sod areas will be made jointly by the Owner's Representative and Contractor. Remove deceased areas and unhealthy stands of turf from the site; do not bury into the soil. Replant all applicable areas with materials and in a manner acceptable to the Owner's Representative.

3.04 ATHLETIC 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, fungicides, herbicides, 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 irrigation 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 Owner'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 Owner'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 Owner's Representatives in attendance. If less than 80 percent of the random tests pass after not less than 15 samples have been 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 open sod joints, dead or bare spots in excess of 3 square inches.

4. Maintenance log is complete and all equipment manuals and documentation delivered to the Owner.

3.05 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 Owner'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 Owner or Contractor.

3.06 INFIELD MAINTENANCE

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.

3.07 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 Owner'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 shall not be scheduled until the Contractor can assure the Owner the work is complete. The incomplete punch-list review meeting and any 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 Owner'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.

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 Owner or its design consultants and remain the sole responsibility of Geotechnical Engineer.
3. The Geotechnical Report is available from the Owner.
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 Owner shall 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 Owner's Representative.
3. In event of conflict between the Specifications and recommendations contained in Geotechnical Report, the Owner's Representative and Geotechnical Engineer shall be notified.
   a. Contractor shall follow clarification and interpretation issued through the Owner's Representative at no extra cost to the Owner.
   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 Owner'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 Owner'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 Owner's Representative.

1.08 FIELD CONDITIONS

A. Underground Utilities: Unknown buried utility lines may exist. If encountered, notify Owner's Representative immediately for direction and re-direct work to avoid delay.
   1. Cooperate and coordinate with Owner's Representative and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
   2. Do not interrupt existing utilities serving occupied facilities without proper notification to, and written direction from, Owner's Representative.

B. Wet Conditions: No grading operations shall be conducted when excessively wet conditions exist as determined by the Owner'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 Owner.

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 benchmarks, monuments, and other reference points. If disturbed or destroyed, they shall be replaced at the Contractor's expense.

C. Contractor shall set temporary benchmarks 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 Owner'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 Owner'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 Owner'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: As noted in the Geotechnical 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 Owner's Representative. Notify Owner'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 Owner'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 Owner'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 Owner 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 Owner'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 Owner'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 Owner or prior written approval from the Owner.

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 Owner'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 Owner.

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 84 percent to 89 percent relative density.

D. Maintain slopes and gradients established during subgrade operations and shape landforms to satisfaction of the Owner'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 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 Owner Representative shall review and accept work at the following stages:
1. Topsoil removal and stockpile.
2. Grading plan for project. Plan shall provide strategy for grading sequence for entire site at one time or by field. Limits and sequence shall be reviewed and coordinated.
3. Cross ripping of subgrade shall be reviewed and observed.

END OF SECTION

SECTION 31 23 00

EXCAVATION AND FILL

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Trenching, backfilling, and compaction required for, but not necessarily limited to, the following:
   1. Sanitary sewer line installation.
   2. Storm drainage system installation.
   3. Potable water line installation.
   4. Irrigation system installation.
   5. Electrical conduit installation.

B. Related Requirements:
   1. Section 01 33 00 - Submittal Procedures
   2. Section 01 71 23 - Field Engineering
   3. Section 01 78 39 - Project Record Drawings
   4. Section 02 41 13 - Site Clearing and Demolition
   5. Section 31 20 00 - Earth Moving
   6. Section 32 01 90 - Existing Tree Protection and Maintenance
   7. Section 32 11 00 - Base Courses
   8. Section 32 90 00 - Planting
   9. Section 33 11 00 - Domestic Water Utilities
   10. Section 33 40 00 - Storm Drainage Utilities

1.02 REFERENCES

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

1.03 SEQUENCING AND SCHEDULING

A. Refer to all other Contract Documents, determine the extent and character of related work, and properly coordinate work specified herein with that described elsewhere to produce a complete, operational installation.

1.04 CLOSEOUT SUBMITTALS

A. Project Record Drawings:
   1. Conform to requirements specified in Section 01 78 39 - Project Record Documents.
   2. Accurately record locations of utilities remaining, re-routed utilities, new utilities, and newly discovered utilities by horizontal dimensions, elevations, inverts and slope gradients as practical.

1.05 QUALITY ASSURANCE

A. Control of Work: Comply with Section 5 of the Standard Specifications.

B. Control of Materials: Comply with Section 6 of the Standard Specifications.

C. Trench Safety: Comply with applicable portions of Sections 5 and 7 of the Standard Specifications and requirements of OSHA and other agencies having jurisdiction).

1.06 FIELD CONDITIONS

A. Wet Conditions: No trenching shall occur when excessively wet conditions exist in the opinion of the Owner'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. Backfill for French Drain and Vertical Drain Lines, refer to Section 33 40 00 - Storm Drainage Utilities.

D. 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 Owner's Representative.

E. Permeable Material: Permeable material shall be Caltrans Class II permeable rock material.

F. Slurry Fill: Controlled low-strength fluid material (CLSM) 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.

G. 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 Owner'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 Owner'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 Owner's Representative.

F. Excavated Material:
1. Excavated material not required for backfill or of value to the Owner 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 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 Owner'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 Owner'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.

B. Initial Backfill:
1. Prior to trench backfill, the condition of the trench and laying of pipe shall be acceptable to the Owner's Representative.
2. Select backfill material shall be used as initial backfill for all utilities except irrigation piping, except as otherwise noted and specified.
   a. After the pipe has been properly laid and accepted by the Owner's Representative, selected backfill material shall be placed on both sides of the pipe and compacted to the depth shown in the Drawings.
   b. Compaction: The initial backfill material shall be hand tamped in layers not exceeding 4 inches in uncompacted depth and shall be brought up uniformly on both sides of the pipe to avoid bending or distortional stress. After hand-tamping, the relative compaction of the initial backfill material shall be at least 95 percent relative compaction.
3. Where trenching occurs at chemically treated subgrade, backfill using specified controlled low-strength material (CLSM) slurry.
   a. The mixture shall be placed using chutes, conveyors, buckets, or pumps depending upon t accessibility.

b. Placed in lifts to prevent piping from floating.
c. Do not vibrate

C. Final Backfill:
1. Native backfill material shall be used for final backfill, unless otherwise noted.
2. Compaction: Final backfill compaction shall be by mechanical means with backfill material placed in layers not exceeding 6 inches in loose depth. Each layer shall be thoroughly compacted before succeeding layers are placed. The use of machine tampers, except manually held types, shall not be permitted. Final backfill shall be compacted to a relative compaction of 95 percent for paving areas and synthetic turf subgrade areas. In planting areas, provide acceptable topsoil to required depth compacted to 85 percent to 89 percent maximum relative compaction.

D. Jetting: No jetting will be allowed.

3.05 TRENCH SURFACING

A. General:
1. In unimproved areas, the trench surface shall be restored to its original condition. No mounds of earth shall be left along the trench.
2. Backfill shall be flush with adjoining grade in a firm, unyielding position with no visible settling for a period of one year after Final Acceptance.

B. Paved Areas:
1. Temporary surfacing acceptable to the Owner's Representative shall be laid within 1 day after backfilling, except where the Contractor elects to place permanent surfacing within this time period, until permanent paving is installed.

END OF SECTION

SECTION 32 01 90

EXISTING TREE PROTECTION AND MAINTENANCE

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Protection of trees and other plants that are scheduled to remain.
   2. Work necessary to ensure that trees, and landscaping in general, designated on the Drawings to remain receive all due protection, care, and maintenance necessary to ensure their survival.
   3. Irrigation as directed or as required to maintain the health of trees and other plants to remain, where existing irrigation of such plants is shut down for the work of this Contract.

B. Work specifically includes the following:
   1. Erection of barriers and other general protective measures.
   2. Placement of wood shavings.
   3. Care of roots during grading.
   4. Inspection and recommendations.
   5. Repair and/or replacement of trees and other plants damaged during the construction operations.
   6. Repair and/or replacement of any irrigation systems damaged or removed during construction operations.

C. Related Requirements:
   1. Section 02 41 13 - Site Clearing and Demolition
   2. Section 31 01 90 - Landscape and Site Maintenance
   3. Section 31 20 00 - Earth Moving
   4. Section 31 23 00 - Excavation and Fill
   5. Section 32 80 00 - Irrigation
   6. Section 32 90 00 - Planting
   7. Section 33 11 00 - Domestic Water Utilities
   8. Section 33 30 00 - Sanitary Sewerage Utilities
   9. Section 33 40 00 - Storm Drainage Utilities

1.02 REFERENCES AND REGULATORY REQUIREMENTS

A. American Joint Committee on Horticultural Nomenclature (AJCHN), Standardized Plant Names.

B. American Association of Nurserymen, Inc. (AAN), American Standard for Nursery Stock.

C. Sunset Western Garden Book, Lane Publishing Company.

D. Agricultural Code of California.

1.03 ADMINISTRATIVE REQUIREMENTS

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

B. Contractor shall avoid injury or damage resulting from the Contractor's operations, including:
   1. Cutting, breaking, or skinning of roots, trunks, or branches.
   2. Smothering or soil compaction by stockpiled materials, excavated materials, foot or vehicular traffic within the dripline.

3. Desiccation due to interruption of existing irrigation schedule.

C. Pre-Construction Meetings:
1. The Tree Work Contractor: Prior to commencing installation of Tree Protection Measures (TPM's), or performing any tree work or tree removal work, arrange and have the tree work contractor attend a pre-construction meeting with the Owners 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 Owners Representative, schedule all other contractors so as to be present on site to attend a single pre-construction meeting with the Owners 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 Owners 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 Owner'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 Owner'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 Owner.

B. If a shrub designated to remain is destroyed or damaged so that in the judgment of the Owner'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 Owner'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: 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 Owner subject to the discretion of the Owner's Representative.

3.02 TREE PROTECTION

A. Tree Protection Zones (TPZ): Unless otherwise expressly permitted by the Owners 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 owners Representative accepted tree protection documents, or as may be otherwise specifically established by written agreement between the owners Representative.

C. Ground Disturbance Controls:
   1. Relocate from and/or limit ground disturbing activities within TPZ's.
   2. Obtain Owners 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 Owners Representative accepted ground disturbing work in a manner that minimizes root disturbance and soil compaction.
   4. As may be requested by the Owners 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 Owners 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 Owners 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 Owners Representative.
6. Throughout the project duration, the Owners 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 Owners 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 Owners 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 Owners 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 Owners 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.
2. Where site constraints and safety considerations prevent placement of the TPF at the limits of the TPZ, obtain direction from the owners representative and locate fence as directed.
3. Caution: Owners Representative accepted adjustments in TPF locations do not alter the extents of the actual TPZ's or the requirements related thereto.
4. Mount Owner-furnished tree protection signs on TPF in a manner and in locations as may be directed by the Owners Representative.
5. Where Owners Representative accepted work within TPZ's requires temporary relocation of TPF, obtain Owners 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.

G. Work Monitoring:
1. When required by the Owners Representative, all work performed within TPZ's shall be continuously monitored by the Owners 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 Owners 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 Owners 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 Owners 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 Owners Representative. Notify the Owners Representative of proposed canopy pruning and request a change assessment as set forth above in assessments.

2. Where practical, the Owners 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 the Project 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 1 foot beyond dripline or as directed by Owner's Representative.

B. Locate structural roots by hand probing and set posts with care to preclude root damage.

C. Space protective fencing posts at 6'-0" centers maximum and securely attach fabric.

D. Maintain protection until Final Acceptance of project.

E. Install signage indicating that the protective fencing and area within shall not be disturbed.

F. When work is required within the fenced protection area, submit a written request to the Owner'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 Owner'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 Owner's Representative. Grading and trenching necessary within the dripline shall be done by hand at the discretion of the Owner'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 ROOT PRUNING

A. Root pruning shall consist of a smooth, final cut and shall be performed wherever a root 2 inches or more in diameter has been broken or severed.

3.07 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 Owner's Representative.
   b. Limbs of weak structure.

c. Limbs with twigs and foliage obstructing the development of more "important" branches, as directed by the Owner'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 Owner's Representative.

3.08 PRUNING REPAIRS

A. Prune and treat damaged area as directed by the Owner's Representative.

3.09 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 un-paved 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 Owner'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 Owner'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.

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 Owner'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 12 17 - Asphalt Track Paving
   5. 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: 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 Owner'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 Owner’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 Owner.

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. Unless otherwise noted, aggregates in asphalt mix may be a blend of virgin material and reclaimed asphalt paving (RAP), with the RAP constituting no more than 15% of the aggregate blend per Section 39 of the Standard Specifications.

D. Asphalt mix for use beneath track surfacing, tennis court surfacing, or other court system to receive surface coating shall consist of only virgin material; RAP shall not be used.

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 SS-1 liquid asphalt as per Section 94 of the Standard Specifications and approved by the Owner's Representative.

C. Tack Coat: Asphaltic emulsion to be penetration type conforming to the RS-1 requirements of Section 94 of the Standard Specifications.

D. Aggregates:
1. Traffic Areas (Vehicular Asphalt Paving): 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 EDGEBAND 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 Owner'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 Owner'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 Owner'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 Owner'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 Owner'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. 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.

C. 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 Owner'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 Owner's Representative.

D. 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 Owner's Representative, in such condition that the quality of the completed joint will be affected.

E. 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 Owner's Representative, may be used to aid in preventing the sticking of the mixture to the wheels.

F. Compaction:
1. Compact pavement by rolling to a specified relative compaction that is 93-96% of bulk unit weight, tested in accordance with the nuclear gauge or CTM 309 core 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.
   i. In-place density of asphalt concrete will be determined prior to opening the pavement to public use.
   j. Relative compaction will be determined by California Test 375.
   k. Laboratory specimens will be prepared in conformance with California Test 304.

G. 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 Owner'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 x 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 Owner'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 Owner'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. Driveway aprons.
   5. Walkways.
   6. Expansion and control joints.
   7. Reinforcement.
   8. Finishing.

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.
   7. Section 32 33 00 - Site Furnishings

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. Owner’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 Owner'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 Owner'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 Owner 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 Owner.

F. When review or observation is required of the Owner's Representative of the concrete work, Contractor shall notify the Owner'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 Owner'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 Owner'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 Owner'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 Owner's Representative
      e. Notify Owner's Representative 5 working days in advance of dates and times when mockups will be constructed and layouts will be ready for review.
      f. Color and texture shall be approved before starting construction.
      g. Perform specified slip-resistance testing on mockups.
      h. Maintain final accepted mockups in an undisturbed condition as a standard for judging the completed Work.
      i. Retain samples of sands, aggregates, and color additive used in the mockups for comparison with materials used in final work.
      j. Demolish and remove mockups when directed if not incorporated into the final work.
   2. Flat Paving Mockups:
      a. 4-feet x 4-feet sample panels of colored concrete flatwork and concrete darkening agent for each required color and texture shall be poured by the Contractor at the site for review and acceptance by the Owner'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.

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.

2.05 CONCRETE ADDITIVES

A. Pigment for Concrete: Synthetic mineral-oxide pigments or colored water-reducing admixtures, color stable, nonfading, and resistant to lime and other alkalis, and complying with ASTM C979; Davis Colors Inc., 800-800-6856, as specified and noted on the Drawings, or equal.
   1. If added to mix at Project site, additive shall be furnished in manufacturer's "Mix-Ready" disintegrating bags.
   2. Dosage Rate: As required to achieve color of approved sample but not exceeding 10 percent of weight of cementitious materials in mix.
   3. Colors:
      a. Darkening Agent: Davis Colors Inc. colorant #8084 Black, or acceptable equal.
         1) Dosage: 1/4-pound per sack of concrete.
      b. Other Colors: As noted on the Drawings.

B. No admixtures shall be allowed without written acceptance by the Engineer of Record. Admixtures that have a negative impact on concrete finish shall not be used. When more than one admixture is used, admixtures shall be compatible.

2.06 ACCESSORIES

A. Non-Shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days. SIKAGrout 212 or equal.

B. Curing Materials:
   1. Liquid Curing Compounds: ASTM C309, Type 1.
   2. Sheet Material: Waterproofed Kraft paper, ASTM C17, regular type.

C. Joint primer: One component, solvent based; Sonneborn horizontal paving joint primer No. 733, or No. 766, or equal.

D. Fiber Expansion Joint Material: Preformed cellular fiber complying with ASTM D1751; 1/2 inch thick unless otherwise indicated.
   1. Expansion joint material shall be variety with "zip-strip" H-channel joint sealant receptacles. If proposed joint material is not installed with sealant receptacles then, the expansion joint material shall be completely covered with a Sonneborn "Sonofoam" closed cell backer rod or acceptable equal prior to application of joint sealant.
   2. Provide 3/8-inch tooled edges each side of joint material. Refer to Drawings for additional information.

E. Paving Expansion Joint Sealant: One-part, self-leveling polyurethane conforming to ASTM C920, Class 25, Type S, Grade P; Sonneborn "Sonolastic SL 2," or equal.
   1. Color: As selected by Owner's Representative.

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 Owner'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 (psi)	Maximum slump	Size of aggregate	Cement (min # of 94 lb. sacks per yard)	W/C Ratio (max)
Slab-On-Grade	3,000	4"	3/4"-1"	5	0.60
Curbs / Edgebands	3,000	4“	3/4"-1"	5	0.60
Refer to Structural plans for structural concrete design					

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 Owner’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 Owner.

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 Owner'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 Owner.
   2. Wherever conduits, piping, inserts, sleeves, and similar item interfere with placing of reinforcing steel, obtain approval of Owner'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 reinforcements, 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.

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.
4. Align score and fiber expansion joints with proposed fence posts.

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 troweled out.

3.09 PLACING OF CONCRETE

A. Notify Owner'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 Owner's Representative, if required, has inspected reinforcement.
4. Notify the Owner'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 restraighten 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 Owner.

3.12 FIELD QUALITY CONTROL

A. Provide free access to Work and cooperate with Owner'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 Owner.

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, Business and Transportation Agency, Department of Transportation (Caltrans) "Standard Specifications."

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.
   2. 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.

PART 2 - PRODUCTS

2.01 CLAY MATERIALS

A. Infield Fines Mixes and Clay Mix for Warning Tracks
   1. General:
      a. 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.
      b. The composition of the mix shall be achieved using mechanical blending equipment prior to delivery to the site and shall be as follows:
   2. Supplier: TMT Enterprises, Inc., San Jose, CA, or equal. Contact: Matt Moore, 408-432-9040.
      a. Product: Pac-Bell 2.0 Infield Fines Mix. Gradation shall be as follows:

Sieve Size	Percent Retained by Weight
4 mm	0
2 mm	3.4
1 mm	14.4
0.5 mm	22.5
0.25 mm	11.3
0.1 mm	11.1
0.05 mm	5.6
Total Sand	64.6
Silt/Clay Ratio	0.89

3. Supplier: PROFILE Products LLC Products, or equal.
   a. Pitchers' Mound Mix: 100 percent, high-density pure virgin clay; "Turface Professional Mound Clay" by PROFILE Products LLC, or equal.
      1) Color: As noted on the Drawings or, if not indicated, as selected by Owner's Representative.
      2) Size: 50-pound bags.
   b. Pitchers' Mound Bricks: 100 percent pure virgin clay blocks; "Turface MoundMaster" by PROFILE Products LLC, or equal.
      1) Color: As noted on the Drawings or, if not indicated, as selected by Owner's Representative.

2.02 ADDITIONAL MATERIALS

A. Aggregate Base: As specified in Section 32 11 00 - Base Courses.

PART 3 - EXECUTION

3.01 PITCHER'S MOUND MIX

A. Excavate evenly designated area 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. Apply the pitchers' mound clay mix at 2-inch lifts, tamp, compact, and repeat.

C. Compact with a 1,000 to 3,000-pound roller after grading and wetting final lift.

D. Fill in back and sides of sloping to the edge of the circle.

3.02 INFIELD FINES AND WARNING TRACK MIX

A. Spread infield fines mix evenly where shown in drawings and screed in t2-inch lifts. Thoroughly water each lift until the entire depth is moist.

B. Roto-till specified sports field conditioner into the top 3 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.

3.03 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 and Infield Grass synthetic grass system consisting of 2 in tall hybrid monofilament/slit-film polyethylene fiber. Color to be green.
   2. Infield clay synthetic grass system consisting of 1.6" slit-film polyethylene fiber with a texturized thatch layer. Color to be brown.
   3. Baseball batting cage and bullpen floor surfacing.
   4. A resilient infill system consisting of graded sand and organic infill.
   5. 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."

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 work including final electronic versions of artwork.
   4. One-quart samples of the following:
      a. Specified primary infill.
      b. Specified secondary (sand) infill.

1.05 INFORMATIONAL SUBMITTALS

A. Manufacturer's installation instructions.

B. Certifications:
   1. Project specific letter from turf manufacturer on the company letterhead certifying that the products to be provided meet or exceed all specified requirements, and state that the installer meets the specified qualifications above and is certified by the manufacturer to install the synthetic turf specified and to be provided.

C. Certified copies from an independent third-party laboratory reports for results of the following tests:
   1. Pile Height, face width & total fabric weight, ASTM D5823 and D5848.
   2. Primary and secondary backing weights, ASTM D5848.
   3. Tuft bind, ASTM D1335.
   4. Grab tear strength, ASTM D5034.
   5. Water permeability, ASTM F1551.
   6. Flame resistance, ASTM D2859.
   7. Tuft yarn tensile strength and elongation, ASTM D2256.

D. Copy of the manufacturers' minimum 8-year or 10-year, prepaid, non-prorated, third-party insured warranty and insurance policy information.

E. Qualifications: A list providing project name, date the field installation was approved, contact names and telephone numbers for each project that meets the experience and qualification requirements specified.

1.06 CLOSEOUT SUBMITTALS

A. The Contractor shall provide the following prior to Final Acceptance and the Owner filing the Project Notice of Completion:
   1. Written warranty as specified with forms completed in Owner'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 TURF COMPANY QUALIFICATIONS

A. The Turf company shall be experienced in both the manufacturing and installation of the specified type of synthetic infilled turf system.
   1. Use of outside, independent contractors for the installation is to be reviewed by the Owner'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. The Turf Company shall coordinate all bid documents, submittals, shop drawings, schedules, warranty and close-out efforts internally and shall not rely on Owner's Representative to coordinate with multiple parties. Failure to do so could result in a time and materials charge from the Owner or Owner's Representative for additional coordination.

   4. Have an NFHS baseball/softball field in play for at least 3 seasons with the specific infill system, backing and sewn seams that is being proposed for this project including non-marking rubber.
   5. For the purpose of meeting these qualifications, the type of fiber and infill and sand are not determining factors in meeting these installation qualifications.

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 owner or other contracting entity in the U.S.
   7. For the purpose of meeting these qualifications, the type of rubber 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 Owner 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 Owner with turf manufacturer's warranty which guarantees the usability and playability of the synthetic turf system for its intended uses for a minimum 10 year period. The warranty coverage shall not be prorated nor limited to the amount of the usage. The warranty submitted must have the following characteristics:
   1. A non-prorated, non-cancellable up-front pre-paid, third-party insured warranty. Warranty shall be covered by a third party insurance policy, non-cancelable and pre-paid, and is in effect

covering this installation, and underwritten by a Best "A" Rated (or better) Insurance Carrier listed in the A.M. Best Key Rating Guide.

2. Insurance carrier shall confirm that the policy is in force and premiums prepaid for entire warranty duration in full.
3. The policy shall include a minimum annual aggregate of $5,000,000 per year and be based on claims arising from fields installed and completed only during the policy year.
4. The policy shall provide full coverage for a minimum of 8 years from the date of Notice of Completion.
5. The policy shall cover all costs associated with full field replacement with new equal or better turf material, including labor, materials and any other costs to repair or replace the field.
6. Owner 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 Lodi Unified School District
13. Turf contractor shall include in the warranty the cost to replace high use areas such as 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 system of 1.6" slit-film polyethylene fiber with a texturized thatch layer and sand 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.
16. Turf shall maintain an ASTM F355 G-Max of less than 160 for the life of the warranty.

PART 2 - PRODUCTS

2.01 DESIGN AND PERFORMANCE CRITERIA

A. General:
1. Synthetic turf construction and components shall be non-toxic and not cause commonly known allergic reactions. Each synthetic turf system should be constructed to provide dimensional stability and resist damage from wear and tear during athletic and recreational usage.
2. System shall be permeable by design with adequate perforations through all of the backing coatings.
3. The bonding or fastening of system material components shall provide a permanent, tight, secure, and hazard-free athletic playing surface.
4. Seams shall be sewn with high strength sewing thread. Gluing of rolls is permitted if warrantied by the turf company and shall be glued with the specified glue.

B. Product Specifications:

1. Monofilament/Slit-Film Fiber: 9,000 denier, low friction, eight-strand monofilament fiber, measuring not less than 2-1/2 inches high and not less than 125 microns in thickness.
   a. The low friction fiber shall be custom blended polyethylene, treated with UV inhibitors.
   b. Fibers shall have been extruded individually through a spinerette, stretched and twisted.
   c. Low friction fiber shall be specifically designed to virtually eliminate abrasion.
2. The tufted fiber weight shall not be less than 36 ounces per square yard. The low friction fiber shall be custom blended polyethylene, treated with UV inhibitors.
3. The maximum gauge of the tufted fiber rows shall be 3/4 inch.
4. The turf product shall have an infiltration rate not less than 40" per hour as tested by ASTM D1551.
5. Backing: Not less than 2 components consisting of a primary and secondary backing system of woven polypropylene or urethane.
   a. Backing system shall be treated with UV inhibitors.
   b. The backing shall receive polyurethane and acrylic applications during the manufacturing process.
   c. The backing weight of all backing material shall be a minimum of 23 ounces per square yard.
6. The minimum tuft binding tensile strength shall be 8 pounds without infill, as determined by ASTM D1335.

C. 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.

D. Markings:
   1. The perimeter white and yellow lines can be tufted into the individual sideline rolls.
   2. Field of play lines for baseball, shall be inlaid or tufted. The lines shall be white.
   3. Field of play lines for softball, shall be inlaid or tufted. The lines shall be white.

2.02 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

      American Sports Construction Inc
      1318 DuPont Court
      Manteca, CA 95366
      P: 209-412-0284

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 fines and foul area - 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 (Bullpens and Batting Cages - GREEN): ASC Inc, Challenger Turf. EPXP 5MM, no infill as specified as the basis of design has been pre-approved by the district.

2.03 MATERIALS

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.

B. The installed artificial grass slit-film FieldTurf shall have the following properties:

STANDARD	PROPERTY	SPECIFICATION
	Yarn Structure – A	Slit-Film
ASTM D1577	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 (BULLPENS AND BATTING CAGES - GREEN)

A. Turf Type III: ASC Inc, Challenger Turf. EPXP 5MM, no infill:
1. Carpet made of polyethylene fibers tufted into a perforated backing.
2. Glue, thread, paint, seaming fabric and other materials used to install and mark the artificial grass

B. The installed artificial grass slit-film FieldTurf shall have the following properties:

STANDARD	PROPERTY	SPECIFICATION
	Yarn Structure – A	Polyethylene
ASTM D1577	Yarn Denier - A	5,040
ASTM D5823	Pile Height	5/8”
ASTM D5793	Stitch Gauge	3/8”
ASTM D5848	Pile Weight	133.1oz/square yard
ASTM D5848	Primary Backing	K-29 / 5 PIC
ASTM D5848	Secondary Backing	5 MM Foam
ASTM D5848	Total Weight	76 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
	Total Product Weight	1386.5 lbs/roll

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 K-29 / 5 PIC
2. Secondary backing shall be 5MM Foam

E. Non-tufted or inlaid lines and markings shall be painted with paint approved by the synthetic turf manufacturer.

F. Glue 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 Sports Turf Groomer – model 920SDE” groomer with STR- Rear-Mounted Spring Tine Rake and 924SD- Extension Wings by GreensGroomer, including base unit with 164 linear inches of brushes, electric lift for raising and lowering, with powder coated frame, super duty synthetic bristle brushes, integrated pneumatic wheels, adjustable spring steel de-thatching tines, and

detachable/foldable brush extension wings, as manufactured by GreensGroomer, 888-298-8852, or acceptable equivalent product.

C. Field Sweeper: "LitterKat - model 760 SFM" sweeper with magnet by GreensGroomer. 888-298-8852. This is a sweeper with basket attachment and tow-behind magnet.

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 Owner'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 Owner, 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 Owner's Representative before cutting turf for utility boxes and other structures.

G. The turf rolls shall be installed directly over the properly prepared base. Extreme care shall be taken to avoid disturbing the base, both in regard to compaction and planarity.

H. The full width rolls shall be laid out across the width of the field.

I. 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.

J. 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 bagger 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.

K. 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 the specified 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.

L. 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 Owner.
   4. Testing and analysis by the testing laboratory shall provide the necessary data to the Owner that verifies the finished field does not exceed shock attenuation of 160 as determined by the ASTM F355A and F1936 test procedures.
   5. Testing and analysis by the testing laboratory shall provide the necessary data to the Owner that verifies the finished field does not exceed shock attenuation of 120 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 Owner.

C. The Contractor shall provide the following prior to Final Acceptance and the Owner filing the Project Notice of Completion:
   1. Written warranty as specified with forms completed in Owner'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 Owner'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 6 months prior to the completion of year eight of the warranty period.

B. Testing shall be completed by an independent testing laboratory accredited for such tests and shall be pre-approved by the Owner. 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 Owner 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 Owner.

3.06 MAINTENANCE CONTRACT

A. If the proposed regular maintenance contract cost for the duration of the warranty is selected by the District, the Turf contractor shall provide one maintenance service visit per year for the first three years of the 8 year warranty, then semi-annual visits (i.e. twice a year) for the remaining 5 years of the warranty period. Each maintenance service visit shall include the following:

1. One (1) Turf Contractor/Maintenance Contractor grooming session including:
   a. A general sweeping to remove foreign objects such as dirt, leaves, bird droppings, chewing gum and other debris that may collect on the field surface.
   b. A deep groom sweep and rejuvenation to de-compact infill and in an effort to maintain appropriate G-Max levels, as well as clean the infill from deleterious matter contaminating the infill material.
   c. All accumulated debris and contaminating material shall be off-hauled and disposed of in a legal manner by the Turf Company.

2. Overall analysis and inspection of the field and its applicable systems, including fiber wear analysis, ultraviolet degradation, infill depth and consistency, infill migration, field edging attachments, sewn and glued seams, line verification and field inserts (inlays).

3. Minor repairs (sewing/adhesive failures, inlay separation, and general workmanship) as needed, of items found relating to the synthetic surface.

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 closed-cell 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. ASTM D1557-12: “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 D2434-22: “Standard Test Methods for Measurement of Hydraulic Conductivity of Coarse-Grained Soils.”
   4. ASTM C88-13: “Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.”
   5. ASTM C136-06: “Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.”
   6. ASTM D75-03: “Standard Practice for Sampling Aggregates.”
   7. ASTM F1936-19: “Standard Specification for Impact Attenuation of Turf Playing Systems as Measured in the Field.”

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 filter fabric and manufactured porous closed-cell composite as applicable. Descriptive literature and product cut sheets for each rock material from quarries, including initial sieve analyses per Part 2 Materials Section, shall be provided with the initial action submittals and shall be certified as current data (within 60 days from date of submission) from the quarries. Once initial submittals and samples are authorized from the Owner's representative, the Contractor may proceed with the additional testing as outlined in Part 1 Section "Material Testing".

B. Samples: Two 1-quart samples of each rock material and additional samples of each rock material to the Owner's testing agent as specified under Article "Material Testing," and Two 1-quart samples of Subdrain Trench Leveling Rock, as required.

C. Refer to Section 01 78 29 – Conformance Survey for Action Submittals relative to Synthetic Turf Base.

1.05 INFORMATIONAL SUBMITTALS

A. Manufacturer's installation instructions.

B. Certification: Certification signed by Contractor and drainage system (piping, structures, and fittings) Installer that installed materials conform to specified requirements and system was successfully checked and tested prior to covering with engineered permeable rock base, trench drain rock, and/or subdrain trench leveling rock.

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 Owner. Material rejected by the Owner 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 summary of Synthetic Turf Base Material Testing includes the following:
      a. Initial Action Submittal and samples for Owner Representative authorization to proceed.
      b. Pre-construction testing procedures described in Section 1.10.B.
      c. Testing procedures during construction described in Section 1.10.C and Section 3.03.
      d. In-situ permeability of Engineered Permeable Base Rock as described in Section 1.10.D.
   2. The Owner will employ and pay for the services of an Independent Testing Agency as specified in Section 01 45 00 – Quality Control.
   3. Payment for initial material testing is the responsibility of the Owner.
   4. Employment by the Owner of the Testing Agency shall in no way relieve Contractor's obligations to perform the Work of the Contract.
   5. The Owner reserves the right to change its testing laboratory if the need arises.
   6. 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.
   7. The Contractor shall include the following with its sample submittals:
      a. Identification of proposed source and supplier.
      b. Current lab mechanical analysis (within the last 60 calendar days) 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 Owner's Testing Agent prior to acceptance of rock provided under this Section, after authorization/review from the Owner's Representative of the initial Action Submittal and samples provided. Testing 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 Owner's Testing Agency, unless the Owner'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 Owner's testing agent will evaluate these materials as specified using ASTM C136-06 and ASTM D75-03 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. 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
Aggregate Soundness (ASTM C88-13)	Not to exceed 12% loss for coarse aggregate, 10% for fine aggregate (based on a sulfate solution)

      e. If Contractor provides current certification (within last four months) that a Permeable Rock Base and Subdrain Trench Drain rock are from the same quarry and vein of rock, only one set of stability testing requirements are required.
   2. Engineered Permeable Base Rock Testing ONLY:
      a. To ensure structural stability: $D_{60}/D_{10} > 5$ and $1 < \frac{D^2_{30}}{D_{10} * D_{60}} < 3$
      Fragmentation shall be 100%.

$D_{"x"}$ 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.

b. 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 through ASTM D2434-22 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.

C. Testing During Construction:
   1. During construction, samples will be taken and analyzed periodically by the Owner's representative/Testing Agent to assure strict compliance with the Specifications. The Owner 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 Owner's representative. Materials rejected by the Owner's representative shall be removed from the site at the Contractor's expense.
   2. 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.
   3. Refer to Section 3.03 Placing the Engineered Permeable Rock Base for additional testing required during construction.
   4. Subdrain Trench Leveling Rock: The leveling rock shall comply with section 2.04 A and be submitted to the Owner'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)

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 MANUFACTURED POROUS CLOSED-CELL COMPOSITE GUARANTY

A. The manufacturer of the porous closed-cell composite shall provide a guaranty, in writing, that for a period of twenty five (25) years, the porous closed-cell composite shall be a part of a turf system that will not exceed a field average G-max of 120 g's as tested according to the ASTM F1936-19 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
#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 that 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.

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 Engineered Permeable Base Rock shall not be installed over the subdrain trench drain rock.

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.

D. 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.

2.04 SUBDRAIN TRENCH LEVELING ROCK

A. For planarity purposes, a clean, washed, 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 Owner's representative. Maximum thickness for this stone layer is 1/2 inch.

2.05 ROCK BASE AND SUBDRAIN TRENCH DRAIN ROCK SUPPLIERS

A. The following suppliers are recommended. Recommendations do not preclude suppliers from meeting all rock requirements specified herein:

FOLSOM OFFICE

Region	**Supplier**	**Address**	**Phone Number**
Sacramento/Folsom	Teichert Aggregate – Perkins	8760 Kiefer Blvd. Sacramento, CA 95826	1 (916) 386-6900
	Teichert Aggregate – Grantline	3417 Grantline Rd Rancho Cordova, CA 9572	1 (916) 351-0123
	Teichert Aggregate – Woodland	35030 County Rd. 20 Woodland, CA 95695	1 (530) 661-4290
Marysville	Teichert Aggregate – Hallwood	3331 Walnut Ave. Marysville, CA 95901	1 (530) 749-1230
	Western Aggregate	4711 Hammonton Road Marysville, CA 95901	1 (530) 749-8670
Stockton/Tracy	Granite – Vernalis Aggregate Plant	37400 S. Bird Rd. Tracy, CA 95304	1 (888) 256-4568
El Dorado			

2.06 MANUFACTURED POROUS CLOSED-CELL COMPOSITE BASE

A. Manufactured Porous Close-Cell Composite Base: Resilient, interlocking, polypropylene panels specifically engineered for sports fields; "PowerBase YSRXD" 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

2.07 PERMEABLE 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 D4632	80 lb.
Puncture Strength	ASTM D4833	25 lb.
Burst Strength	ASTM D3786	130 lb.
Trapezoid Tear	ASTM D4533	25 lb.
Permeability	ASTM D4491	0.1 cm/sec
Apparent Opening Size	ASTM D4751	#50 Sieve size
Permittivity	ASTM D4491	

2.08 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 laid in shingle fashion overlapping 12 inches minimum following direction of slope with upslope fabric laying atop the down slope fabric 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 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.

C. NO VIBRATORY COMPACTION OF THE SUBDRAIN TRENCHES SHALL BE PERMITTED.

D. Contractor shall protect the installed subdrain trenches with fabric until ready for installation of turf. If rain is imminent, add straw waddles and silt fencing to prevent contamination of the subdrain trench rock.

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. Contractor shall roll field ridges so as to provide a rounded ridge and not a harsh break.

E. If the required compacted depth of the base course exceeds 6 inches, the base stone course shall be constructed in 2 or more layers or lifts of approximate equal thickness. Each layer shall achieve a uniform 90 percent relative compaction.

F. Top of porous rock elevations shall be verified using laser-operation survey instruments. Refer to Conformance Surveying specifications for requirements.

G. The final grade shall be ideally compacted to a uniform 90 – 92 percent relative compaction.

H. Contractor shall not overwork the stone material and consequently modify its gradation characteristics. Minimal moving of the stone upon placement of the material on the subgrade and rolling is advisable to achieve design grades and compaction. Do not compact greater than 93 percent relative compaction.

I. Contractor shall prepare an initial 50’ X 50’ area of compacted, placed permeable base during the start of base import for initial permeability testing per ASTM 2898-11. Notify the Owner’s Representative three (3) days prior to completion of the test area being ready for testing. Testing Shall be completed by The Owner’s Representative.

J. Contractor shall manually screed the top stone surface to ensure tolerances are met.

K. Top of rock elevations shall be verified using laser-operation survey instruments. Refer to Conformance Surveying specifications for requirements.

L. 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 Owner and the synthetic turf installer.

M. Once the top of the Engineered Permeable Rock Base is fully installed and compacted, the Contractor shall notify the Owner 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 specified requirements.
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. Chain link fence Baseball / Softball backstop(s) with baseboards.
   3. Chain link fence with integrally woven privacy plastic slats
   4. Protective Tension netting systems.
   5. Batting cage(s) with chain link roof and interior netting.

B. Related Requirements:
   1. Section 01 33 00 - Submittal Procedures
   2. Section 09 91 15 – Exterior Site Painting
   3. Section 32 33 00 - Site Furnishings
   4. Section 32 13 13 – Concrete Paving
   5. Structural Drawings

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. A53/A53M-18 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
   2. A123/A123M-15 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
   3. A392-11a - Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric.
   4. F567-14a - Standard Practice for Installation of Chain-Link Fence."
   5. F1043-18 - Standard Specification for Strength and Protective Coatings on Steel Industrial Fence Framework.
   6. F1083-18 - Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.

B. American Welding Society (AWS):
   1. A2.4: "Standard Symbols for Welding, Brazing and Nondestructive Examination."
   2. B2.1: "Specification for Welding Procedure and Performance Qualification."
   3. D1.1: "Structural Welding Code – Steel."
   4. D19.0: "Welding Zinc-Coated Steel."

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, Section 32 13 13 – Concrete Paving, structural plans and specifications, and all other work.

1.04 ACTION SUBMITTALS

A. Shop Drawings: To scale drawings showing all different types and sizes of backstop unit(s, gates, fencing and/or netting, padding, slats, and windscreen 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 such as wood baseboards at backstops and locking mechanisms.
   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 "Standard 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 Owner's Representative.
   2. Hardware and fittings Owner's Representative.
   3. 12 inch square sample of protective netting.
   4. Sample of privacy slat system.

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 "Specification for Welding Procedure and Performance Qualifications," B2.1.
   3. Comply with AWS publication D19.0 "Welding Zinc-Coated Steel" for galvanized products.
   4. Welding inspector's qualifications shall be in accordance with AWS D1.1.

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. Fabric Type:
      a. 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.

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 1 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	---

NPS in inches	Outside Diameter (OD) in inches	Type 1 Steel ASTM F1083 (30 KSI)	Type II Steel ASTM F1043 (50 KSI)
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).
8. Brace Bands: Hot-dip galvanized steel, heavy 1" wide x 11 gauge, sized appropriately for each post diameter. Use offset brace bands, one-way at end posts, and two-way at line posts, at large diameter posts where appropriate (4" NPS and greater) to ensure continuous chain link fence fabric alignment. Large diameter offset brace bands available from Fittings That Fit, Inc., Montclair, CA - (909) 248-2808

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. Non-self-closing 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 ½ -feet wide: Heavy-duty self-closing hinge with hydraulic damping, ADA compliant (requiring maximum 5 lbs of operating force per CBC 11B-309.4); Locinox Mammoth Ultra Heavy Duty "Mammoth-HD" or accepted equal.
4. Self-closing hinge bracket for round gate post: Locinox CLB-Mammoth, or approved equal. Color to match fencing/gates.
5. Panic Hardware:
   a. Panic bar requiring maximum 5 lbs of operating force per CBC 11B-309.4; Allegion "Von Duprin 98/99 – AX 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 Von Duprin, or accepted equal.
6. 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. One of the following to be selected by Owner's Representative:
      1) Standard Operation: Von Duprin 996L
7. Gate Latch Hardware:
   a. Gate latch hardware shall be sized to match receiving fence/gate post size.
   b. Provide and attach welded accessible pull handle where specified.
   c. Fulcrum gate latch, Model "#STRONG-ARM-SNG" by DAC Industries, available from Hoover Fence Co., (800) 355-2335.

E. Batting Cage Netting and Accessories:
   1. Sportsfield Specialties Inc., Delhi, NY, 408-728-0482; or equal
      a. Netting: #60 Knotted Nylon Netting, Model No. BSSN60
         1) Knotless Netting: Model BSSNUC – 1-3/4 inch (530 lb. min break strength).
   2. Netting shall be affixed to eyebolts with 1/4 inch minimum stainless steel aircraft cable.

F. Protective Tension Netting and Accessories:
   1. Sportsfield Specialties Inc., Delhi, NY, 408-728-0482; or equal
      a. Custom pole-to-pole tension netting system with Ultracross Netting Black Model TNPPUC

2.03 ADDITIONAL MATERIALS AND COMPONENTS

A. Refer to Section 32 13 13 Concrete Paving.

B. Privacy Slats: Tubular PVC, UV-Light stabilized, flame resistant, self-locking, fastened to chain link fabric, sized to fit specified mesh opening and providing full privacy; "Fin/Slat 1000" by Master Halco, or equal
   1. Color: As selected by Owner's Representative from reviewed submittals.

C. Backstop Baseboards: Surfaced Kiln Dried Douglas Fir painted with a primer coat and two coats of durable exterior enamel paint.
   1. Color: To be selected by Owner's Representative.
   2. Install as shown on the Drawings.
   3. Galvanized or Stainless Steel Bolts and nuts shall be painted the same color as the boards after installation.

D. 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.

E. Distance Banners, Signage and all other Applicable Attachments:
   1. Refer to Section 32 33 00, "Site Furnishings" for product information. 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.

F. Top of Fence Protective Cap: Attach with heavy duty zip ties, color matched. Sportsfield Specialties Inc, Delhi, NY 408-728-0482, or equal

2.04 FABRICATION

A. Welding: Welds shall be shop fabricated prior to galvanizing unless otherwise acceptable to Owner's Representative and were 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.
   1. Round Posts, Rails, Braces, and Gate Frames: Type I galvanized steel pipe as specified.
   2. Top, Bottom and Horizontal Intermediate Rails: 1.66 inch outside diameter (1-5/8 inch outside diameter).
   3. Gate Frames: Single or double gate for nominal gate widths as follows:
      a. Under 6 Feet: 1.66 inch outside diameter (1-5/8 inch outside diameter).
      b. 6 Feet to 10 Feet: 1.90 inch outside diameter (1-7/8 inch outside diameter).
   4. Pedestrian Gate Square Posts, Rails, Braces, and Gate Frames (Height noted below)

a. 8 Feet and Under:
   1) Posts: 4" square galvanized.
   2) Header above Gate: 2" x 4" galvanized steel header.
   3) Gate Frame: 2" square (11 gauge) galvanized.
   4) All railing connections from square posts to round posts to be made by fencing contractor as necessary for secure connections throughout fencing system.
   5) Fencing contractor to submit shop drawings of square post and inclusion/connection to overall fencing system for approval by owner's representative.
b. Above 8 Feet – Refer to Structure Drawings and Calculations
   1) All railing connections from square posts to round posts to be made by fencing contractor as necessary for secure connections throughout fencing system.
   2) Fencing contractor to submit shop drawings of square post and inclusion/connection to overall fencing system for approval by owner's representative.

5. Batting Cage Roof: As noted on the Drawings.

D. Pole-to-Pole Tension Ball Safety Netting System upright support posts and pole structures – fabricated, sized, and configurated as required:
   1. Height above finish grade as required
   2. Two (2) coat powder coated process consisting of zinc gray epoxy primer and super durable silvadillo finish with enhanced resistance to UV and fade
   3. Ground sleeve, base plate or permanent embedment mount
   4. Hot dipped galvanized assembly hardware – quantities, sizes and configurations as required.

PART 3 - EXECUTION

3.01 PREPARATION

A. Prior to excavation, layout all fencing locations for review and acceptance by Owner'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 (Refer to Concrete Paving Section 32 13 13)
   2. 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.

O. Fencing shall be provided with concrete edgebands unless otherwise noted. Edgebands shall have a minimum 4 inch clearance from edge of post to edge of concrete. Gates shall have the same edgeband width as adjacent fencing.

P. All Fencing Horizontal Alignment: Where occurring, contractor shall install posts of differing sizes with fabric-side face in alignment to allow for fence fabric to hang in a continuous vertical plane. Undulations of fence fabric at large-diameter posts (4" NPS and greater) will not be accepted. Use offset brace bands sized appropriately for each post size. Refer to post alignment details to indicate alignment of fabric (typically at interior side of field/court area, unless otherwise noted).

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 to post and gate frame in place once gates are aligned and approved by Owner's 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 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. Bases, plates, and pitching rubbers.
      b. Foul poles.
      c. Batting cage netting.
      d. Dugout Structure
      e. Flagpole.
      f. Drinking fountain.
      g. Benches.
      h. Scoreboard.
      i. Truncated domes.
   2. Site Furnishings Product Matrix

B. Related Requirements:
   1. Section 32 12 16 - Asphalt Paving
   2. Section 32 13 13 – Concrete Paving
   3. Section 32 18 13 – Synthetic Turf Playing Field

1.02 REFERENCES

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

1.03 ADMINISTRATIVE REQUIREMENTS

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

B. Scheduling and Sequencing:
   1. Do not install site furnishings prior to acceptance by Owner's Representative of area to receive items.
   2. Coordinate construction timing of installation of site furnishings in conformance with other work interfacing with installation of the site furnishing items.

1.04 ACTION SUBMITTALS

A. Shop Drawings: Submit complete shop drawings for all materials or furnishings requiring field or shop fabrication.

B. Product Data: Manufacturer's catalog cut sheets of materials and equipment to be provided.
   1. Include the manufacturer and distributor name, and subcontractor as applicable.
   2. Cut sheets clearly describe the specific product by catalog number and that additional non-specified products that may appear on the same cut sheet are crossed out where applicable.

C. Samples: Colors and finishes for products and furnishings requiring selection by the Owner's Representative.

1.05 INFORMATIONAL SUBMITTALS

A. Statement of qualifications for manufacturers and installer if requested by the Owner's Representative.

1.06 CLOSEOUT SUBMITTALS

A. Provide operation and maintenance data for items with operable, movable, or replaceable parts, for items with mechanical connections, and for other items as applicable.

B. Extended warranties as specified.

1.07 QUALITY ASSURANCE

A. Furnishings shall be reviewed for conformance with the intent of the Contract Documents and accepted by the Contractor prior to installation.

B. Site furnishings shall be in a new, "first-class" condition as determined by the Owner's Representative at the time of Final Acceptance.

C. Field Samples and Mockups: As requested by the Owner's Representative.

1.08 DELIVERY, STORAGE AND HANDLING

A. General:
   1. The Contractor is responsible for coordination of the delivery, acceptance, handling, and storage of site furnishings.
   2. Store and handle site furnishings as acceptable to the Owner's Representative and so that work or access of others is not impeded.
   3. Protect site furnishings from theft or damage until such items have been accepted by the Owner.

B. Packaging and Labeling: Furnish materials in manufacturer's unopened, original packaging, bearing original labels showing quantity, description, and name of manufacturer. Verify that materials and components are adequately padded and securely bound in such a manner that no damage occurs to the product during delivery and unloading at the site.

C. Storage: Damaged materials will be rejected. Remove damaged materials from job site immediately and pay cost of replacement. Determination of damage shall be the sole authority of the Owner's Representative.

D. Painted Finishes: Provide non-scratching, non-staining, firmly bound covering for shop-painted finishes until installed and accepted.

E. Protect wood materials from stains.

1.09 WARRANTY

A. Manufacturers: Provide Owner with manufacturer's written extended product warranties as available for the specified products.

PART 2 - PRODUCTS

2.01 SITE FURNISHINGS - GENERAL

A. Refer to the Site Furnishing Matrix included at the end of this Section for complete list of items to be provided.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Prior to commencement of work described in this Section, carefully inspect installed work, and verify all such work is correct and complete. Immediately notify the Owner's Representative of any discrepancy before proceeding with work.

3.02 INSTALLATION - GENERAL

A. Conform to layout shown on Drawings. Final placement shall be field verified with the Owner's Representative.

B. Installation of products shall be as shown in the Drawings, or according to manufacturer's instructions. If discrepancies are found, or if information is lacking, consult with the Owner's Representative prior to beginning the work.

C. Concrete footings shall conform to requirements of Section 32 32 15 – Landscape Concrete unless noted otherwise.

D. Furnish anchorage and fastening required for installation to ensure proper fit and accurate placements. Bolts, where exposed, shall be cut back to within three threads of the nut.

3.03 CLEANING AND ADJUSTMENT

A. Protect furnishings from damage until acceptance of work. Do not remove protective wrappings from furnishings until so instructed by the Owner's Representative.

B. Clean soiled site furnishings prior to acceptance by Owner.

C. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by the Owner's Representative.

D. Replace damaged items to the satisfaction of the Owner's Representative. Replace missing accessories at no cost to Owner.

3.04 SITE FURNISHINGS MATRIX

ITEM	DESCRIPTION	MANUFACTURER	MODEL NO.	QTY.	FINISH/COLOR	DISTRIBUTOR/CONTACT
A.	Pitcher's Rubber	Sportsfield Specialties	SHBBPB Rawlings Hollywood MLB Official	8 ea.	White	Sportsfield Specialties Dan DeVantier (607) 437-7301
B.	Baseball Bases	Sportsfield Specialties	SHIBL Schutt Hollywood Impact Base	1 sets	White	Sportsfield Specialties Dan DeVantier (607) 437-7301

ITEM	DESCRIPTION	MANUFACTURER	MODEL NO.	QTY.	FINISH/COLOR	DISTRIBUTOR/CONTACT
C.	Softball Bases	Sportsfield Specialties	SHIBD Hollywood Impact Double First Base Set	1 set	White	Sportsfield Specialties Dan DeVantier (607) 437-7301
D.	Dual Steel Ground Anchor Mount	Sportsfield Specialties	SH12920711	1ea	N/A	Sportsfield Specialties Dan DeVantier (607) 437-7301
E.	Ground Anchor Mounts	Sportsfield Specialties	SHBBP-44	2 sets	n/a	Sportsfield Specialties Dan DeVantier (607) 437-7301
F.	Ground Anchor Plugs	Sportsfield Specialties	SHBBP-64	2 sets	N/A	Sportsfield Specialties Dan DeVantier (607) 437-7301
G.	Synthetic Turf Access Frame Kit	Sportsfield Specialties	SHAFIT	5 ea.	N/A	Sportsfield Specialties Dan DeVantier (607) 437-7301
H.	Synthetic Turf Dual Anchor Access Frame with Infill Retainer	Sportsfield Specialties	SHAFPRIT	1 ea.	N/A	Sportsfield Specialties Dan DeVantier (607) 437-7301
I.	Fence Cap	Sportsfield Specialties	PC250/PC100	Per Plan	Black and Yellow	Sportsfield Specialties Dan DeVantier (607) 437-7301
J.	Foul Pole	Sportsfield Specialties	FPW420	2	Yellow	Sportsfield Specialties Dan DeVantier (607) 437-7301
K.	Foul Pole	Sportsfield Specialties	FPW630	2	Yellow	Sportsfield Specialties Dan DeVantier (607) 437-7301
L.	Outfield Distance Markers	Beacon Athletics	160-245-019	6	Per District	Beacon Athletics
M.	Two Tier Polyboard Bench	Sportsfield Specialties	PTBTT10	12	Red	Sportsfield Specialties Dan DeVantier (607) 437-7301
N.	Drinking Fountain w/ Bottle Filler (ADA and bottle filler at right)	Elkay EZH2O, Hi-Lo Fountain w/Bottle Filler	Model LK4430BF1L	4 ea.	Red	Mainline Sales, Inc 916-614-9970
O.	Scoreboard	Nevco	Model 1608-ETN, 18' width Digit color Amber	2 ea	Red	Nevoc Stacey Kotzamanis (618) 659-7948
P.	Score Keepers Bench	AAE	UST-7.5/SP – Unibody Scorer's Table	2 ea	Red	AAE 800-523-5471
Q.	Flag Pole	Concord American Flagpole	IRW25D61	1 ea.	-	Concord American Flagpole 800-527-3902
R.	Truncated Domes	Engineered Plastics – Armor Tile	ADA-C-Series Cast-in-place tiles	Per plan	Federal Yellow	Gerard Angeles, Engineered Plastics (916) 844-4132
S.	Removable Bollard	DuMor	400-36	4 ea	Safety Yellow	Ross Recreation, Nicole Nowak 707-531-0933

END OF SECTION

Removable bollard model number is **400-36_S-1SL**, per manufacturer's specifications.

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. Automatic irrigation controls and systems.
   2. Line voltage connections to the irrigation controllers and low voltage control wiring from controllers to master valve, flow sensor, and 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 11 00 - Domestic Water Utilities

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. D1785 - Standard Specifications Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40 and 80.
   2. D2241 - Standard Specifications for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
   3. D2464 – Standard Specification for Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
   4. D2466 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
   5. D2467 – Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
   6. D2564 - Standard Specifications for Solvent Cements for (PVC) Plastic Pipe and Fittings.
   7. 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.
   8. F512 - Standard Specification for Smooth-Wall Poly (Vinyl Chloride) (PVC) Conduit and Fittings for Underground Installation.
   9. 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 Owner'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 whether it be 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).

C. Contractor shall record and scan and submit PDF files of full size plan set of Record Drawings (As-builts Drawings) to the Owner'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 Owner or stored at another location selected by the Owner'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 Owner's Representative.

B. Trench excavation and backfilling shall not be performed during excessively wet conditions at the discretion of the Owner'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 Owner.

D. Discrepancies: In the event of discrepancy, immediately notify the Owner'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 Owner'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 Owner 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 Owner'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 Owner, 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.". If specified pipe type is not manufactured in purple color, Contractor shall clearly paint/mark pipe with purple paint regularly, along with purple marking tape to indicate recycled water system.

2.03 FITTINGS

A. PVC Fittings: Polyvinyl chloride (Type I) plastic 1120, Schedule 40 or Schedule 80 where noted on the Drawings.

B. PVC Nipples: Polyvinyl chloride (Type I) plastic 1120, Schedule 80.

C. Joint Restraint for Ductile Iron Fittings: Shall be manufactured of ductile iron per ASTM A536. Gripping surfaces shall be machined serrations. As cast gripping surfaces are not permitted.
1. Sizes 1 ½" 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.

D. 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.

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. Grounding: 5/8"x8' copper grounding rod (one per controller) including #6 solid copper ground wire.

2.06 PLASTIC VALVE BOXES

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 Owner 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.

A. 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 – BV" on lid.

B. 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.

C. 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.

D. Valve Boxes: Valve boxes shall have locking or bolt down type lids. Approved box manufacturers as equals: Applied Engineering Inc., NDS, Christy, Carson Industries, or equal.

2.07 AUTOMATIC CONTROLLER AND ENCLOSURE

A. Controller: Manufacturer, model, size, and type as specified on Drawings.

B. Enclosure: Manufacturer, model, size, and type as specified on Drawings.

C. Grounding: 5/8"x8' copper grounding rod (one per controller) including #6 solid copper ground wire.

2.08 ELECTRICAL

A. General:
1. Electrical equipment shall be NEMA Type 3, waterproofed for exterior installations.
2. Electrical work shall conform to local codes and ordinances.
3. Remote control wire shall be UL rated for direct burial.
4. Where two or more controllers are used, the control wires shall be a different color for each controller. These colors shall be noted on the "Record Drawings" placed in the controller cabinet.

B. Flow Sensor Wiring:
1. As per manufacturer's details and recommendations.
2. Flow Sensor conductors shall be installed in 1" Schedule 80 electrical conduit from controller to the Flow Sensor valve box.
3. Control wires from controller to flow sensor: 2 #14-gauge (AWG) wire, not to exceed 2,000 feet.
4. Splice connectors: 3M DBR-Y6 splice connectors, 3M Scotchcast #3570G-N Connector seal packs, or Spears DS-100 connectors with DS-300 sealant.

C. 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.

B. Install bubblers with purple caps if system is designed for recycled water.

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 Owner’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 Owner’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 Owner’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.
   5.

D. Controller:
   1. Install as shown in Drawings.
   2. Owner's Representative shall determine final approved controller locations.
   3. Label cabinet door exterior with permanent, minimum 1-inch tall letter or number of controller designations corresponding with designations on the Drawings and Record Documents.
   4. 120 power, pull/splice box, conduit and sweeps from power source to controller shall be provided and installed by an electrical contractor.
   5. All above grade conduit shall be steel electrical conduit.
   6. Affix reclaimed water warning on controller enclosure (as applicable).

E. 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.

F. 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.

G. Tree Bubbler Assemblies:
1. Install in perforated pipe sump as shown on the Drawings.
2. Coordinate installation with planting operations to ensure timely and proper placement of heads.

3.06 FIELD QUALITY CONTROL

A. General:
1. Notify Owner'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 Owner.
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 Owner'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 Owner'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 Owner'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 Owner's Representative.
2. Correct all deficiencies to the satisfaction of the Owner'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 Owner's Representative.

3.09 DEMONSTRATION

A. Instruct Owner'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 Owner'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 Owner'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. Mulch top dress.
   3. Topsoil, as applicable.

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 Owner'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 Owner's Representative immediately of changes in supervisory personnel.

C. Products and materials shall be new, first quality, and acceptable to the Owner'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, sunscald, 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 Owner's Representative will review trees and shrubs before planting for compliance with specified requirements for genus, species, variety, size and quantity. Owner'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 Owner'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 Owner's Representative. Provide proper identification for landscape labor force and vehicles at all times while on site.
   2. Storage: Coordinate with Owner'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 Owner'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 Owner's Representative.
   2. Confine materials to neat piles in areas acceptable to the Owner's Representative.

1.07 FIELD CONDITIONS

A. Planting operations shall not be conducted under the following conditions, subject to the discretion of the Owner'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 wall 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 Owner'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 Owner'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 1.5 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. 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 Amendments: Organic Humus Compost
   1. Fully composted aerobic humus compost without presence of decomposition products. The organic matter content shall be at least 50% on a dry weight basis. Humus material shall have an acid-soluble ash content of no less than 6% and no more than 20%.
   2. The pH of the material shall be between 6% and 7.5%.
   3. The salt content shall be less than 10 millimho/cm @ 25° C in a saturated paste extract.
   4. Boron content of the saturated extract shall be less than 1.0 parts per million.
   5. Silicon content (acid-insoluble ash) shall be less than 50%.
   6. Calcium carbonate shall not be present if to be applied on alkaline soils.
   7. Types of acceptable products are composts, manures, mushroom composts, straw, alfalfa, peat mosses etc. low in salts, low in heavy metals, free from weed seeds, free of pathogens and other deleterious materials.

8. Composted wood products are conditionally acceptable [stable humus must be present]. Wood based products are not acceptable which are based on red wood or cedar.
9. Sludge-based materials are not acceptable.
10. Carbon:nitrogen ratio is less than 25:1.
11. The compost shall be aerobic without malodorous presence of decomposition products
12. The maximum particle size shall be 0.5 inch, 80% or more shall pass a No. 4 screen for soil amending.
13. Maximum total permissible pollutant concentrations in amendment in parts per million on a dry weight basis:

Arsenic	20	Lead	200	Silver	10
Cadmium	15	Mercury	10	Vanadium	500
Chromium	300	Molybdenum	20	Zinc	200
Cobalt	50	Nickel	100		
Copper	100	Selenium	50		

14. Soil Amendments for consideration are listed below:

    a. Soil Amendment: "Super Humus" Compost available from BFI Organics Inc., 1995 Oakland Road, San Jose, CA, 408-262-1401;

    b. "Organic Compost" available from Z-Best Products Inc. 705 Los Esteros Road, San Jose CA, 408-934-6152;

    c. Soil amendment submittal shall include sieve analysis as well as an agronomic soil analysis using a saturation extraction test. prepared by a qualified soil lab. Upon direction of owner's representative, contractor to provide, at contractor's sole cost, updated testing results for review and approval that are dated within 1 month of submittal date and prior to delivery of product to site.

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 BIORETENTION SOIL MIX

A. Bioretention soil mixture in rain gardens shall have the following general characteristics:
   1. Properties of bioretention soil mix:
      a. Consisting of the following mixture, measured by volume:
         1) 60-70% Sand
         2) 30-40% Compost
      b. Supportive of vigorous plant growth
      c. Able to achieve a long-term, in-place infiltration rate of at least 5 in/hr. and no more than 10 in/hr.
   2. Supplier: 'Biotreatment soil mix' by TMT Enterprises. Contact: Matt Moore (408) 432-9040

2.05 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.

B. Non-floating Mulch (for use in Bioretention Areas): 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, consisting of dense wood source that does not float or migrate when inundated with water. "Float resistant Bioretention Mulch" from Zanker Landscape Materials, (408) 586-9292.

2.06 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 Owner'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.

2.07 TURF SOD

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. Sod shall be as follows:
      a. Tahoma 31; West Coast Turf. 888-893-8873
   2. Sod shall have a 3/4 inch cut or thickness.
   3. Sod shall be large roll cut.
   4. Sod shall have a peat or sand / peat base.

C. Source: West Coast Turf, Pacific Sod, Delta Bluegrass, or equal.

2.08 HYDROSEED SLURRY

A. Hydroseed slurry shall contain the following (or acceptable equal), thoroughly mixed and applied per acre. Method for hydroseeding shall be a two-step hydraulic straw treatment as follows:

Step One

Lbs/acre	hydroseed mix
o 2000	Hydro straw™ straw and tack mulch
o 1000	7-2-3 Biosol
o As specified	Tahoma 31
o 60	AM 120 mycorrhizal inoculant

Step Two

Lbs/acre	hydroseed mix
o 2000	Hydro straw™ straw and tack mulch

B. Hydroseed slurry shall contain green dye at a rate common to the industry so that hydroseed coverage can be confirmed visually from a distance.

C. Equipment used for application of hydroseed slurry shall be a commercial type hydro-seeder and have built-in agitation system with an operational capacity sufficient to agitate, suspend and homogeneously mix slurry. Tank capacity shall be a minimum of 1,500 gallons and shall be mounted on a truck to allow access to site. Distribution lines shall be large enough to prevent stoppage and allow for even distribution of slurry over the site. Pump shall be able to generate 150 psi at the nozzle.

D. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below sod.

2.09 HERBICIDES

A. Pre-Emergent: "Ronstar-G" pelletized, "Surflan" liquid, or equal.

B. Other Herbicides: Submit for review and accepted by Owner's Representative prior to use.

2.10 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 Owner'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 testing agency shown below, or as approved by Owner's Representative, for tests.
      1) Testing agencies are as follows:
         a) Wallace Laboratories, El Segundo, CA, (310) 615-0116. Contact: Garn Wallace.
   b. The results of the testing will be reviewed by the Owner 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 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 Owner'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 Owner'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.

3.05 TURF HYDROSEEDING

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 Owner's Representative prior to seed installation.

B. Slurry preparation shall be performed at job site.
   1. Water, mulch, fertilizer and other ingredients shall be added to the tank simultaneously so that the finished load is a homogenous mix of specified ingredients.
   2. Seed shall be added last and shall be discharged in 2 hours.
   3. Slurry held over 2 hours shall be recharged with 1/2 the seed rate before application.
   4. Once fully loaded, the complete slurry shall be agitated for 3-5 minutes to allow for uniform mixing.

C. Apply hydroseed evenly and uniformly over areas to be seeded at rates specified. Apply in a sweeping motion to form a uniform application and form a mat at the specified rates.

D. Seeding shall occur before first germinating rains in the fall.

E. If mixture remains in the tank for more than 8 hours it shall be removed from the job site.

F. Remove or clean areas not intended to receive hydroseed treatment.

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

H. 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 Owner's Representative.

I. 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.

3.06 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 2.5 inches and turf shall be mown to 1 -3/4" inches. Submit written request to the Owner'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. Owner'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 Owner'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. Watering:
   1. Thoroughly water plants immediately after planting.
   2. Construct water basins as specified in Drawings.

G. 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 hyrdoseeded 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 dictate finish grade in planting areas.

3.11 INSTALLATION OF ADDITIONAL MATERIALS

A. Header Board: 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 Owner's Representative.

B. The Owner'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 Owner'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 Owner'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, and connections.
   3. Field testing and disinfection.

B. Related Requirements:
   1. Section 32 11 00 - Base Courses
   2. Section 31 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 Owner.

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 Owner's Representative.

B. Trench excavation and backfilling shall not be executed during excessively wet conditions as determined by the Owner's Representative.

1.10 WARRANTY

A. Contractor: Provide Owner 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 verity that water pressure levels meet the domestic water system requirements. Notify the Owner’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 Owner.

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 Owner.
   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, tested, and has been accepted by the Owner'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 Owner 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 Owner's Representative for review and acceptance.
   3. Furnish two copies of a Certificate of Compliance to the Owner.

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 settlings shall be corrected by the Contractor at no additional cost to the Owner.

F. Install pipe detection tape and reinforced tracer wire above pressurized lines.

3.11 DEMONSTRATION

A. Contractor shall instruct Owner's personnel in complete and proper operation of domestic water system per prior to Contract closeout.

3.12 FINAL REVIEW

A. Provide Owner'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 restroom/buildings.
   2. Sanitary sewerage system installation for drinking fountains.

B. Related Requirements:
   1. Section 31 20 00 - Earth Moving
   2. Section 31 23 00 - Excavation and Fill
   3. Section 32 11 00 - Base Courses
   4. Section 32 32 15 - Landscape Concrete
   5. Section 32 33 00 - Site Furnishings
   6. Section 33 11 00 - Domestic Water Utilities

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. C700 Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated.
   2. D3034: Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

B. American Water Works Association (AWWA):
   1. C110: Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. (76 mm Through 1,219 mm) for Water.
   2. C111: Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
   3. C151: Ductile-Iron Pipe, Centrifugally Cast, for Water.

C. California Plumbing Code, current edition, Sections as specified.

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

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 cleanout 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 Owner'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: 48 inch diameter.
   3. Steps: Manufacturer's standard polypropylene coated steel.
   4. Grade Rings: Precast, sized as required, with grouted joints.
   5. Frame and Cover: Manufacturer's standard cast iron, 24 inches inside diameter. Identification shall conform to City standards.
   6. Base: Manufacturer's precast unit or cast-in-place, at Contractor's option.

2.03 STRUCTURES

A. Clean Outs: As detailed on Drawings and as follows.
   1. Non-Vehicular Travel Areas: Christy "F8" by Oldcastle Precast clean out boxes, or equal.
   2. Vehicular Travel Areas: Christy "G5" Oldcastle Precast clean out boxes, or equal.

2.04 MISCELLANEOUS MATERIALS

A. Crushed Rock: 3/4-inch bedding rock as specified in Section 32 11 00 – Base Courses

B. Mortar: Conform to applicable sections of the Standard Specifications. Mixture shall be a 1:2 Portland cement to sand mixture with a minimum of water.

C. PVC Solvent Cement: Conform to pipe manufacturer's recommendations.

D. PVC Primer: Conform to pipe and solvent cement manufacturer's recommendations.

E. Reinforcing Bars: Refer to Section 32 32 15 – Landscape Concrete.

F. Minor concrete shall comply with Section 32 32 15 – Landscape Concrete and applicable sections of the Standard Specifications.

PART 3 - EXECUTION

3.01 PIPE LAYING

A. General:
   1. The Owner'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 Owner'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 Owner's Representative.

3.02 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.

3.03 SANITARY SEWER CONNECTIONS

A. Sanitary sewer connections to existing sewer mains shall be made watertight, straight, and true to line, grade and "crown to crown" unless noted otherwise.

3.04 FIELD QUALITY CONTROL

A. The Owner'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 Owner's Representative.

3.05 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 Owner'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 pipeline 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 pipeline 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 stopwatch which is allowed to run until the line pressure drops to 2.5 psi at which time the stopwatch is stopped. The time required, as shown on the stopwatch, 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 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. Expansion joints and deflection fittings.
   4. Cleanouts.
   5. Drains.
   6. Channel drainage systems.
   7. Catch basins.
   8. Stormwater inlets.
   9. Pipe outlets.
   10. 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 11 00 – 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. D2321-20: Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
   4. D2412-21: Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
   5. D2729-21: Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
   6. D3034-21: Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
   7. D3350-21: Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
   8. D4101-11: 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, 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 Owner's Representative.

C. Do not interrupt service to facilities occupied or used by Owner without the Owner'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: 4 feet.
   3. Resilient connectors between manhole and piping shall comply with ASTM C923.

B. Precast Catch Basins/Drain Inlets:
   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. Square Basin Product Matrix:

ITEM	DESCRIPTION	MANUFACTURER	MODEL NO.	GRATE INFORMATION
A.	12" Concrete Basin	Oldcastle Precast, or equal. (Contact Number: 888-965-3220)	1212CB	Galvanized Steel cross bars, ADA compliant (pedestrian applications), meeting AASHTO H-20 loading (vehicular applications), locking bolts included
B.	18" Concrete Drain Inlet	Oldcastle Precast, or equal. (Contact Number: 888-965-3220)	DI-1818	Hot-dipped galvanized, ADA compliant (pedestrian applications), ADA compliant meeting AASHTO H-20 loading (vehicular applications), bicycle-proof grates for all applications, locking bolts included.
C.	24" Concrete Drain Inlet	Oldcastle Precast, or equal. (Contact Number: 888-965-3220)	DI-2424	Hot-dipped galvanized, ADA compliant (pedestrian applications), ADA compliant meeting AASHTO H-20 loading (vehicular applications), bicycle-proof grates for all applications, locking bolts included.
D.	36" Concrete Drain Inlet	Oldcastle Precast, or equal. (Contact Number: 888-965-3220)	DI-3636	Hot-dipped galvanized, ADA compliant (pedestrian applications), ADA compliant meeting AASHTO H-20 loading (vehicular applications), bicycle-proof grates for all applications, locking bolts included.
E.	48" Concrete Drain Inlet	Oldcastle Precast, or equal. (Contact Number: 888-965-3220)	DI-4848	Hot-dipped galvanized, ADA compliant (pedestrian applications), ADA compliant meeting AASHTO H-20 loading (vehicular applications), bicycle-proof grates for all applications, locking bolts included.

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. Structure:
      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 Foundry 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. 411QS

K. 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.

L. Drinking Fountain Drain: Square with cast iron body and bronze grate; Z415 Series floor drain Model Z415SH by Zurn, or equal.
1. Size: 8 inches by 8 inches.

2.03 ADDITIONAL MATERIALS

A. Permeable Rock Beneath Synthetic Turf Area: As specified in Section 32 18 14 – Synthetic Turf Base.

B. Drain Rock:

1. Drain Rock shall conform to requirements of Subdrain Trench Drain Rock beneath Synthetic Turf Area: As specified in Section 32 18 14 – Synthetic Turf Base

C. Pea Gravel:
1. Pea gravel shall 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

2. Supplier: Harbor Sand & Gravel, Redwood City, TMT Enterprises, Inc., San Jose; or equal.

D. Sand Bedding for Storm Drain Piping: Sand conforming to Section 19-3.02F(2) of the Standard Specifications.

E. French drains shall have a backfill with one of the following general characteristics:
1. USGA Root Zone Sand,
   a. 65 percent USGA Root Zone sand conforming to the following sieve range:

Sieve Size	USGA Spec
	Individual % Retained
#4 (4.75mm)	0
#10 (2mm)	0-10% Combined
#18 (1mm)	
#35 (0.5mm)	Minimum 60% Combined
#60 (.25mm)	
#100 (.15mm)	20% Maximum
#140 (.1mm)	5% Maximum Combined
#270 (.05mm)	
Silt (.05-.002mm)	5% Maximum
Clay (<.002mm)	3% Maximum

   b. 15 percent Coconut Coir Fiber.
   c. 15 percent AXIS Calcined Diatomaceous Earth.
   d. 5 percent Worm Castings.
2. Supplier: 'Terra Vida French Drain Backfill Mix' by TMT Enterprises. Contact: Matt Moore 408-432-9040

F. Bioretention soil mixture in rain gardens shall have the following general characteristics:
1. Properties of bioretention soil mix:
   a. Consisting of the following mixture, measured by volume:
      1) 60-70% Sand
      2) 30-40% Compost
   b. Supportive of vigorous plant growth
   c. Able to achieve a long-term, in-place infiltration rate of at least 5 in/hr. and no more than 10 in/hr.
2. Supplier: Biotreatment soil mix' by TMT Enterprises. Contact: Matt Moore (408) 432-9040

G. Permeable Filter Fabric : Mirafi 140N, or equal.

H. Filter Fabric Fasteners: Metal clip type staple.

I. Mortar: A 1:2 Portland cement to sand mixture with a minimum of water conform to the applicable sections of the Standard Specifications.

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 31 20 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.

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 Owner'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 watertight 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. Cleanouts: Install as shown in the Drawings.

E. Nyloplast Basins:
   1. For at-grade or raised conditions (in biotreatment areas or similar), Nyloplast risers shall be painted from rim down to 6" below finish grade with UV resistant exterior paint suitable for PVC applications. Contractor shall submit product for approval.
   2. For buried applications in softscape, Nyloplast basin rims/covers shall be minimum 12" below finish grade to allow for proper plant growth.
   3. For buried applications in synthetic turf, install as shown in the Drawings.

F. French Drains: Install per drawings. Contractor shall use a roller to compact the sand to 85-88% compaction and leave the sand in the trench areas ¼-1/2" high to allow for anticipated settling. Should settling of trenches occur as observed by Owner's representative, Contractor shall repair by applying small layers (1/4" max) of sand with a spreader over the affected area twice weekly as necessary to gradually raise the area to match adjacent grades.

G. Trench Drains: Install as shown in the Drawings and in accordance with the manufacturer's written recommendations.

H. 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 Owner'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