San Pedro Elementary School Athletic Field Improvements
498 Point San Pedro Rd R, San Rafael, CA 94901

PROJECT SPECIFICATIONS

50% Submittal

November 1, 2024

PREPARED BY:

VERDE DESIGN

Project No. 2401200

DOCUMENT 00 01 10

TABLE OF CONTENTS

Initial Issue	Current Revision

END OF DOCUMENT

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 78 29

CONFORMANCE SURVEY

PART 1 - GENERAL

1.01 SUMMARY

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

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

1.02 ADMINISTRATIVE REQUIREMENTS

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

1.03 ACTION SUBMITTALS

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

1.04 INFORMATIONAL SUBMITTALS

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

1.05 QUALITY CONTROL AND REWORK

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

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

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

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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 LAYING OUT THE WORK

A. Prior to beginning work, Contractor shall secure the electronic grading plan from the District for use by the Surveyor.

B. The Contractor's Surveyor shall provide all conformance survey drawings. The drawings shall provide both the design elevations and the as-constructed spot elevations. These elevations shall be for comparison to those on the Contract Documents for the same location. Contractor shall also show the difference in these two numbers. Unique reference numbers shall be assigned to each point for reference purposes. For spacing requirements, refer to specific type of improvement identified in this Section.

C. Accuracy of the Contractor's surveys provided under this Section shall be to 0.01 feet.

D. The Contractor's Licensed Surveyor shall provide all conformance survey drawings and all 25-foot grid or other grid conformance grades based on the designed grades shown on the Drawings.

3.02 SYNTHETIC TURF SUBGRADE AND BASE CONFORMANCE SURVEYING

A. General: The stone grades shall not vary from the specified grades more than 1/4-inch (0.02) feet at any location when measured in any direction. In addition, no two adjacent points within the grid shall cumulatively deviate more than 1/2-inch (0.04 feet) from point to point of the design grades.

B. Subgrade:
   1. Contractor shall verify that subgrade has been prepared according to the Specifications with regard to compaction and grade tolerances and is free of debris, non-compactable material, topsoil, or organics prior to beginning work.
   2. Prior to acceptance of the subgrade, a Conformance Survey shall be prepared by the Contractor and a digital file submitted to the District Representative as specified. The survey shall be based on a 20-foot grid showing the field crown, the center of the subgrade elevation of the subdrain trench edges, perimeter of the field at edge finish grade and curb finish surface. The plan shall show the comparison of the design grades versus the as-constructed grades.
   3. Top of subgrade elevations shall be verified using laser-operation survey instruments. Grades at each point shall be within plus or minus 1/2-inch (0.04 feet) from the elevations shown on the Drawings. In addition, no two adjacent points within the grid shall cumulatively deviate more than 3/4-inch (0.06 feet) from the respective points' design grades.

C. Completed Stone Base:
   1. Prior to acceptance of the stone base, a Conformance Survey will be prepared by the Contractor's Surveyor and submitted by the Contractor to the District's Representative as specified.
   2. The survey shall be based on a 25-foot grid showing the field crown, perimeter of the field and adjacent curb edge.
   3. The survey plan shall show the comparison of the design grades versus the as-constructed grades.
   4. A portion of the survey that does not conform to the requirements identified above shall be corrected by the Contractor.

a. Areas out of conformance shall be resurveyed following the identical procedure stated above by the Surveyor, and these revised points shall be added to the original digital file for review and acceptance by the District's Representative.
b. Delays and costs incurred due to grades out of conformance are the sole responsibility of the Contractor.

5. It is the Contractor's responsibility to protect the grading and compaction tolerances of the base after conformance survey is complete and prior to installation of the synthetic turf.

D. Finish surface planarity shall be verified, and if necessary adjusted, by the Contractor using the string line method.
1. A mason's line held taught between two workers separated by a distance of approximately 40 feet shall be placed directly on the finished surface parallel to the direction of greatest slope.
2. A third worker shall check for separations between the mason's line and the finished surface that are equal to or greater than the specified tolerances.
3. Entire finished surface shall be "walked" with mason's line in increments of approximately 3 feet.
4. Areas of separation shall be outlined with marking paint and the depth of separation indicated.

END OF SECTION

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

1.01 SUMMARY

A. Section Includes: Requirements for preparing, maintaining, and submitting the Project Record documents.

B. Related Requirements:
1. Section 32 80 00 - Irrigation
2. Section 33 40 00 - Storm Drainage Utilities
3. [_____]

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.
   e. **[**_____.**]**

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 and salvage of designated items.
   3. Disconnection and capping of existing utility and irrigation lines.
   4. Incidental demolition of abandoned utility and irrigation lines.
   5. Spraying until dead, clearing, grubbing vegetated areas in existing turf areas.
   6. Protection of existing plant material.
   7. 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 District will obtain and pay for all permits required in connection with this work. Fees for the dumping of debris shall be paid for by the Contractor.

1.07 FIELD CONDITIONS

A. Dust Control:
   1. The Contractor shall prevent the formation of airborne dust on and around the project site with the use of sprinkled water or other means acceptable to the District's Representative. Non-compliance with proper dust control measures may be grounds for issuance of a "stop work" order by the District until satisfactory measures are implemented.

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

PART 2 - PRODUCTS

2.01 HERBICIDES

A. Herbicides shall conform to District's approved chemicals list.

B. Herbicide shall be non-selective broad-spectrum systemic herbicide for perennial vegetation and straight contact herbicide for annual vegetation in accordance with a licensed pest control advisor or herbicide manufacturers' recommendations.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Conform to applicable requirements of Section 01 45 00 - Quality Control.

B. Carefully identify limits of demolition and site clearing.

C. Mark project areas in coordination with the District's Representative and as necessary to clearly identify the interface of items to be removed and items remain.

3.02 PREPARATION

A. Protection:
   1. Make provisions and take necessary precautions to protect all existing items not designated for removal. An existing item or area damaged during construction operations shall be replaced or repaired to an "as-was" or better condition at no additional cost to the District and subject to the acceptance of the District's Representative.
   2. Erect barriers, fences, guard rails, enclosures, chutes, and shoring as necessary to protect personnel, structures, and utilities to remain.
   3. Provide warning signs and lighting as necessary for vehicular and personnel protection. Maintain warning signs during construction as required by applicable safety ordinances and as reasonably prudent.
   4. Coordinate arrangements for items to be salvaged and turned over to the District.
   5. Notify Underground Service Alert (USA), (800) 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 District's Representative or governing authorities as applicable.
   3. Provide approved alternate routes around closed or obstructed traffic ways as required by the District's Representative.
   4. Maintain access to adjacent existing buildings to ensure uninterrupted operations during demolition work.

3.03 DEMOLITION

A. General: Refer to the Drawings for extent of demolition and site clearing work.

B. Paving: Demolish paving in accordance with local noise ordinance regulations and as acceptable to the District's Representative.

C. Filling:
1. Completely fill below-grade areas and voids resulting from demolition work.
2. Install appropriate, acceptable fill material consisting of soil, gravel, or sand, free of trash and debris, stones over 6-inch diameter, roots, or other organic matter. Meet fill and compaction requirements specified and recommended by the District'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 District's Representative in written, accurate detail. Pending receipt of response from District's Representative, rearrange selective demolition and site clearing schedule as necessary to continue overall job progress without delay.

3.04 CLEARING AND GRUBBING

A. Mow all existing turf areas to a height of 1 inch and remove cuttings.

B. Prior to site clearing, existing vegetation 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.

C. Allow a sufficient period of time to ensure that all sprayed vegetation is dead. Refer to manufacturer's recommendations.

D. Irrigation heads, valves, and controllers shall be salvaged and provided to District.

E. 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.

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

G. Utilities and Related Equipment:
1. The locations of existing utilities, as may be shown on the Drawings, are approximate. Should existing utilities not shown on the Drawings be encountered during construction operations, notify the District's Representative immediately, and re-direct work to avoid delay. The District's Representative will then determine what action, if any, is required.
2. Remove abandoned utilities as indicated and as uncovered by the work and terminate in a manner conforming to code.
3. Remove and salvage designated items and related equipment and deliver to a location acceptable to the District's Representative.

H. Underground Piping:
1. Existing storm drain and irrigation systems, as may be shown on the Drawings, shall be modified to allow for construction of new items and systems as a part of this project. Caution shall be exercised so as not to damage underground piping not scheduled for removal.
2. Remove underground piping as indicated or necessary and backfill to specified compaction density.

3. Existing piping abandoned but not removed shall be backfilled with slurry fill (grout), and ends shall be capped with concrete.
4. Manholes and lines scheduled for removal which connect to active systems shall have their active remaining portions capped, plugged, or blind-flanged as appropriate.
5. Materials used for pipe terminations and temporary connections shall be the same as the existing lines. Fittings and flanges shall be of weight and class suitable for the service in which used.

3.05 SALVAGE

A. Demolition:
1. Materials or equipment to be demolished shall become the property of the Contractor except for items specified or noted on the Drawings to be salvaged for the District.
2. Carefully remove items to be salvaged to avoid damage.
3. Irrigation heads, valves and existing controller shall be salvaged and provided to District. Contractor shall clean and box items. Items shall be returned to District in accordance with instructions provided by the District.

B. Replacement: In the event items not scheduled to be demolished are damaged, promptly replace or repair such items to an as-was or better condition per the discretion of the District's Representative at no additional cost to District.

C. Materials scheduled for removal shall not be placed on view to prospective purchasers or sold on site.

3.06 CLEANING

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

END OF SECTION

SECTION 09 91 15

EXTERIOR SITE PAINTING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Painting and painter's finish on site and landscape improvements, except prefinished items and unless otherwise noted, as required to complete finishing of the Work. The Work includes the following specific items:
      a. Field painting for fencing.

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. Other Surfaces: Prepare on hardboard, 8 inches square.
   3. Each sample shall have stepped finish, clearly showing each coat and build-up of specified finish. Submit separate samples for each required gloss level.
   4. Resubmit samples as requested until required sheen, color, and texture are achieved.
   5. 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 District'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 District's Representative, of first finished item of each finish type or color scheme required for color, texture, and workmanship.
   2. Modify selected colors, if requested by District's Representative, to achieve desired effect.
   3. 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 District's Representative, in writing, of any anticipated problems arising from using specified coating systems with substrates primed by other Sections.

1.07 DELIVERY, STORAGE, AND HANDLING

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

B. Store materials in tightly covered containers. Maintain containers in a clean condition, free of foreign materials and residue.

C. Store materials at ambient temperature of between 45 degrees F minimum and 90 degrees F maximum, in a well-ventilated area.

D. Ensure that storage area is neat and orderly.

E. Take precautionary measures to prevent fire and health hazards.

1.08 FIELD CONDITIONS

A. Ambient Conditions:
   1. Comply with manufacturer's recommendations as to environmental conditions under which coatings and coating systems can be stored and applied.
   2. Do not apply finish in areas where dust is being generated.

B. Cover or otherwise protect in progress and finished work of other trades, and surfaces not being painted concurrently or not to be painted.

1.09 WARRANTY

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

1.10 EXTRA MATERIALS

A. At completion of the Work, deliver to District extra stock of paint of each color used in each coating material used.

B. Containers shall be full, tightly sealed, and clearly marked.

C. Provide the following quantities:
   1. Field Colors: One 5-gallon container.
   2. Accent Colors: One 1-gallon container.

PART 2 - PRODUCTS

2.01 MANUFACTURERS AND PRODUCTS

A. Products are specified under "Paint Systems" in Part 3 below and are manufactured by Kelly-Moore Paints, unless otherwise indicated. Equivalent products manufactured by PPG, Benjamin Moore, Sherwin-Williams, or Dunn-Edwards are acceptable.

B. Materials selected for coating systems for each type surface shall be the product of a single manufacturer or shall be acceptable to manufacturer of finish coating for system.

C. If more than one quality level of product type is marketed, use material of highest quality.

2.02 COLORS

A. Colors shall be as scheduled on the Drawings. Scheduled colors may have manufacturer identifications other than the acceptable manufacturers listed above. The Drawing listing is solely for the purpose of conveying color information and does not imply manufacturer's approval or waiver of the requirement that all coatings be from the same manufacturer, unless a specific system is not available from the primary manufacturer.

B. Submit samples of selected colors as specified in Part 1 above.

C. Colors of paints, including shades of stain, shall match color chips on schedule.

2.03 MIXING AND TINTING

A. Deliver paints and stains ready mixed to jobsite.

B. Accomplish job mixing and job tinting only if required for adjustment to finish applied to field test areas to achieve color acceptable to District's Representative.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine surfaces scheduled to receive paint and finishes for conditions that will adversely affect execution, permanence, or quality of work and that cannot be put into acceptable condition through preparatory work as included in Article 3.02, "Preparation."

B. Do not proceed with surface preparation or coating application until conditions are suitable.

3.02 PREPARATION

A. General:
   1. Verify that surfaces to be painted are dry, clean, smooth, and free from deleterious materials.
   2. Protect hardware, exposed metals, and other surfaces that are not to be painted by masking, removal, or other means to ensure a neat job.

B. 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.

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

3.03 FACTORY FINISHING AND PRIMING

A. Pertinent Work and Requirements Specified Elsewhere: Review all Sections for products that are to be factory finished or factory (shop) primed.

B. Touch-up: Touch up abrasions in prime coat immediately after products arrive on jobsite and as required prior to application of finish coats.

3.04 APPLICATION

A. Do not apply initial coating until moisture content of surface is within limitations recommended by paint manufacturer.

B. Application:
1. Apply paint with suitable brushes, rollers, or spraying equipment.
2. Guardrails and other exposed metal requiring field finish painting shall be sprayed to the fullest extent conditions will permit. If brush or roller application is used, surface finish shall be subject to review by the District's Representative for complying with the appearance requirements specified herein.
3. Apply coatings in accordance with manufacturer's recommendations.
4. Rate of application shall be within limits recommended by paint manufacturer for surface involved.

C. Spray-Gun Application - Standard Coatings:
1. Spray-apply standard paints only with airless sprayer.
2. Apply in fine, even spray, without addition of thinner, using nozzle pattern suitable to surface being painted.
3. When necessary, follow by brushing to ensure uniform coverage and to eliminate wrinkling, blistering, and air holes.
4. If spraying becomes detrimental to equipment or objectionable to personnel, brush painting will be required.

D. Comply with recommendation of product manufacturer for drying time between succeeding coats.

E. Finish coats shall be smooth and free from brush marks, streaks, laps or pileup of paints, and skipped or missed areas.

F. Leave all parts of moldings and trim clean and true to details with no undue amount of paint in corners and depressions.

G. Make edges of paint adjoining other materials or colors clean and sharp, with no overlapping.

H. Refinish whole area where portion of finish is not acceptable.

3.05 CLEANING

A. Touch up and restore finish where damaged.

B. Remove spilled, splashed, or spattered paint from all surfaces. Do not mar surface finish of item being cleaned.

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

3.06 PAINT SYSTEMS

A. General:

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

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

C. Gloss and Sheen Ratings: It is recognized that manufacturer's use various identifiers for the sheen of their paints. The sheen rating of applied paint, therefore, shall be identified as a Gloss Level and generally fall within the following limits established by the Master Painters Institute, Inc. (MPI) Standards and ASTM D523. Not all of the Gloss Levels are necessarily scheduled or used on this Project.
1. Gloss Level 1: Matte or Flat; not more than 5 units at 60 degrees and 10 units at 85 degrees.
2. Gloss Level 2: Velvet or Low Sheen; not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees.
3. Gloss Level 3: Eggshell; 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees.
4. Gloss Level 4: Satin; 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees.
5. Gloss Level 5: Semi-gloss; 35 to 70 units at 60 degrees.
6. Gloss Level 6: Gloss; 70 to 85 units at 60 degrees.

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

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

4. Hyphenated suffix identifies the topcoat gloss levels.

E. Exterior Painting Systems:

EXT 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 5.1H-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.

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 60 calendar days.

B. Continuously maintain the entire project area during the progress of the work, during the specified Landscape Maintenance Period or until Final Acceptance of the project by the District's Representative.

C. Landscape Maintenance Period shall not start until all elements of construction, planting and irrigation for the entire project are completed in accordance with Contract Documents. A prime requirement is that turf and landscape areas shall be planted and that turf areas shall show an even, healthy stand of "sod-like" turf which shall have been mown twice. If such criteria are met to the satisfaction of the District's

Representative, a written notification shall be issued to establish the effective beginning date of Landscape Maintenance Period. Additionally, elements included in the Pre-maintenance Punch-list shall have been completed to the satisfaction of the District's Representative. The Landscape Maintenance period shall, at the discretion of the District's Representative, be allowed to start and finish at different times in different areas as applicable.

D. A day of improper maintenance, as determined by the District's Representative, shall not be credited as an acceptable Landscape Maintenance Period day. The Landscape Maintenance Period shall be extended on a day-for-day basis should this occur until proper maintenance, as determined by the District's Representative, is being performed.

E. Contractor shall secure the project site against trespass, vandalism, and theft during the Landscape Maintenance Period. Security procedures shall be coordinated with the District's Representative.

1.07 GUARANTEE

A. All work executed under this section shall be guaranteed against any and all poor, inadequate or inferior materials and/or workmanship, as determined by the District's Representative, for the entire Landscape Maintenance Period and for a period of one year after Final Acceptance of project.

B. The Contractor shall install all replacement material in conformance with the Contract Documents.

1.08 FINAL ACCEPTANCE

A. Upon completion of all project work, including Landscape Maintenance Period, the District's Representative will, upon written request from the Contractor (2 working day minimum notice), make an observation to determine conformance with the Contract Documents.

B. If, at the final project observation, work is found at variance with the Contract Documents, or is otherwise unacceptable, the District's Representative shall issue a punch-list of items requiring attention to the Contractor. The Contractor shall repair, replace, or otherwise correct all non-compliant work, continue Landscape Maintenance Period, and make another written request to the District's Representative to verify punch-list completion. If punch-list is found to be incomplete, or if site is still found to be unacceptable, the Contractor shall be back-charged as necessary for 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 District's Representative with all Record Drawings and written Guaranty Statements in accordance with the Contract Documents.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials used shall either conform to Specifications in other Sections or shall otherwise be acceptable to the District's Representative. The District's Representative shall be given a monthly record of all herbicides, insecticides and disease control chemicals used.

B. Maintenance Fertilizer: "Gro-Power High Nitrogen" as available through Gro-Power, Inc., 800-473-1307, or accepted equal, and shall contain the following chemical analysis:

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

C. Humus: Inactive, decomposed organic material approved by District's Representative.

PART 3 - EXECUTION

3.01 MAINTENANCE

A. General: Proper maintenance, including watering, weeding, mowing, edging, fertilization, repairing, and protection is required until Final Acceptance of the entire project but not less than the specified Landscape Maintenance Period.

B. Watering: Water appropriately for each plant type to insure vigorous and healthy growth until work is accepted. Water or irrigate in a manner to prevent runoff or erosion. When hand watering, use a "water wand" to break the water force.

C. Weeding: Entire project site shall be kept free of weeds at all times. Control new weed growth with pre-emergent herbicides. If weeds develop, use legally approved herbicides.
   1. No herbicide shall be used without the District's Representative prior consent. Use herbicides in accordance with manufacturer's recommendations. If selective herbicides are used, extreme caution shall be observed so as not to damage other plants. Spraying shall only be done under windless conditions.
   2. Disease and Pest Control: Disease and insect damage shall be controlled by the use of fungicides and insecticides, subject to the prior consent of the District's Representative. Mole and gopher mitigation shall be accomplished using legal means other than poison baits.

D. Pruning:
   1. Trees: Prune trees to select and develop permanent scaffold branches; to eliminate narrow V-shaped branch forks that lack strength; to reduce potential toppling and wind damage by thinning out crowns; to maintain a natural appearance; and to balance crown with roots. Prune only as directed by the District's Representative.
   2. Shrubs: The objectives of shrub pruning are the same as for trees. Shrubs shall not be clipped into balled or boxed forms unless such is required by the design.
   3. All pruning cuts shall be made to lateral branches, buds or near flush with the trunk. "Stubbing" or heading cuts is not permitted.
   4. Only skilled workers shall perform pruning work in accordance with standard horticultural pruning practices. Remove from the project all pruned branches and material. Remove and replace plant material excessively pruned or malformed resulting from improper pruning practices at no additional cost to the District.

E. 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.

F. Protection: The Contractor shall maintain protection of planting areas until Final Acceptance. Damaged areas shall be repaired or replaced at the Contractor's expense. Install a temporary maintenance fence using 4-foot blaze orange with steel driven stakes, or acceptable equal, around all turf areas for the entire length of Landscape Maintenance Period.

G. Trash: Remove trash in all project areas plus adjacent pedestrian walkways and parking areas for the entire length of Landscape Maintenance Period.

H. Replacement: Refer to the Article "Guarantee" in Part 1.

3.02 IRRIGATION SYSTEM

A. System Observation: The Contractor shall visually check all systems for proper operation on a weekly basis and make necessary repairs. Equipment shall be adjusted as necessary for proper coverage and function.

B. Controllers: Program automatic controllers for appropriate seasonal water requirements. Perform a full instruction session in the presence of the District's designated maintenance personnel demonstrating programming, system testing, and trouble shooting. Include instructions on how to turn off system in case of emergency.

C. Repairs: Repairs made to the irrigation system shall be at the Contractor's expense. Repairs, when required, shall be made within 24 hours of discovery by either District or Contractor.

3.03 FIELD QUALITY CONTROL

A. Final Review:
   1. At, or near the end of specified Landscape Maintenance Period, the Contractor shall make a written request for a final review and the work shall be reviewed for conformance with the Construction Documents.
   2. If the work is not accepted at time of review, a punch-list of items requiring attention will be prepared by the District's Representative and issued to the Contractor for correction.
   3. The Landscape Maintenance Period shall be extended at Contractors sole cost, as necessary.
   4. Upon completion of the punch-list, the Contractor shall again make written request for review. If, upon re-visiting the site, it is found that the punch-list has not been completed, the review shall end and a subsequent visit shall not be scheduled until the Contractor can assure the District 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 District's Representative, a statement of Final Acceptance shall be issued to the Contractor.

END OF SECTION

SECTION 31 20 00

EARTH MOVING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Site excavation and backfilling as shown on the Drawings including, but is not necessarily limited to, the following:
   1. Topsoil stripping, stockpiling, and replacement into planting areas.
   2. Rough grading.
   3. Filling and backfilling to attain required grades.
   4. Excavating for paving, footings, and foundations.

B. Related Requirements:
   1. Section 01 33 00 - Submittal Procedures
   2. Section 01 71 23 - Field Engineering
   3. Section 01 78 39 - Project Record Drawings
   4. Section 02 41 13 - Site Clearing and Demolition
   5. Section 31 23 00 - Excavation and Fill
   6. Section 32 01 90 - Existing Tree Protection and Maintenance
   7. Section 32 11 00 - Base Courses
   8. Section 32 90 00 - Planting

1.02 REFERENCES

A. California Building Code (CBC).

B. American Society for Testing and Materials (ASTM):
   1. D 1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.

C. California Occupational Safety and Health Standards (OSHA):
   1. Article 6 - Excavations and Shoring.

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

1.03 ADMINISTRATIVE REQUIREMENTS

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

1.04 CLOSEOUT SUBMITTALS

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

1.05 ACTION SUBMITTALS

A. Import Topsoil:

1. It is the Contractor's responsibility to determine if import topsoil is required on the Project.
2. If required, Contractor shall submit four 1/2-pound samples in nominal 1 quart-sized "zip-lock" plastic bags for each proposed import topsoil. Each sample shall include current accompanying fertility and structure analyses prepared by a recognized soil and plant laboratory.

1.06 QUALITY ASSURANCE

A. Adhere to requirements, recommendations, and Best Management Practices (BMPs) for storm water management as may be outlined in the Project Storm Water Pollution Prevention Plan (SWPPP) prepared for this project, or as required by governing agencies.

B. Geotechnical Investigation:
1. A Geotechnical Report has been prepared for use on this Project. The recommendations contained therein have been incorporated into the Contract Documents.
2. Accuracy, sufficiency, and competency of Geotechnical Report are not ratified by the District or its design consultants and remain the sole responsibility of Geotechnical Engineer.
3. The Geotechnical Report is available from the District.
4. Unless otherwise specified or indicated on the Drawings, it is intended that all work shall be done in accordance with applicable provisions of the Geotechnical Report.

C. The District may retain the services of the Geotechnical Engineer to make recommendations based on the soil conditions encountered the results of field and laboratory tests, and observations of the activities performed under this Section.
1. If, in opinion of the Geotechnical Engineer, work performed does not meet technical or design requirements stipulated, the Contractor shall make necessary readjustments to the approval of the Geotechnical Engineer.
2. No deviations from the Contract Documents shall be made without specific and written acceptance of the District's Representative.
3. In event of conflict between the Specifications and recommendations contained in Geotechnical Report, the District's Representative and Geotechnical Engineer shall be notified.
    a. Contractor shall follow clarification and interpretation issued through the District's Representative at no extra cost to the District.
    b. If clarification or interpretation should change scope of work, there will be mutually agreed-to adjustment in the Contract price by written Change Order.
4. The Geotechnical Engineer will not inspect the Contractor's safety measures.

D. Compaction densities specified for structural fills under footings, slabs, or pavements shall be determined in accordance the Geotechnical Engineer's written recommendations.

E. Certification:
1. The Contractor shall certify source and type of backfill and topsoil proposed to be incorporated into the work, at the request of the District's Representative.
2. The Contractor shall certify elevations of excavations, footings, subgrades, and finish grades with the use of a Licensed Surveyor, at Contractor's expense, at the request of the District's Representative.

F. Control of Work: Conform to Section 5 of the Standard Specifications.

G. Control of Materials: Conform to Section 6 of the Standard Specifications.

1.07 PROTECTION

A. Protect all existing structures, fences, roads, sidewalks, paving, curbs, and other items as necessary from earthwork activity.

B. Protect above or below grade utilities which are to remain.

C. Protect trees to remain in accordance with Section 32 01 90 - Existing Tree Protection and Maintenance as applicable.

D. Repair damage to any existing site features which are to remain. Repair and restoration shall be equal to quality and appearance of prior condition and to the satisfaction of the District's Representative.

1.08 FIELD CONDITIONS

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

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

C. Contractor shall provide de-watering equipment as required to continue scheduled operations and provide optimum working conditions at no additional cost to District.

D. Dry Conditions: Contractor shall apply sufficient water to materials during construction to properly compact materials and control dust. Contractor shall provide dust control in conformance with Section 10 of Standard Specifications and shall provide water to subgrades as necessary to achieve compaction goals.

1.09 GRADE STAKES AND LINES

A. Grading and subgrading shall be controlled by Contractor-installed intermediate grade stakes and lines necessary to obtain the finished grade elevations shown or implied in the Drawings. Subgrade and finish grade surfaces shall conform to the control planes established by these grade stakes and lines.

B. Protect and maintain all existing 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 District's Representative a minimum 2 working days' notice when staking and layout is scheduled so that a review of completed chalk lines and staking can take place.

1.11 TOLERANCES

A. Refer to related specification sections for grading tolerances of specified improvements.

PART 2 - PRODUCTS

2.01 PERFORMANCE CRITERIA

A. Excavations shall not exceed plus or minus 1/10-foot variation from dimensions and elevations shown or noted, unless otherwise accepted by District's Representative.

B. Grading Tolerance: Refer to related specification sections for grading tolerances of specified improvements.

2.02 MATERIALS

A. Fill Material: Soil excavated from the site or imported conforming to requirements for fill material contained in applicable portions of Division III Grading, Section 19 - Earthwork of the Standard Specifications, unless modified by recommendations for fill material contained in the Geotechnical Report. Imported fill shall be approved by the Geotechnical Engineer before importation to the site.

B. Topsoil: Excavated material from top 6 inches maximum of existing grade at unpaved areas and/or import material graded free of roots and rocks larger than two inches, subsoil, debris, weeds, large mats of grass, and other deleterious material. Topsoil shall be approved by the District's Representative and comply with the additional requirements specified in Section 32 90 00 - Planting.

C. Subsoil: Excavated material below top 6 inches of existing grade, graded free of clay clods larger than 6 inches, rocks larger than 3 inches, and debris.

D. Permeable Fills: As specified in Section 32 11 00 - Base Courses and conforming to recommendations for granular fill in the Geotechnical Report.

E. Water: Clean and free from deleterious amounts of acids, alkalis, salts, and organic matter.

F. Additional Materials: 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 District's Representative. Notify District's Representative of discrepancies prior to start of work and re-direct work to avoid delay.

C. Identify all known below grade utilities. Stake and flag locations.

D. Identify and flag surface grades and utilities.

E. Contact Underground Service Alert (USA), 800-642-2444, and local utility companies to verify locations of existing utilities a minimum of 5 working days prior to excavation.

3.02 PROTECTION

A. Maintain and protect existing utilities remaining which pass through work area.

B. Perform excavation work near utilities by hand. Provide necessary protection as the work progresses.

C. Provide and maintain protection for walks, curbs, drains, trees, corners of structures, and other improvement, as necessary to prevent damage.

D. Barricade and/or cover open excavations occurring as part of this work and post with warning lights to the satisfaction of the District's Representative. Operate warning lights during hours from dusk to dawn each day and as otherwise required.

E. Keep adjacent properties, streets and drives clean of any dirt, dust, or stains caused by earthwork operations.

F. Upon discovery of unknown utility or concealed conditions, notify the District's Representative immediately and re-direct work to avoid delay.

G. Control dust on and near the work, and on and near off-site borrow areas.
   1. Thoroughly moisten surfaces as required to prevent dust from being a nuisance to the public, neighbors, and concurrent performance of any other activities that may occur on the site.
   2. Non-compliance with proper dust control measures will be cause for issuance of a "stop work" order by the District until such time as satisfactory measures can be implemented.

3.03 TOPSOIL EXCAVATION

A. Excavate topsoil from areas scheduled for paving or rough grading and stockpile material in neat wind-row(s) and in location(s) previously established and accepted in coordination with the District's Representative and which will cause least interference to construction operations.

B. Do not excavate topsoil that has become wetted to, or beyond, the saturation point that would be required for optimum compaction.

C. Stockpile topsoil in wind-row(s) of a height not to exceed 8 feet, protect from erosion, and cover as necessary to prevent formation of dust.

D. Topsoil staging areas shall be clearly defined and protected from other grading and utility operations.

3.04 ROUGH GRADING

A. Grade site subsoil to establish proper subgrade elevations and site contouring as described or implied in the Drawings:

B. Contouring:
   1. Construct landforms depicted in the Drawings to the satisfaction of the District's Representative.
   2. "Round-off" tops of slopes.
   3. "Feather" toes of slopes.

C. Compaction: Compact subgrade for the specific areas as follows unless otherwise noted:
   1. Areas to be Planted: Maximum 8-inch loose lifts to be between 85 percent and 88 percent relative compaction.
   2. Areas to be Paved:
      a. Maximum 8-inch loose lifts to at least 95 percent relative density.
      b. Additional lifts should not be placed if the previous lift did not meet the required density, relative compaction, moisture content or if the soil conditions are not stable. The top 12 inches shall be compacted to at least 95 percent relative compaction.
      c. Fill soils shall be compacted to no less than 90 percent relative compaction at moisture content of 2 to 4 percent for pavement area.

d. Compacted subgrade should be non-yielding under construction traffic, including a loaded ten-wheel truck such as a water or dump truck, in all pavement areas. Removal and subsequent replacement of some material (i.e. areas of excessively wet materials, unstable subgrade, or pumping soils) may be required to obtain the minimum 95 percent compaction to the recommended depth of 12 inches.
e. Subgrade preparation for pavement areas shall extend laterally for at least two feet beyond the edge of pavement.

3. Areas to Receive synthetic Turf: Shall be as follows:
   a. Maximum 8-inch loose lifts to at least 90 percent relative density. The top 12 inches shall be compacted to at least 95 percent relative compaction.
   b. Additional lifts should not be placed if the previous lift did not meet the required density, relative compaction, moisture content or if the soil conditions are not stable.
   c. Fill soils shall be compacted to no less than 90 percent relative compaction at moisture content of 2 to 4 percent for pavement area.
   d. Compacted subgrade should be non-yielding under construction traffic, including a loaded ten-wheel truck such as a water or dump truck, in all pavement areas and synthetic turf subgrade areas. Removal and subsequent replacement of some material including areas of excessively wet materials, unstable subgrade, or pumping soils, may be required to obtain the minimum 95 percent compaction to the recommended depth of 12 inches.

D. Remove all excess subsoil material from site and dispose of in a legal manner. Refer to "Material Storage" below.

E. Entire project or individual field area shall be rough graded at one time. No earthwork operation shall occur for partial field areas without receiving direction from the District or prior written approval from the District.

3.05 EXCAVATION

A. Remove and dispose of all miscellaneous materials encountered when establishing required grade elevations:
   1. Miscellaneous materials can include but are not limited to: pavements and other obstructions, underground structures, utilities, abandoned irrigation materials, and other materials encountered per the discretion of the District's Representative.

B. Stability of Excavations:
   1. Comply with any applicable recommendations contained within the Project Geotechnical Report and requirements of agencies having jurisdiction.
   2. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

C. De-watering: Provide and maintain, at all times during construction, ample means and devices with which to promptly remove and properly dispose of water from any source entering structural excavation, pipe trenches, or other excavations. All costs incurred from de-watering activities shall be paid for by the Contractor.

D. Excavation for Structures: Conform to elevations and dimensions shown in the drawings within a tolerance of plus-or-minus 1/10 (0.10) of a foot, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete form-work, installation of services, and quality review.

E. Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations, and grades as shown in the Drawings.

F. Material Storage:
   1. Stockpile satisfactory excavated materials where appropriate, until required for use.
   2. Stockpile topsoil and subgrade soil in separate piles.

3. Place, grade, and shape stockpiles for proper drainage.
4. Locate and retain stockpiles away from edge of excavations.
5. Dispose of excess soil material in a legal fashion after it has become evident that the material is no longer needed on the project and is of no value to the District.

3.06 TOPSOIL PLACEMENT

A. Thoroughly cross-rip all subgrade soil to a depth of 12 inches prior to placing the specified thickness of topsoil back into all applicable planting areas. Secure review and acceptance of ripping depth prior to placement of topsoil. Refer to Section 32 90 00 - Planting for this process.

B. Topsoil placement requirements for planting areas shall be as follows:
   1. Planting Areas: A minimum of 6 inches of clean, acceptable topsoil.
   2. Topsoil shall not be placed until all earthwork and utility operations are complete.
   3. Topsoil shall be installed at one time for entire project or entire field area. No partial placements shall occur.

C. Compact topsoil to 84 percent to 89 percent relative density.

D. Maintain slopes and gradients established during subgrade operations and shape landforms to satisfaction of the District's Representative.

E. Refer to Section 32 90 00 - Planting for finish grading information and finish grades at edge of planting areas and hardscape.

3.07 FIELD QUALITY CONTROL

A. Tolerances: Conform to Conform to Section 19 of the Standard Specifications, unless more stringent requirements in these Contract Documents are provided, in which place the more stringent tolerances shall govern. Refer to Section 01 71 23 - Field Engineering for additional project requirements.

B. The District Representative shall review and accept work at the following stages:
   1. Topsoil removal and stockpile.
   2. Grading plan for project. Plan shall provide strategy for grading sequence for entire site at one time or by field. Limits and sequence shall be reviewed and coordinated.
   3. Cross ripping of subgrade shall be reviewed and observed.

END OF SECTION

SECTION 31 23 00

EXCAVATION AND FILL

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Trenching, backfilling, and compaction required for, but not necessarily limited to, the following:
   1. Storm drainage system installation.
   2. Irrigation system installation.
   3. 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 40 00 - Storm Drainage Utilities

1.02 REFERENCES

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

1.03 SEQUENCING AND SCHEDULING

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

1.04 CLOSEOUT SUBMITTALS

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

1.05 QUALITY ASSURANCE

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

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

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

1.06 FIELD CONDITIONS

A. Wet Conditions: No trenching shall occur when excessively wet conditions exist in the opinion of the District's Representative.

B. Dry Conditions: Contractor shall provide dust control in conformance with Section 10 of Standard Specifications and shall provide water to work as necessary to achieve compaction goals.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: Materials shall be free of debris, roots, wood, scrap material, vegetative matter, refuse, soft unsound particles, or other deleterious and objectionable materials.

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

C. Backfill for 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 District'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 District's Representative to clear the existing utility.

3.02 TRENCH EXCAVATION

A. General:
1. Excavation shall include removal of water and materials that interfere with construction. Remove water which may be encountered in the trench by pumping or other methods prior to pipe laying, bedding and backfill operations. Trenches shall be sufficiently dry to permit proper jointing and compaction.

2. Contractor is responsible for directing vehicular and pedestrian traffic safely through or around the work area at all times.
3. The Contractor shall relocate, replace, reconstruct or repair, to an "as-was" or better condition, surface or subsurface improvements which are in the line of construction or which may be damaged, removed, disrupted or otherwise disturbed by the construction activities. Except as specified in other Sections or shown in the Drawings, this provision applies to all surface improvements of whatever nature such as walls, fences, above-grade utilities, landscaping, paving, structures, or other physical features whether shown in the Drawings or not and to all subsurface improvements such as utilities which may be indicated in the Drawings or marked in the field. The Contractor shall connect modified utilities to existing systems and leave work in an operating condition. The cost of this work shall be considered as included in other items of work and no additional compensation will be allowed.
4. The maximum allowable trench width at the top of pipe shall be 18 inches greater than the pipe diameter.
5. New utility trenches extending deeper than 2 feet below finish grade should be located a minimum of 5 feet away from footings and foundations.

B. Existing Paving Areas:
1. Existing asphalt paving over new trenches shall be sawcut, removed, and legally disposed. Existing asphalt paving shall be neatly sawcut 1 foot greater on each side than the trench width. If a longitudinal pavement joint or edge of pavement is located within 3 feet of the limit of excavation, intervening pavement shall be removed and replaced after completion of backfilling. If curb, gutter, or similar concrete improvement are to be replaced, the adjacent existing asphalt paving shall be sawcut 2 feet from the edge of concrete.
2. Existing Portland cement concrete paving over new trenches shall be sawcut to a minimum depth of 1-1/2 inches in straight lines either parallel to the curb or at 90-degree angles to the alignment of the sidewalk prior to being broken out. No section to be replaced shall be smaller than 30 inches in either length or width. If the sawcut would fall within 30 inches of a construction joint, expansion joint, or edge, or within 12 inches of a score mark, the concrete shall be removed to the joint, edge, or mark.

C. Walkway Areas:
1. Backfill for trenches or other excavations within walkway areas should be compacted in 6-inch maximum layers, unless otherwise noted, with hand-held tampers to assure adequate subgrade support.

D. Compacted Fill Areas:
1. Where trenches are to be excavated in compacted fill, these trenches shall be backfilled with the fill materials excavated and re-compacted in the layers and to the density specified for the particular area.

E. Open Trench:
1. No trench shall be left in an open un-protected condition at the end of the day. At the end of the day, open trenches shall be protected in a manner acceptable to the District's Representative.
2. Provisions for trench crossings and access shall be made at all street crossings, driveways, water gate valves, and fire hydrants unless otherwise acceptable to the District's Representative.

F. Excavated Material:
1. Excavated material not required for backfill or of value to the District shall be removed and legally disposed of by the Contractor at no additional cost.
2. Material excavated in streets and roadways shall be laid alongside the trench no closer than 2 feet from the trench edge and kept trimmed to minimize inconvenience to public traffic.
3. Provisions shall be made whereby all storm and waste water can flow uninterrupted in gutters or drainage channels to drainage structures.
4. Excavated material shall not be stored on existing landscaping or paving without provisions being made to protect the surface below from being stained or otherwise adversely affected.

G. Shoring
1. Should excavations extend more than 4 feet below existing ground surface, shoring will be required.
2. For trenching greater than 4 feet deep side slopes are not to exceed 1-1/2: 1 with a depth of 20' max.
3. When trenching greater than 4 feet deep, provide a trench box or shield approved by a PE or designed with accompanying tabulated data approved by a PE.
4. Provide shoring, bracing, or underpinning when trenching next to adjoining walls, sidewalks, or pavements. There shall be no trenching below the base or footing of a foundation that can reasonably expected to pose a hazard to workers unless one of the mentioned support systems is used.
5. Follow OSHA standards for maintaining, installing, and removing support systems.
6. Utility trenches shall be excavated according to accepted engineering practices following OSHA.

3.03 PIPE BEDDING

A. Stabilization of Trench Bottom:
1. When the trench bottom is unstable due to wet or spongy foundation, trench bottom shall be de-watered as necessary. The District's Representative will determine the suitability of the trench bottom and the amount of sand, gravel, or crushed rock needed to stabilize the soft foundation.

3.04 TRENCH BACKFILL AND COMPACTION

A. General:
1. Construct backfill in two operations, initial and final.
2. Do not backfill where the foundation material in trench is already saturated, except as acceptable to the District's Representative. Provide a minimum cover as shown or specified.
3. Where settling greater than the tolerance allowed for grading occurs in trenches and pits due to unstable subgrade material, excavate to the depth necessary to rectify the problem, then backfill and compact the excavation as specified herein and restore the surface to the required elevation.
4. Place final backfill in 6-inch maximum loose lifts for utilities under roads, streets, concrete slabs or other areas to be paved and synthetic turf subgrade areas.
5. Compact backfill surrounding ducts, conduits, pipes and other structures, including the top 12-inches of subgrade to 95 percent maximum density in accordance with ASTM D1557.
6. Backfill to permit the rolling and compacting of the completed excavation with the adjoining material providing the specified density necessary to enable rock placement of paving of the area immediately after backfilling has been completed.

B. Initial Backfill:
1. Prior to trench backfill, the condition of the trench and laying of pipe shall be acceptable to the District's Representative.
2. Select backfill material shall be used as initial backfill for all utilities except irrigation piping, except as otherwise noted and specified.
   a. After the pipe has been properly laid and accepted by the District's Representative, selected backfill material shall be placed on both sides of the pipe and compacted to the depth shown in the Drawings.
   b. Compaction: The initial backfill material shall be hand tamped in layers not exceeding 4 inches in uncompacted depth and shall be brought up uniformly on both sides of the pipe to avoid bending or distortional stress. After hand-tamping, the relative compaction of the initial backfill material shall be at least 95 percent relative compaction.

C. Final Backfill:
1. Native backfill material shall be used for final backfill, unless otherwise noted.
2. Compaction: Final backfill compaction shall be by mechanical means with backfill material placed in layers not exceeding 6 inches in loose depth. Each layer shall be thoroughly compacted before succeeding layers are placed. The use of machine tampers, except manually held types, shall not

be permitted. Final backfill shall be compacted to a relative compaction of 95 percent for paving areas and synthetic turf subgrade areas. In planting areas, provide acceptable topsoil to required depth compacted to 85 percent to 89 percent maximum relative compaction.

D. Jetting: No jetting will be allowed.

3.05 TRENCH SURFACING

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

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

END OF SECTION

SECTION 32 01 90

EXISTING TREE PROTECTION AND MAINTENANCE

PART 1 - GENERAL

1.01 SUMMARY

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

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

C. Related Requirements:
   1. Section 02 41 13 - Site Clearing and Demolition
   2. Section 31 01 90 - Landscape and Site Maintenance
   3. Section 31 20 00 - Earth Moving
   4. Section 31 23 00 - Excavation and Fill
   5. Section 32 80 00 - Irrigation
   6. Section 32 90 00 - Planting
   7. Section 33 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 Districts 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 Districts Representative, schedule all other contractors so as to be present on site to attend a single pre-construction meeting with the Districts 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 Districts Representative.

1.04 ACTION SUBMITTALS

A. Product Data: Manufacturer's descriptive literature or "cut-sheets" for all products proposed for use.

1.05 EXAMINATION

A. At the outset of construction, the Contractor shall have all trees to remain inspected by a qualified and experienced arborist, and the recommendations of the arborist shall be submitted in writing to the District's Representative.

B. The Contractor shall be notified by the Architect of any changes or additions to the procedures herein specified.

1.06 GUARANTEE

A. If a tree to remain is destroyed, or damaged so that in the judgment of the District's Representative it should be replaced, it shall be removed at Contractor's expense. Except as provided below, liquidated damages will be assessed at the rate of $350.00 per inch of circumference at 12 inches above grade for trees with a diameter of 8 inches or less and at D.B.H. (Diameter at Breast Height) for diameters greater than 8 inches. For a tree designated as of special significance, the amount of liquidated damages may be increased to a maximum of $50,000 at the discretion of the District.

B. If irrigated turf or groundcover to remain is destroyed or damaged so that in the judgment of the District's Representative it should be replaced, it shall be removed at the Contractor's expense. Unless shown or specified otherwise, liquidated damages will be assessed at the rate of $15.00 per square foot of turf or groundcover area.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Protective Fencing: 6 foot high, self-supporting, chain link. Materials and installation shall conform to the requirements of the Chain Link Fence Manufacturers Institute (CLFMI) "Product Manual." Driven support posts are not acceptable.

PART 3 - EXECUTION

3.01 GENERAL

A. Protect, prune, irrigate and maintain all existing trees and other vegetation not designated for removal.

B. At a minimum, protect existing trees and other vegetation not designated for removal from the following:

1. Breaking, cutting and skinning of branches, bark and roots.
2. Stockpiling of building materials, soil or trash within dripline.
3. Vehicular traffic and parking.

C. Trees and other vegetation not designated for removal that become damaged during the life of the project shall be repaired or replaced by the contractor at no cost to the District subject to the discretion of the District's Representative.

3.02 TREE PROTECTION

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

C. Ground Disturbance Controls:
1. Relocate from and/or limit ground disturbing activities within TPZ's.
2. Obtain Districts 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 Districts Representative accepted ground disturbing work in a manner that minimizes root disturbance and soil compaction.
4. As may be requested by the Districts 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 Districts 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 Districts 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 Districts Representative.
6. Throughout the project duration, the Districts 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 Districts 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 Districts 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 Districts 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 Districts 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 Districts representative and locate fence as directed.
3. Caution: Districts Representative accepted adjustments in TPF locations do not alter the extents of the actual TPZ's or the requirements related thereto.
4. Mount District-furnished tree protection signs on TPF in a manner and in locations as may be directed by the Districts Representative.
5. Where Districts Representative accepted work within TPZ's requires temporary relocation of TPF, obtain Districts 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 Districts Representative, all work performed within TPZ's shall be continuously monitored by the Districts 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 Districts 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 Districts 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 Districts 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 Districts Representative. Notify the Districts Representative of proposed canopy pruning and request a change assessment as set forth above in assessments.
2. Where practical, the Districts 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 under the supervision of 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 District'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 District's Representative stating work to be performed and approximate time of completion. No work shall be allowed within the protected fenced area without the prior acceptance by the District's Representative. Fencing shall be replaced promptly following completion of work within fenced areas.

3.04 GRADING AND TRENCHING

A. The earth surface within protective fencing shall not be altered except as acceptable to the District's Representative. Grading and trenching necessary within the dripline shall be done by hand at the discretion of the District's Representative.

3.05 IRRIGATION

A. Provide and maintain irrigation for existing trees and other vegetation not designated for removal as necessary to promote healthy, vigorous growth. Weekly watering shall occur with a 20 minute soak equivalent to 100 gallons per tree.

3.06 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 District's Representative.
      b. Limbs of weak structure.
      c. Limbs with twigs and foliage obstructing the development of more "important" branches, as directed by the District's Representative.
      d. Branches near the end of a limb which may produce more weight than the limb is likely to support.
      e. Branches conflicting with building or vehicular roadways.
   4. Removal of branches located between grade level and 10 feet above grade over pedestrian walkways.

C. Selectively prune branches as deemed necessary by the District's Representative.

3.08 PRUNING REPAIRS

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

B. Dry Conditions: Contractor shall provide dust control in conformance with Section 10 of Standard Specifications and shall provide water to subgrades and base courses as necessary to achieve compaction goals.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be stockpiled on site in locations that, in the opinion of the contractor, cause least interference with construction operations and as acceptable to the District's Representative.

B. Materials shall not be stockpiled in proposed planting areas.

C. Protect materials from segregation, contamination and wind and water erosion.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Aggregate Base: Class 2, 3/4-inch maximum material conforming to Section 26-1.02A of the Standard Specifications. No recycled materials will be accepted for synthetic turf areas. All other paving and surfacing using aggregate base can use recycled materials.

PART 3 - EXECUTION

3.01 SUBGRADE PREPARATION

A. Preparation of subgrade shall conform to Section 6 of the Standard Specifications and as specified in Section 31 20 00 - Earth Moving.

B. Remove unsuitable subgrade material as necessary and replace with suitable material or aggregate base per the discretion of the District's Representative.

3.02 BASE MATERIAL PLACEMENT

A. Conform to Section 26 of the Standard Specifications.

B. Obtain acceptance of subgrade preparation work prior to placing base material thereon.

C. Place and compact base material in 6-inch maximum lifts unless otherwise noted. Compaction shall be at least 95 percent relative compaction.

D. Base material shall be moisture conditioned to between optimum and 3 percent above optimum prior to placement and compaction.

3.03 TOLERANCES

A. Conform to Section 26 of the Standard Specifications, unless more stringent requirements in these Contract Documents are provided, in which place the more stringent tolerances shall govern.

3.04 CLEAN-UP OF WORK AREA

A. The Contractor shall remove and legally dispose of excess materials, spoils, and debris from the job site on a daily basis.

3.05 PROTECTION OF FINISHED PRODUCT

A. The Contractor shall provide lighted barricades, signs, and other devices as necessary to prevent damage to finished base courses.

END OF SECTION

SECTION 32 12 16

ASPHALT PAVING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Asphalt paving is shown on the Drawings including, but is not necessarily limited to, the following:
   1. Plant-mixed asphalt and other asphalt items.
   2. Header boards.

B. Related Requirements:
   1. Section 01 33 00 - Submittal Procedures
   2. Section 31 20 00 - Earth Moving
   3. Section 32 11 00 - Base Courses
   4. Section 32 12 17 - Asphalt Track Paving
   5. Section 32 13 13 - Concrete Paving
   6. Section 32 33 00 - Site Furnishings
   7. Section 33 40 00 - Storm Drainage Utilities

1.02 REFERENCES

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

1.03 ADMINISTRATIVE REQUIREMENTS

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

B. Sequencing and Scheduling:
   1. Time delay between placement and compaction of base material and installation of asphaltic shall not be more than 5 calendar days. Base material left unpaved longer than this time period shall be subject to testing and re-compaction at the expense of the contractor.

1.04 ACTION SUBMITTALS

A. Product Data: Descriptive literature for primer and other materials proposed for use if requested by the 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. 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. Tack and Levelling Course:
   1. After completion of the base course a tack coat shall be applied and a leveling course of minimum 1-inch thickness shall be placed and compacted over entire area.
   2. After compacting, the surface of the leveling course shall be check for compliance with the specified tolerances.
   3. Where required, depressions shall be filled with asphalt concrete fines prior to proceeding with subsequent pavement construction.

C. Paver Equipment Requirements:
   1. Asphalt pavers shall be self-propelled mechanical spreading and finishing equipment provided with a screed or strike-off assembly capable of distributing the material to not less than the full width of a traffic lane.
      a. Screed action shall include cutting, crowding, and other practical action which is effective on the mixture without tearing, shoving, or gouging, and which produces a surface texture of uniform appearance.
      b. The screed shall be adjustable to the required section and thickness. The paver shall be provided with a full width roller or tamper or other suitable compacting devices.
   2. Asphalt pavers shall be operated to insure continuous and uniform movement of the paver.
   3. The asphalt paver shall operate independently of the vehicle being unloaded or shall be capable of propelling the vehicle being unloaded in a satisfactory manner and, if necessary, the load of the haul vehicle shall be limited to that which will insure satisfactory spreading.
   4. While being unloaded, the haul vehicle shall be in contact with the machine at all times, and the brakes on the haul vehicle shall not be depended upon to maintain contact between the vehicle and the machine.

D. Placing Hot-Mix Asphalt:
   1. The completed mixture shall be deposited at a uniform quantity per linear foot to provide the required compacted thickness without resorting to spotting, picking-up or otherwise shifting the mixture.
      a. Segregation shall be avoided, and the surfacing shall be free from pockets of coarse or fine material.
      b. Asphalt containing hardened lumps shall not be used.
   2. Unless lower temperatures are directed by the 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.

E. Construction Joints: Before placing the top layer adjacent to cold transverse construction joints, the cold transverse construction joints shall be trimmed to a vertical face and to neat line.
1. Transverse joints shall be tested with a 16-foot straightedge and shall be cut back to conform to meet the specified tolerances.
2. Connections to existing surfacing shall be feathered to conform to the requirements for smoothness.
3. Longitudinal joints shall be trimmed to a vertical face and to a neat line if the edges of the previously laid surfacing are, in the opinion of the Owner's Representative, in such condition that the quality of the completed joint will be affected.

F. Rollers and Roller Equipment: The Contractor shall furnish a sufficient number of rollers to achieve the compaction and surface finish required by these Specifications.
1. Each roller shall have a separate operator.
2. Rolling equipment shall be self-propelled and reversible.
3. Rollers shall be equipped with pads and water systems that prevent sticking of asphalt mixtures to the pneumatic- or steel-tired wheels.
4. A parting agent that will not damage the asphalt mixture, as determined by the Owner's Representative, may be used to aid in preventing the sticking of the mixture to the wheels.

G. Compaction:
1. Compact pavement by rolling to 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.

H. The completed surfacing shall be thoroughly compacted, smooth, and free from routes, humps, depressions, or irregularities. Ridges, indentations, or other objectionable marks left in the surface of the asphalt paving by blading or other equipment shall be eliminated by rolling or other means. The use of any equipment that leaves ridges, indentations, or other objectionable marks in the asphalt paving shall be discontinued, and other acceptable equipment shall be furnished by the Contractor.

3.06 TOLERANCES

A. Surface Tolerance:
1. The Contractor shall have on site a 12-foot straightedge for testing the asphalt paving surface when said straightedge is laid on the finished surface and parallel with the center line, the surface shall not vary more than 0.01-foot from the lower edge of the straightedge.
2. The transverse slope of the finished surface shall be uniform to a degree that no depressions greater than 0.02-foot are present when tested with a straightedge 12 feet long.
3. Skin patching will not be allowed to correct depressions.

B. Thickness Tolerance:
   1. The pavement thickness shall be determined by measuring the average thickness of core samples taken from the pavement for density determination.
   2. Thickness will be determined from the cores and shall be based upon the average of the cores.
   3. The asphalt thickness indicated on the cross sections shall be maintained.
   4. Thickness deficiencies in excess of 3/8-inch shall be corrected by removal and replacement of overlay at the discretion of the 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
   2. Mowbands and edge bands.
   3. Stairs
   4. Walkways.
   5. Expansion and control joints.
   6. Reinforcement.
   7. 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. District's Representatives.

1.04 ACTION SUBMITTALS

A. Product Data: Manufacturers' current catalog cuts and specifications for the following:
   1. Expansion joint filler materials.
   2. Color admixtures.
   3. Curing compounds.

4. Surface retarder.
5. Other items as requested by District's Representative.

B. Samples:
1. Concrete materials as required for testing and inspection.
2. Expansion Joint Sealant: Manufacturer's standard bead samples showing full range of colors available.
3. Concrete Panels: Not less than 12 inches by 12 inches for each selected color and finish texture using concrete mix proposed for this Project.
a. Indicate materials and methods used to produce each color and texture.
b. Mockup work shall not commence until a concrete sample panels have been approved.

C. Concrete Mix Design: Submit mix designs and certified compressive strength test reports for each concrete strength, type, additives, and maximum aggregate size required, prepared, and certified by the ready-mix concrete supplier.

1.05 INFORMATIONAL SUBMITTALS

A. Statement of installer/finisher qualifications if requested by District's Representative.

B. Mill Certificates and Certifications for reinforcing bars, if used.

C. Delivery tickets for each load of concrete delivered to the site.

D. Results of slip-resistance testing.

1.06 QUALITY ASSURANCE

A. Construction of concrete flatwork, including curbs and gutters, shall conform to Section 73 of the Standard Specifications.

B. Codes and Standards: Comply with the applicable provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:
1. California Building Code, Title 24, Part 2, Chapter 19A - Concrete
2. ACI 301 Specifications for Structural Concrete for Buildings
3. ACI 318 Building Code Requirements for Reinforced Concrete
4. ACI 614 Recommended Practice for Measuring, Mixing, and Placing Concrete
5. Concrete Reinforcing Steel Institute, Manual of Standard Practice

C. Contractor shall be responsible for quality of concrete in place and shall bear burden of proof that concrete as placed meets minimum requirements.

D. Slip Resistance: Floor tile shall provide a value equal to or greater than 0.42 when tested in accordance under dry conditions with DCOF AcuTest procedure contained in ANSI A137.1:2012, Section 9.6, and under wet conditions with DCOF AcuTest procedure of ANSI B101.3.

E. Concrete Testing:
1. The District may retain, at its expense, a testing laboratory to perform material evaluation tests in accordance with Section 01 45 00 - Quality Control.
2. Testing may include slump tests and securing samples of concrete, cement, aggregates, or other materials for testing. Applicable materials shall be provided by the Contractor at no additional cost to the District.

F. When review or observation is required of the District's Representative of the concrete work, Contractor shall notify the District's Representative not less than 2 working days prior to date when the review or observation is required.

G. Pre-Pouring Review:
   1. Formwork, joint patterns, base material, reinforcement, "dobies," ties, and other installation accessories shall be reviewed and accepted by the District's Representative prior to pouring concrete.
   2. Forms, reinforcing, and accessories shall be in place and Contractor shall give a minimum of 5 working day lead-time notice to District's Representative when scheduling the review request.
   3. Contractor shall allow a minimum of 2 working days after pre-pour review in Construction Schedule for possible modifications to concrete preparation work, at no cost or delay to the project.

H. The District's Representative shall have access to any off-site batch plant or quarry supplying materials at all times for subject project and trucks in route to the project site.

I. Mockups:
   1. General:
      a. Mix design shall match that used on accepted sample panels and proposed for use in final construction including cement and color additive.
      b. Prepare at least one month before start of final concrete work to allow concrete to cure before observation.
      c. Concrete color and finish for mockup appearance shall match color and finish of accepted sample.
      d. Build mockups at the location indicated or, if not indicated, as selected by the District's Representative
      e. Notify District's Representative 5 working days in advance of dates and times when mockups will be constructed and layouts will be ready for review.
      f. Color and texture shall be approved before starting construction.
      g. Perform specified slip-resistance testing on mockups.
      h. Maintain final accepted mockups in an undisturbed condition as a standard for judging the completed Work.
      i. Retain samples of sands, aggregates, and color additive used in the mockups for comparison with materials used in final work.
      j. Demolish and remove mockups when directed if not incorporated into the final work.
   2. Flat Paving Mockups:
      a. 4-feet x 4-feet sample panels of colored concrete flatwork and concrete darkening agent for each required color and texture shall be poured by the Contractor at the site for review and acceptance by the District's Representative.
      b. Quantity:
         1) Contractor shall allow for preparation of up to 2 flat paving mockups for evaluation and final approval of each concrete.
         2) For mockups demonstrating appearance using specified surface retarder, Contractor shall prepare a mockup using specified retardant level plus additional samples one level higher and one level lower, of applicable, for review by District's Representative.
      c. Samples shall include each type and profile of joint, surface texture, and tooled conditions for approval. Contractor shall schedule review well in advance of concrete operations to allow for modifications and preparing an additional mockup panel if necessary.

1.07 DELIVERY AND STORAGE

A. Deliver concrete reinforcement to job site properly tagged and ready to set. Store above ground surface on platforms, skids, or other supports. Coordinate delivery and storage of all other materials as appropriate.

B. Coordinate delivery so that mixes may be immediately poured upon arrival at site.

1.08 FIELD CONDITIONS

A. Maintain control of concrete dust and water. Do not permit adjacent areas to be contaminated.

PART 2 - PRODUCTS

2.01 BASE MATERIALS

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

2.02 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
   1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less.
   2. Do not use notched and bent forms.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.03 REINFORCING

A. General:
   1. Reinforcing steel shall be cut and bent cold to exact lengths and shapes to comply with Drawings, reviewed shop drawings, and referenced codes and standards.
   2. Comply with the additional requirement shown on the Drawings.

B. Reinforcing Steel: Deformed billet steel bars complying with Section 52-1.02B of Standard Specifications, Section 1907 of CBC and ASTM A615.
   1. Provide Grade 60 for No. 4 and larger, Grade 40 for No. 3 and smaller.
   2. Bars shall be in a new, “first-class” condition.

C. Smooth Dowel Steel Bars for Expansion Joints: ASTM A29, Grade 40, No. 3 smooth.
   1. Dowels shall be shop painted with iron-oxide zinc-chromate primer.
   2. Where shown, provide metal dowel sleeve or other approved break-bond method at one end of dowel to permit lateral movement at dowel within concrete section.
   3. Provide for movement which equals joint width plus 1/2 inch.
   4. Bars shall be in a new, “first-class” condition.

D. Dowel Insert System: Single component dowel sleeve with self-locking design; Greenstreak “Speed Dowel” by Sika, or equal selected for dowel profile and diameter indicated on the Drawings.

E. Tie Wire: ASTM A82, black annealed, minimum 16 gage.

F. Supports for Reinforcement: Provide bolsters, chairs, spacers, and other devices for spacing, support and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI specifications, unless otherwise acceptable.

2.04 CONCRETE MATERIALS

A. Cement: ASTM C150, Type II, and shall be provided by one manufacturer.

B. Pozzolan: Class F Fly Ash per ASTM C618 comprising 15-20% of total cementitious materials. Fly Ash may be added to a maximum ratio of 35% of total cementitious materials where testing reports are provided for the mix design review.

C. Coarse Aggregates: Coarse aggregates shall conform to ASTM C33, sizes 57, 67 or 7. Pea gravel aggregate shall not be used.

D. Fine aggregates: Fine Aggregates shall conform to ASTM C33.

E. Water: Clean and not detrimental to concrete.

F. Surface Retarder at Concrete Paving: Water-based, top-surface retarder and etch; "Grace Top-Cast" by Grace Construction Products. Contractor shall verify compatibility with concrete mix to achieve desired sandblast finish.
   1. Grade: 05 Light Blue, unless otherwise required to achieve a median sand blasted texture.

2.05 CONCRETE ADDITIVES

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

B. Fiber Reinforcement: 100 percent virgin homopolymer polypropylene fibrillated fibers; "Fibermesh 300" by Propex Concrete Systems Corp., or equal.

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

2.06 ACCESSORIES

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

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

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

D. Fiber Expansion Joint Material: Preformed cellular fiber complying with ASTM D1751; 1/2 inch thick unless otherwise indicated.
   1. Expansion joint material shall be variety with "zip-strip" H-channel joint sealant receptacles. If proposed joint material is not installed with sealant receptacles then, the expansion joint material

shall be completely covered with a Sonneborn “Sonofoam” closed cell backer rod or acceptable equal prior to application of joint sealant.
2. Provide 3/8-inch tooled edges each side of joint material. Refer to Drawings for additional information.

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

F. Cold Joint Form: “Key Kold” by MeadowBurke, or equal.

2.07 CONCRETE MIXING

A. General:
1. Mix and deliver concrete in accordance with ASTM C94.
2. Addition of water to the mix after leaving the plant is not permitted.
3. No admixtures will be allowed without prior acceptance by the District’s Representative. If accepted, use admixtures according to manufacturer's written instructions.
4. Ensure equipment and plant will afford accurate weighing, minimize segregation, and will efficiently handle materials.
5. Deposit concrete into final position within 90 minutes of introduction of cement.

B. Pigments:
1. Darkening Agent: Add 1/4 pound of specified black colorant per 94 lb. sack of cement to all concrete which will be exposed to view when cured except for drain rims and concrete receiving other colorants.
2. Other Colors: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

C. Minimum ultimate compression strength of concrete at 28 days is as follows:

Item	Strength (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	0.50
Curbs / Edgebands	3,000	4“	3/4"-1"	5	0.60

D. Drying Shrinkage Limit at 21 Days: 0.40 percent.

E. Adjustment to Concrete Mixes:
1. Mix design adjustments may be requested by Contractor when job conditions, weather, test results warrant, or to meet appearance of accepted samples or mockup.
2. Test data for revised mix design shall be submitted to and accepted by District’s Representative before using in work.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify requirements for concrete cover over reinforcement.

B. Verify that anchors, seats, plates, reinforcement, and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

3.02 PREPARATION

A. Prepare joints in previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.

B. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

3.03 EXCAVATION

A. In addition to the general grading excavation required, the Contractor shall excavate to the required depths in the locations shown for flatwork and curbs. Excess excavation shall be replaced with concrete poured monolithically with the wall or pavement, at no additional cost to the District.

3.04 INSTALLATION OF FORMWORK

A. Formwork shall conform to Section 51 of the Standard Specifications and as follows:
   1. The Contractor shall build forms with a high degree of care and shall select from materials of adequate strength and smoothness to produce smooth, even surfaces of uniform texture and appearance, free of bulges, depressions, or other imperfections per the discretion of the District's Representative. Remove any residue remaining on concrete after forms are removed.
   2. Transition of curves to straight lines and of curves to curves shall be formed as smooth, continuous, and uninterrupted with typical 90-degree radius alignment at the points of tangency.

3.05 PLACING REINFORCEMENT

A. General:
   1. When there has been a delay in placing concrete, reinforcement shall be inspected and, if necessary, cleaned, relocated, and tied at no additional cost to District.
   2. Wherever conduits, piping, inserts, sleeves, and similar item interfere with placing of reinforcing steel, obtain approval of District's Representative of method of procedure before concrete is placed.

B. Reinforcement installation shall conform to the provisions of the Standard Specifications as follows:
   1. Cleaning — Section 52-1.03B
   2. Bending — Section 52-1.03C
   3. Placing — Section 52-1.03D
   4. Splicing — Section 52-6
   5. Lapped Splices — Section 52-6.03B

3.06 PLACING CONCRETE

A. Place concrete in accordance with ACI 301.

B. Notify Engineer of Record and Special Inspector minimum 48 hours prior to commencement of operations. Do not place concrete until forms and 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.
   1. Cold Joints: Install specified cold joint forms in accordance with manufacturer's recommendations. Joints shall not be covered with concrete. Tool joint to remove concrete from edge of metal.
   2. Fiber Expansion Joints: After allowing concrete to fully cure, remove zip strips and install expansion joint sealant as shown and in accordance with manufacturer's instructions.
   3. Install specified dowel sleeves in accordance with manufacturer's instructions and as shown.

C. Score Joints: Tool to a 3/8-inch radius and to a 1-inch depth.

D. Form contraction joints as detailed on plans. Joints shall be formed immediately after final finishing with an approved concrete-sawing machine; "SOFF-Cut" as manufactured by SOFF-Cut International: Corona, California (909) 272-2330, or equal.
   1. Avoid dislodging aggregates.
   2. Unless otherwise indicated or directed, the joints shall be 1/8-inch-wide and 1-inch deep. Do not use zip-strips.
   3. Saw contraction joints to true alignment with "SOFF-Cut" concrete-sawing machines adequate in number and power and with sufficient replacement blades to complete the sawing at the required rate.
   4. Joints shall be cut as the concrete has hardened sufficiently to permit walking on the slab, and as recommended by the saw manufacturer.
   5. Unless otherwise approved, saw joints in the sequence of concrete placement. Remove cutting debris.
   6. Saw cuts shall be made in accordance with manufacturer's instructions.

E. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
   1. Cut depth shall be 25 percent of slab depth unless otherwise shown or required to comply with accepted mockup.
   2. Layout: As shown on the Drawings.

F. Curb and Edge Band Joint: Locate as follows, unless otherwise noted on the Drawings.
   1. Every 5 feet for score joints.
   2. Install fiber expansion joints maximum 15 feet on center.
   3. Install fiber expansion joints at corners, and beginnings and endings of radii.
   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 District's Representative minimum 5 working days prior to pour.

B. Preparation:
1. Protect finished surfaces adjacent to areas to receive concrete.
2. Valve boxes, electric boxes, drainage inlet structures, manholes, lids, and other similar items shall be covered and protected prior to and during concrete pour. Concrete staining to these items will not be accepted.
3. Verify that the District's Representative, if required, has inspected reinforcement.
4. Notify the District's testing laboratory at least 2 working days before placing concrete.

C. Placing:
1. Concrete placement shall conform to Section 40-103H of the Standard Specifications.
2. Moisten earth, and spray forms and reinforcement with water before placing concrete.
3. Place concrete in continuous operation to permit proper and thorough integration and to complete scheduled placement.

D. Concrete shall not be dropped freely where reinforcing bars will cause segregation, nor shall it be dropped freely more than six feet. Spouts, elephant trunks, or other acceptable means shall be used to prevent segregation.

3.10 CONCRETE FINISHING - GENERAL

A. Provide formed concrete surfaces to be left exposed with a medium sand-blast finish. Coordinate with Landscape Architect prior to placing concrete.

B. Finish concrete floor surfaces in accordance with ACI 301. Provide non-slip surface where concrete floor surfaces are left exposed, unless noted otherwise.

C. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains as indicated on drawings.

3.11 FLATWORK FINISHING

A. General:
1. Provide each concrete finish where shown in the Drawings.
2. Provide samples and mockups as specified of all concrete finishes for review and acceptance prior to pouring concrete.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats.

C. Trowel Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and 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 District.

3.12 FIELD QUALITY CONTROL

A. Provide free access to Work and cooperate with District's Representatives.

B. Tests of cement and aggregates may be performed to ensure conformance with specified requirements.

C. One additional test cylinder will be taken during cold weather concreting, cured on job site under same conditions as concrete it represents.

D. At a minimum one slump test will be taken for each set of test cylinders taken.

E. Tolerances:
1. Vertical deviation from specified grades shall not exceed 0.04 foot.
2. Surface smoothness deviations shall not exceed 1/8 inch in 8 feet, in any direction.
3. Thickness shall not be more than 0.01 foot less than planned thickness at any point.

3.13 CURING AND PROTECTION

A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

C. Cure floor surfaces in accordance with ACI 308.

D. Spraying: Spray water over floor slab areas and maintain wet for 7 days.

E. Provide necessary security to protect the concrete from vandalism. Concrete which is defaced or damaged during the course of this Contract shall be replaced by the Contractor at no additional cost to the District.

3.14 PATCHING

A. Allow Engineer to inspect concrete surfaces immediately upon removal of forms.

B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Engineer upon discovery.

C. Patch imperfections in accordance with ACI 301.

3.15 DEFECTIVE CONCRETE

A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances, or specified requirements; concrete with excessive honeycombs or other surface or finish defects.

B. Repair or replacement of defective concrete will be determined by the Engineer of Record.

C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Engineer for each individual area.

D. No additional compensation will be allowed for repair of defective concrete.

3.16 CLEANING

A. Remove excess base material, concrete spills, cement stains and all other excess materials from all project areas prior to Final Acceptance.

END OF SECTION

SECTION 32 18 13

SYNTHETIC TURF 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. Synthetic grass system consisting of [xxx-inch-tall monofilament, slit-film, or hybrid of monofilament and slit-film polyethylene or xxx fiber.]
   2. A resilient infill system consisting of [xxx and graded sand.]

B. Related Requirements:
   1. Section 32 18 14 - Synthetic Turf Base

1.02 REFERENCES

A. ASTM Standard Test Methods:
   1. D1335: "Standard Test Method for Tuft Bind of Pile Yarn Floor Coverings."
   2. D5848: "Standard Test Method for Mass Per Unit Area of Pile Yarn Floor Covering."
   3. F355: "Standard Test Method for Shock-Absorbing Properties of Playing Surfaces."
   4. F1936: "Standard Test Method for Shock-Absorbing Properties of North American Football Field Playing Systems as Measured in the Field."

B. [Current NCAA [_____] Rules and Interpretations or National Federation of High School (NFHS) [_____] Rules, as applicable.] [FIFA rules of the Game as applicable for NCAA Soccer Rules.]

1.03 ADMINISTRATIVE REQUIREMENTS

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

1.04 ACTION SUBMITTALS

A. Submit Drawings: Prepare and submit the following.
   1. Seaming plan.
   2. Installation details; edge detail, utility box detail, and other conditions of the installation.
   3. Field layout and striping plan including field colors, including field line layouts and colors.
   4. Final electronic versions of artwork.

B. Samples:
   1. Turf, 4" x 4" in size, illustrating details of finished product.
   2. Loose samples, 1-foot square, of the turf backing and tufted fibers.
   3. [Color samples of color [and logo] work including final electronic versions of artwork.]
   4. One-quart samples of the following:
      a. [Specified 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.
2. [Verification of recycled content of SBR infill as specified.]

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, NCAA, or FIFA] 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 NCAA Division One stadium football field in play for at least 3 seasons with the specific infill system, backing and sewn seams that is being proposed for this project.]
   5. [Have an NCAA Division One soccer field in play for at least 3 seasons with the specific infill system, backing and sewn seams that is being proposed for this project.]
   6. [Have an NCAA Division One 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.]
   7. For the purpose of meeting these qualifications, the type of fiber and infill [xxx 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 **[8/10]** 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 **[**8/10**]** 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 **[**District/Owner**]**.
13. **[**Turf contractor shall include in the warranty the cost to replace high use areas such as but not limited to goal mouth of soccer pitch's, corner kick areas, goal kick areas, base paths, etc. Replacement shall be one time for each area during the warranty period at a time of the warranty holder's discretion. The replacement area shall include the required square footage needed to replace the damaged areas up to the closest field line or change in turf color. Contractor shall provide 2 replacement panels for each batter's box per field (8 total), 2 replacement catcher boxes per field (4 total) and 2 replacement strips for the pitcher's stride area per field (4 total) from the top of the pitching plate to the change of color in the home plate direction.**]**
14. **[**Turf system of 2" hybrid/monofilament turf with sand/cork infill over a manufactured porous closed-cell composite shall not exceed a field average Gmax of 120, as tested according to the ASTM 1936 Standard Specifications, for the life of the system.**]**
15. **[**Turf shall maintain an ASTM F355 G-Max of less than 160 for the life of the warranty.**]**

PART 2 - PRODUCTS

2.01 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.
   d. [Systems with less than a 2-1/2-inch fiber, 100 percent fibrillated slit-film, will not be accepted as equal.]
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 soccer, including soccer penalty kick circle, shall be inlaid or tufted. The lines for soccer including soccer penalty kick circle shall be yellow.
3. All field of play lines for lacrosse, including team and official areas, shall be inlaid or tufted. The lines shall be blue.
4. Field of play lines for field hockey, including team and official areas, shall be inlaid or tufted. The lines shall be blue.
5. Field of play lines for football (except hash marks, which can be painted) shall be inlaid or tufted. The lines for football shall be white.
6. For football, sideline yardage markers conforming to NCAA, NFHS, and / or CIF recommendations shall be inlaid. These shall include markers in 10-yard increments including goal line on both sides of the field and the entire length of the field, as well as player and coachers boxes.
7. Field of play lines for baseball, shall be inlaid or tufted. The lines shall be white.
8. Field of play lines for softball, shall be inlaid or tufted. The lines shall be white.

2.02 INFILL SYNTHETIC TURF

A. Manufacturer and System: [_____] as specified and the basis of design has been pre-approved by the Owner.

2.03 MATERIALS

A. Synthetic Turf Infill system shall consist of two components, a Primary and Secondary Infill:
1. Primary Infill: [SBR rubber] [Cork] [Olive Pits] [Cork] complying with the product specification and sourced from recycled tires. Submit documentation on approved form certifying SBR source and number of tires recycled. Rubber shall be a homogeneous black color and uniform size and shall be clean of any impurities or material other than approved rubber.
2. Secondary Infill: Sand shall be rounded silica sand and dust free. Coarse jagged sand will not be accepted. Sand shall consist of 50-60 percent of the total infill material as defined by weight. The sand shall have the following gradation:

Sieves (US Mesh Size)	% Retained
16	0
25	10-30
30	30-50
35	15-35
40	5-15
50	<5
70	<1

3. At the end of installation, and prior to acceptance, the top of the infill shall be not less than a uniform 3/4 [___] inch depth below the top of fibers. If additional infill is required to meet with requirement, it shall be furnished and installed by the Turf Company at no additional charge.

B. Thread for sewing seams of turf shall be as recommended by the synthetic turf manufacturer.

C. Synthetic Turf Glue
1. Glue for inlaying lines and markings shall Nordot 34G, Mapei 2K, Turf Claw, hot melt technology or equivalent, as recommended by the synthetic turf manufacturer.
2. Any adhesive products required for the installation of the proposed turf system shall be purpose-suited to the system. The material and application methods shall be as recommended by the adhesive manufacturer.
3. Disposal of adhesive containers and unused adhesives as well as any fees resulting from such disposal shall be the responsibility of the Contractor.

2.04 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 [8/10] year warranty, then semi-annual visits (i.e. twice a year) for the remaining [five/seven] 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 District'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 District'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 District. Material rejected by the District shall be removed from the site at the Contractor's expense.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Prior to trucking of material to project sites, crushed rock shall be washed so it is clean of impurities and fines created during rock crushing operations.

B. Store products to be installed as part of the field base neatly and orderly, stacked and blocked to prevent damage and contamination.

1.09 FIELD CONDITIONS

A. Protection of Project Site: Make provisions, and take the necessary precautions, for protect existing and completed work from damage during turf installation.

B. Contractor shall be responsible for stabilizing top of subgrade elevations for the synthetic turf areas prior to receiving the stone aggregate base and for executing fine grading as may be necessary or incidental to placement of the synthetic turf.

C. Contractor shall prevent surface water and subsurface or groundwater from flowing into excavations and flooding area to receive turf base. Contractor shall not allow water to accumulate in excavations. Contractor shall remove water to prevent softening of sub grades.

1.10 MATERIAL TESTING

A. General:
1. The summary of Synthetic Turf Base Material Testing includes the following:
   a. Initial Action Submittal and samples for District 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 District 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 District.
4. Employment by the District of the Testing Agency shall in no way relieve Contractor's obligations to perform the Work of the Contract.
5. The District 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 District's Testing Agent prior to acceptance of rock provided under this Section, after authorization/review from the District'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 District's Testing Agency, unless the District's Testing Agent elects to pull the sample directly at the quarry and/or requests test samples of varying quantities based on the testing labs' needs, for each porous base rock material. The District's testing agent will evaluate these materials as specified using ASTM C136-06 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%.

"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 District's representative/Testing Agent to assure strict compliance with the Specifications. The District may sample and test the rock material either at the source or at the project site upon delivery from incoming transfer trucks. Frequency of sampling for gradation testing would be to sample every 500 tons of Engineered Permeable Base Rock delivered to the site. Rock not meeting Specifications will be rejected by the District's representative. Materials rejected by the District's representative shall be removed from the site at the Contractor's expense.
   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 District's Testing Agent for gradation testing. No additional tests are required for the leveling stone.

D. Permeability of placed engineered permeable rock base shall not be less than 10 in/hr (Tested per ASTM F2898-11)

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 District'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:

SANTA CLARA OFFICE

Region	**Supplier**	**Address**	**Phone Number**
South Bay	Vulcan Pleasanton	50 El Charro Rd, Pleasanton, CA 94588	1 (925) 846-5125
	DeSilva Gates Sunol	6527 Calaveras Rd, Sunol, CA 94586	1 (925) 862-1909
	Graniterock – Wilson Quarry	1900 Quarry Rd, Aromas, CA 95004	1 (831) 768-2330
East Bay	Vulcan Pleasanton	50 El Charro Rd, Pleasanton, CA 945881 (925) 846-5125	1 (925) 846-5125
	DeSilva Gates Sunol	6527 Calaveras Rd, Sunol, CA 94586	1 (925) 862-1909
	Teichert - Woodland	35030 County Rd. 20 Woodland, CA 95695	1 (530) 661-4290
North Bay	Syar	885 Lake Herman Rd, Vallejo, CA 94591	1 (707) 252-8711
	Vulcan Pleasanton	50 El Charro Rd, Pleasanton, CA 94588	1 (925) 846-5125
	DeSilva Gates Sunol	6527 Calaveras Rd, Sunol, CA 94586	1 (925) 862-1909
Peninsula/SF	Dutra	2350 Kerner Blvd, San Rafael, CA 94901	1 (415) 258-6876
Central Coast	Graniterock – Wilson Quarry	1900 Quarry Rd, Aromas, CA 95004	1 (831) 768-2330

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 YSR" by Brock International, 303-544-5800, or equal.
   1. Panel Size: Approximately 73.5 x 49.0 inches.
   2. Thickness: 1.0 inches, (25 mm).
   3. Weight: 5.56 lbs per panel

2.07 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

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. 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 District's Representative three (3) days prior to completion of the test area being ready for testing. Testing Shall be completed by The District's Representative Testing Agency.

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 District 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 District Testing Agent that it is ready for the field permeability test.
   1. The Agent shall be given 2 working days' notice and have 2 days to complete the in-field test which will consist of a minimum of 4 controlled field permeability tests per synthetic turf field.
   2. Tests shall be by the following test method: ASTM F2898-11: "Standard Test Method for Permeability of Synthetic Turf Sports Field Base Stone and Surface System by Non-confined Area Flood Test Method"
   3. Permeability of placed Engineered Permeable Rock Base shall comply with 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. Thermally fused and bonded PVC coated ("vinyl coated") galvanized chain link fabric with painted posts, gates, hardware, and related appurtenances.
   3. Concrete footings.

B. Related Requirements:
   1. Section 01 33 00 - Submittal Procedures
   2. Section 32 33 00 - Site Furnishings
   3. Section 32 32 15 - Landscape Concrete
   4. Section 32 90 00 - Planting
   5. Structural Drawings

1.02 REFERENCES

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

B. American Welding Society (AWS):
   1. A2.4: "Symbols for Welding, Brazing and Nondestructive Examination."

C. Chain Link Fence Manufacturers Institute (CLFMI): Product Manual CLF-PM0610.

D. Industrial Steel Guide for Fence, Rails, Posts, Gates and Accessories.

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

1.03 ADMINISTRATIVE REQUIREMENTS

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

B. Sequence and Scheduling: Contractor shall coordinate construction timing of chain link fencing and related work with installation of concrete work specified in Section 32 32 15 – Landscape Concrete and all other work.

1.04 ACTION SUBMITTALS

A. Shop Drawings: To scale drawings showing all different types and sizes of gates and fencing systems.
   1. Shop Drawings shall include, but may not be limited to:
      a. All information regarding clearances, connections, components and any miscellaneous related appurtenances (such as wood baseboards at backstops, locking mechanisms etc.).
      b. Concrete footing and reinforcement information.
   2. Indicate materials, dimensions, sizes, weights and finishes of components. Include plans, elevations, sections and other required installation and operational clearances, connections, components and miscellaneous related appurtenances and locking.
   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.
   4. Details showing post anchorage, attachment and bracing. Provide setting drawings, templates, instructions, and directions for installation of anchorage devices.
   5. Details of gates and hardware.
   6. Welds, both shop and field, shall be indicated by AWS "Symbols for Welding, Brazing and Nondestructive Examination," A2.4.

B. Product Data: Manufacturer's descriptive literature for materials and components of the chain link fencing system including coatings, fittings, and hardware.
   1. Include the manufacturer's name and catalog number for each item where applicable.
   2. Clearly identify which portions of the information on the printed literature are applicable if more than one product is shown.

C. Samples:
   1. Chain-link fabric, approximately 12 inches square, if requested by District's Representative.
   2. Hardware and fittings District's Representative.
   3. Color selections for finishes of vinyl coated fencing 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 "Standard for Welding Procedure and Performance Qualifications," B2.1.
   3. Comply with AWS publication "Welding Zinc Coated Steel" for galvanized products.
   4. Welding inspector's qualifications shall be in accordance with AWS D1.1.

PART 2 - PRODUCTS

2.01 DESIGN AND PERFORMANCE CRITERIA

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

B. Except as otherwise specified, comply with Chain Link Fence Manufacturers Institute (CLFMI) Product Manual.

C. Industry Standards: Materials and installation shall conform to the requirements of the Chain Link Fence Manufacturers Institute (CLFMI) "Product Manual."

D. Regulatory Requirements: Pedestrian gates and related hardware shall comply with applicable codes, including provisions for accessibility required by CBC Chapters 10 and 11B, Part 2; and the Americans with Disabilities Act (ADA) Standards for Accessible Design.

E. Bottom 10 inches of pedestrian gates shall have a smooth uninterrupted surface.

2.02 MATERIALS

A. Fabric: Galvanized steel wire complying with ASTM A392, Class 1, with not less than 1.2 ounce zinc coating per square foot.
1. Selvage: Knuckled finish top and bottom.
2. Steel Fabric: Comply with Chain Link Fence Manufacturers Institute (CLFMI) Product Manual. Furnish one-piece fabric widths for fencing up to 16 feet high. Wire sizes includes zinc coating.
3. Mesh Opening: 2 inches.
4. Wire Diameter: 9-gauge (0.148-inch diameter), unless noted otherwise.
5. Polymer Coating: Thermally fused and bonded polyvinyl chloride (PVC) complying with ASTM F668 Class 2b, 7mil (0.18 mm) thickness thermally fused over zinc-coated wire.
   a. Color: Black and in compliance with F934.

B. Framework: Posts and rails shall be Schedule 40 pipe complying with conforming to ASTM F1083, Regular Grade, 30,000 psi Yield Strength, or ASTM F1043, Group 1-C, High Strength Grade 50,000 psi Yield Strength, galvanized with no less than 1.8 ounces of zinc coating per square foot of surface area complying with ASTM A123.
1. Strength requirements for posts and rails shall conform to ASTM F1043 or F1083 as noted below.
2. Pipe shall be straight, true to section, material, and sizes specified, and shall conform to the following weights per foot:

NPS in inches	Outside Diameter (OD) in inches	Type 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	---
6	6.625	18.97	---
8	8.625	28.55	---

C. Fittings and Accessories:
1. Unless specified otherwise, steel fence fittings and accessories shall comply with ASTM F626 and be galvanized in accordance with ASTM A53, with zinc weights per Table 1 of ASTM A153.
2. Tension Wire: 7-gauge (0.177 inch diameter) coil spring steel with finish to match fabric.
3. Tie Wires: 9 gauge (0.148 inch diameter) steel with finish to match fabric.

4. Caps: Provide weather tight closure cap for each post and exposed ends of framing. Provide line post caps with loop to receive wire or top rail with finish to match fabric.
5. Tension Bars: Hot-dip galvanized steel with minimum length 2 inches less than full height of fabric, minimum cross-section of 3/16 inch by 3/4 inch and minimum of 1.2 ounce zinc coating per sq. ft. of surface area.
6. Tension Clips: Minimum 3/4 inch wide 12-gauge (.105 inch) thick with finish to match fabric.
7. Truss Rods: Hot dipped galvanized steel rods with a minimum diameter of 5/16 inch (7.9 mm).

D. Hardware for Swinging Gates:
1. General:
   a. Hardware shall be of adequate size and strength to provide proper operation of gates.
   b. Provide hinges, latching and locking devices, and other hardware as shown on the Drawings or required for a complete operable installation.
2. Hinges: Master Halco heavy duty, or acceptable equal.
3. Self-closing Hinges:
   a. For gates up to 330 lbs and 5-feet wide: Heavy-duty self-closing hinge with hydraulic damping, ADA compliant (requiring maximum 5 lbs of operating force per CBC 11B-309.4); Locinox Mammoth Heavy Duty "Mammoth180" or accepted equal.
   b. For gates up to 440 lbs and 6 and 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. 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.

2.03 ADDITIONAL MATERIALS AND COMPONENTS

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

B. 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.

2.04 FABRICATION

A. Welding: Welds shall be shop fabricated prior to galvanizing unless otherwise acceptable to District'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. Posts, Rails, Braces, and Gate Frames: Type I galvanized steel pipe as specified.
2. End, Corner, and Pull Posts for the Following Fabric Heights: As noted on the Drawings.
3. Line or Intermediate Posts for the Following Fabric Heights: As noted on the Drawings.
4. Top, Bottom and Horizontal Intermediate Rails: 1.66 inch outside diameter (1-5/8 inch outside diameter).
5. Gate Posts: Single gate leaf, and one leaf of a double gate installation, for nominal gate widths as follows: As noted on the Drawings.
6. Gate Frames: Single or double gate for nominal gate widths as follows:
   a. 6 Feet to 10 Feet: 1.90 inch outside diameter (1-7/8 inch outside diameter).

b. Under 6 Feet: 1.66 inch outside diameter (1-5/8 inch outside diameter).

D. Finishing: At fencing with vinyl coated fabric, posts and railings shall be painted with exterior grade paint, System as specified in Section 09 91 15 – Exterior Site Painting.
1. Color: To match vinyl.

PART 3 - EXECUTION

3.01 PREPARATION

A. Prior to excavation, layout all fencing locations for review and acceptance by District's Representative.

B. Do not begin installation and erection before final grading is completed, unless otherwise permitted.

3.02 ERECTION

A. General: Erect chain link fence and related items in accordance with ASTM F567, in strict conformance with reviewed and accepted shop drawings, and manufacturer's recommendations.

B. Set all posts straight, plumb, and true to line.
1. Set line posts at equal spacing not to exceed 8 feet on centers, in concrete footings not less than 10 inches around and 36 inches deep.
2. Set terminal posts at corners, ends, and gates, in concrete footings not less than 12 inches around and 36 inches deep.
3. Slope tops of concrete footings so as to provide drainage away from posts.

C. Excavation: Drill or hand-excavate holes for posts to diameter and spacing indicated in firm, undisturbed or compacted soil.
1. Unless noted otherwise, excavate holes for each post to minimum diameter recommended by fence manufacturer, but not less than 4 times largest cross section of post.
2. Unless noted otherwise, excavate hole depths approximately 3 inches lower than post bottom, with bottom of posts set not less than 36 inches below finish grade surface.

D. Setting Posts: Center and align posts in holes 3 inches above bottom of excavation. Space chain link posts maximum 8 feet on center unless noted otherwise. Surface mount posts with mounting plates where indicated. Fasten with lag bolts and shields.

E. Top Rails: Run rail continuously through line posts caps, bending to radius for curved runs and at other posts termination into rail end attached to posts or post caps fabricated to receive rail. Provide expansion couplings as recommended by fencing manufacturer.

F. Bottom Rails: Install bottom rails between posts with fittings and accessories as shown in Drawings, as applicable.

G. Brace Assemblies: Install braces so posts are plumb when diagonal rod is under proper tension.

H. Tension Wire: As applicable, install at bottom of fabric (and at top if top rail is not specified) as shown in Drawings. Install tension wire before stretching fabric and attach to each post with ties. Secure wire to fabric with 12.5 gauge hog rings at 24 inches on center maximum.

I. Fabric: Leave approximately 2 inches between finish grade and bottom selvages (1 inch at backstops) unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Install fabric on infield or primary use side of fence, unless noted otherwise, and anchor to framework so that fabric remains in tension after pulling force is released.

J. Tension Bars: Provide one bar for each gate and end post, and two for each corner and pull post, except where fabric integrally woven into post. Thread through fabric, and secure to end, corner, pull, and gate posts with tension clips spaced not over 15 inches on center.

K. Tie Wires: Use U-shaped wire of proper length to secure fabric firmly to posts and rails with ends twisted at least 2 full turns. Bend ends of wire to minimize hazard to persons or clothing. Tie fabric to line posts 12 inches maximum on center and to rails and braces 24 inches maximum on center.

L. Fasteners: Install nuts for tension clips and hardware bolts on side of fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts. Cut all bolts within three threads of nut or less.

M. Field Welding:
1. Field welds shall be completed by a Certified Structural Welder.
2. Comply with applicable AWS specification for procedures of manual shielded metal arc welding, for appearance and quality of welds, and for methods used in correcting welding work.
3. Repair zinc coating damaged by field welding as specified for shop welding.

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

3.03 GATE INSTALLATION

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

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

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

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

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

3.04 ADJUSTMENT AND TOUCH-UP

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

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

END OF SECTION

SECTION 32 32 15

LANDSCAPE CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Architecturally exposed formed concrete.
   2. Natural site concrete at utility pads.
   3. Subgrade, natural, as-cast concrete for tall curbs and other site improvements.

B. Related Requirements:
   1. Section 31 20 00 - Earth Moving
   2. Section 32 13 13 - Concrete Paving
   3. 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: Action and Informational Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.

B. Pre-Installation Meeting: Conduct meeting at Project with District's Representative and concrete installer at site to review scope of landscape concrete work and expectations.
   1. Meeting shall be scheduled after approval of mockups and sufficiently in advance of commencement of architecturally exposed concrete for the site improvements.
   2. Record discussions of conference and any conflict, incompatibility, or inadequacy. Furnish a copy of record to each participant.

C. Coordination:
   1. Coordinate delivery so that mixes may be immediately poured upon arrival at site.
   2. Coordinate proper installation of accessories and anchorage embedded in concrete and for the provision of holes, openings, and other penetrations necessary to the execution of the work of other trades.
   3. Coordinate mix design and finishing of colored concrete work to assure appearance match with cast-in-place concrete included on the Structural Drawings.

1.04 ACTION SUBMITTALS

A. Formwork: Submit for tall curbs.
   1. Show joints, edge profiles, form material, and other items that affect appearance of exposed surface. Indicate specified Class.
   2. See Section 32 33 00, "Site Furnishings," for additional requirements.

B. Reinforcing Steel: Fabricators drawings for steel reinforcing showing complete bending and placing details of reinforcement necessary for location of reinforcement.

C. Product Data: Manufacturers' current catalog cuts and specifications for the following:

1. Formwork panels and board form liners, if used.
2. Expansion joint filler materials.
3. Color admixtures.
4. Curing compounds.
5. Other items as requested by District's Representative.

D. Samples:
   1. Concrete materials as required for testing and inspection.
   2. Expansion Joint Sealant: Manufacturer's standard bead samples showing full range of colors available.
   3. Concrete Panels: Not less than 12 inches by 12 inches for each selected color and finish texture using concrete mix proposed for this Project.
      a. Indicate materials and methods used to produce each color and texture.
   4. Mockup work shall not commence until a concrete sample panels have been approved.

E. Concrete Mix: Mix design and certified compressive strength test report for each concrete strength and type indicating additives and maximum aggregate size required. Report shall be prepared and certified by the ready-mix concrete supplier.

1.05 INFORMATIONAL SUBMITTALS

A. Statement of installer/finisher qualifications if requested by District's Representative.

B. Mill Certificates and Certifications for reinforcing.

C. Delivery tickets for each load of concrete delivered to the site.

D. NRMCA Certificate of Conformance: Submit a copy of the NRMCA Certificate of Conformance to the District's Testing Agency for the ready-mix plant, equipment, and mix trucks that will supply the concrete for the project.

E. Record of pre-installation meeting.

1.06 QUALITY ASSURANCE

A. Codes and Standards: Comply with the applicable provisions of the following codes, specifications and standards, except where more stringent requirements are shown or specified:
   1. California Building Code, Title 24, Part 2, Chapter 19A – Concrete.
   2. American Concrete Institute (ACI):
      a. ACI 301: Specifications for Structural Concrete for Buildings
      b. ACI 303.1: Standard Specification for Cast-In-Place Architectural Concrete.
      c. ACI 303R: Guide to Cast-In-Place Architectural Concrete.
      d. ACI 318: Building Code Requirements for Reinforced Concrete.
      e. ACI 614: Recommended Practice for Measuring, Mixing, and Placing Concrete.
   3. Concrete Reinforcing Steel Institute, Manual of Standard Practice.
   4. NRMCA - National Ready-Mix Concrete Association, Quality Control Manual – Section 3: Certification of Ready Mixed Concrete Production Facilities.

B. Contractor shall be responsible for quality of concrete in place and shall bear burden of proof that concrete as placed meets minimum requirements.

C. Qualifications:
   1. Contractors Design Laboratory: When mixes are proportioned by trial batch method, engage a laboratory conforming to ASTM E329 and under direction of a civil engineer licensed in the State of California.

2. Installer for Formed Surfaces: An experienced concrete contractor who has specialized experience installing cast-in-place architectural concrete similar in quality level, material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance. Installer shall retain a quality-control inspector, experienced in inspecting cast-in-place architectural concrete, and who is an ACI-certified Concrete Construction Inspector or is certified by ICC, as a Reinforced Concrete Special Inspector.
3. Contractor's Testing Agency: An independent testing agency meeting "Recommended Requirements for Independent Laboratory Qualification," published by American Council of Independent Laboratories and basic requirements of ASTM E329, "Use in the Evaluation of Testing and Inspection Agencies as Used in Construction."

D. Concrete Testing:
1. The District may retain, at its expense, a testing laboratory to perform material evaluation tests in accordance with Section 01 45 00 - Quality Control.
2. Testing may include slump tests and securing samples of concrete, cement, aggregates or other materials for testing. Applicable materials shall be provided by the Contractor at no additional cost to the District.

E. Mockups:
1. General:
   a. Mix design shall match that used on accepted sample panels and proposed for use in final construction including cement and color additive.
   b. Prepare at least one month before start of final concrete work to allow concrete to cure before observation.
   c. Concrete color and finish for mockup appearance shall match color and finish of accepted sample.
   d. Build mockups at the location indicated or, if not indicated, as selected by the District's Representative.
   e. Notify District's Representative 5 working days in advance of dates and times when mock- ups will be constructed and layouts will be ready for review.
   f. Contractor shall allow for preparation of 1 comprehensive mockup and up to 2 flat paving mockups for evaluation and final approval of each concrete.
   g. Color and texture shall be approved before starting construction.
   h. 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. Walls and Steps:
   a. Wall Size: Minimum 4 feet long by maximum height and include 2 tie holes, horizontal and vertical corner treatment, and specified texture finishes.
   b. Stair Size: Minimum 2 treads and 2 risers by 4 feet long and including safety scoring at nosing.
3. Board Formed Concrete: An on-site mockup is required for the board-formed architectural cast-in-place concrete for verification of concrete appearance using the proposed mix design. Mockup will also be used for final evaluation and approval of appearance, formwork layout, and workmanship
   a. Size: Not less than 4 foot x 4 foot and to include a typical outside corner.
   b. Form release agent, if required in final construction, shall also be used on mock-up.
   c. Prepare promptly to allow concrete to cure sufficiently before observation by District's Representative.
   d. Mockup will be evaluated for visual appearance of concrete with and without water repellent and patching methods.
   e. Repairs: Representative areas of concrete shall be intentionally damaged, in the presence of the District's Representative, to mimic honeycombing, spalling, and other defects as may be experienced upon stripping of formwork.
   f. Repair it to demonstrate materials and methods proposed for repair of surface blemishes.

g. Specific procedures and materials used for patched area shall be thoroughly documented.

F. Lines and levels shall be established by a licensed surveyor or registered civil engineer.

G. District's Representative will review all forms and joint layout prior to casting concrete.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Coordinate delivery so that mixes may be immediately poured upon arrival at site.

1.08 FIELD CONDITIONS

A. Maintain control of concrete dust and water. Do not permit adjacent areas to be contaminated.

B. For protection of existing trees to remain, see Arborist Report on the Drawings and Section 32 01 90 – Existing Tree Protection and Maintenance.

C. Maintain control of concrete dust and water. Do not permit adjacent areas to be contaminated.

PART 2 - PRODUCTS

2.01 BASE MATERIALS

A. Aggregate: Class 2, 3/4-inch maximum aggregate base, conforming to Section 26 of California Department of Transportation (CDT) "Standard Specifications."

2.02 FORMWORK

A. General:
1. Comply with ACI 347, "Recommended Practice for Concrete Formwork," for formwork and other form-facing material requirements.
2. Furnish in largest practicable sizes to minimize number of joints unless otherwise shown on the Drawings.
3. Seal joints to prevent leakage of paste using demonstrated effective method that will not affect appearance of finished surface.
4. Forms may be reused at concealed surfaces. Forms shall not be reused for exposed concrete surfaces if there is any evidence of surface wear or defect that would impair the quality of the surface or if their reuse will evident and produce a noticeable variation in the appearance in the completed work.
5. Formwork Surface Class at Exposed Concrete: Class A. In addition to ACI 303.1 limits on form-facing panel deflection, limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, to 1/8 inch.

B. Forming Materials:
1. Panels at Smooth Concrete: New, manufactured without addition of urea-formaldehyde, minimum 3/4-inch thick, MDO plywood made specifically for forming of Architectural Concrete to achieve joint pattern shown on Drawings or accepted shop drawings; "PureKor MDO Concrete Formply" by Panel Source International, Inc., or equal.
2. Form Boards: 2 x 8 with resawn face, sized to net 7-1/4 inch width as required for layouts shown on the Drawings.
3. Unexposed Surfaces of Concrete: Plywood, lumber, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
4. Framing: Contractor option, subject to meeting necessary strengths and surface tolerances.

C. Form Hardware:
   1. Ties:
      a. Typical: Metal, spreader type, removable to 1-inch from concrete face.
      b. Exposed Concrete: Fiberglass rod ties, tinted to color to match concrete; “SuperTie” by RJD Industries, Inc., or equal, in tensile strength as selected by form designer.
   2. Wire ties and wood spreaders will not be allowed except that such devices may be permitted for footings, shallow foundations and similar other totally concealed below grade surfaces. Wood spreaders shall not remain in concrete.

D. Form Release Agents:
   1. Concealed Concrete: Contractor option.
   2. Exposed Concrete: Colorless, free from oils, chemically active, guaranteed to provide clean, stain-free concrete release and not to interfere with future applied coatings and finishes.

2.03 REINFORCING

A. Materials:
   1. Reinforcing Steel: Deformed billet steel bars, ASTM A615, Grade 60 for No. 5 and larger, Grade 40 for No. 4 and smaller.
   2. Tie Wire: ASTM A82, black annealed.
   3. Spacers, Bar Supports, and Other Accessories: In accordance with ACI 315. Galvanize metal items exposed to moisture, or use approved other non-corrodible, non-staining supports.
   4. Smooth Dowels for Expansion Joints: ASTM A615, Grade 40 smooth, billet-steel bars, shop painted with iron-oxide zinc-chromate primer.

B. Reinforcing steel shall be cut and bent cold to exact lengths and shapes to comply with Drawings, reviewed shop drawings, and referenced codes and standards.

C. Comply with the additional requirement shown on the Drawings.

2.04 CONCRETE MATERIALS

A. Portland Cement: ASTM C150, Type II, low alkali brand, with a proven history of successful use with proposed aggregates. Cement shall be same brand and from same source throughout the Project.

B. Hardrock Aggregate: ASTM C33.

C. Water: Clean, potable concrete mixing water free from injurious amounts of salts, oils, acids, alkalis, organic materials or other deleterious matter.

2.05 ACCESSORIES

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

B. Fiber Expansion Joint Material: Preformed cellular fiber complying with ASTM D1751; 1/2 inch thick unless otherwise indicated; "SealTight Fiber Expansion Joint Filler" by W.R. Meadows or equal precut to proper size.

C. Safety Strips at Stairs: Cast in, heat treated extruded aluminum alloy 6063-T-6, filled with a mixture of aluminum oxide and silicon carbide abrasive granules in an epoxy binder, ADA and Title 24 compliant; Type 24 by American Safety Tread Co., Inc., or equal.
   1. Colors:
      a. Intermediate Treads: Black.

b. At upper approach and bottom tread, use a strip of contrasting color selected by District's Representative.

2.06 CONCRETE MIXING

A. General:
1. Mix designs for concrete shall be Contractor-designed at its expense. Designs shall be prepared by a qualified agency approved by the District's Representative.
2. Use admixtures according to manufacturer's written instructions.
3. Ensure equipment and plant will afford accurate weighing, minimize segregation, and will efficiently handle materials.
4. Deposit concrete into final position within 90 minutes of introduction of cement.

B. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

C. Waterproofing: Crystalline waterproofing powder shall be added to the concrete mix at water features at rate of 3 percent by weight of Portland cement content, unless otherwise recommended by manufacturer for mix design.
1. Waterproofing shall be added to the concrete mix at time of batching.
2. Thorough blending of the admixture throughout the concrete mix to ensure a homogeneous mixture is obtained.

D. Minimum ultimate compression strength of concrete at 28 days is as follows:

Item	Strength	Maximum slump	Size of aggregate	Cement (# of 94 lb. sacks per yard)	W/C Ratio
Slab-On-Grade	3,000	4 inches	3/4"-1"	5	0.60
Walls and Footings	3,000	4 inches	3/4"-1"	5	0.60

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 Architect before using in work.

PART 3 - EXECUTION

3.01 PREPARATION

A. Use templates for anchor plates, bolts, inserts and other items embedded in concrete. Accurately secure so that they will not be displaced during placing of concrete.

B. Piping and Conduit: Do not embed piping, other than electrical conduit at irrigation sleeves, in structural concrete.
1. Locate conduit to maintain strength of structures at maximum. Verify size, length, and location of electrical conduit.
2. Provide sleeves for irrigation lines provided under Section 32 84 00 - Irrigation.

C. Aggregate Base Course: Compact base course to thickness shown on Drawings in accordance with recommendations of the Geotechnical Engineer.

3.02 INSTALLATION OF FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.
   1. Forms shall be tight enough to prevent loss of concrete mortar.
   2. Wavy surfaces and bulged vertical or slab surfaces in finished work will be rejected.

B. Ties for exposed concrete surfaces shall be arranged symmetrically and shall be aligned both vertically and horizontally. Do not stagger.

C. Extend forms for all exposed concrete at least 6 inches below finish grade.

D. Do not disturb earth at bottoms of excavations for footings or foundations. Maintain these areas free of water, properly cleaned and leveled off.

E. Assemble forms so that all construction joints appear only as shown on Drawings and as accepted by District's Representative Incorporate all formwork joints into required reveal and expansion joints. No exposed form joints will be permitted.

F. Thoroughly clean all formwork prior to pouring concrete. Where no form coating is used, wet down all wood.

G. Place and secure anchorage devices and other embedded items. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

H. Leave no wood in concrete, except pressure-treated nailers.

3.03 PLACING REINFORCEMENT

A. Comply with Comply with CRSI's "Manual of Standard Practice" and additional requirements for placing reinforcement specified for structural concrete on the Drawings.

B. Reinforcement shall be free of paint, oil, dirt, scale, or loose rust or coating that might reduce bond with concrete.

C. When there has been a delay in placing concrete, reinforcement shall be inspected and, if necessary, cleaned, relocated, and tied at no additional cost to District.

D. Wherever conduits, piping, inserts, sleeves, and similar item interfere with placing of reinforcing steel, obtain District's Representative's approval of method of procedure before concrete is placed.

E. Securely tie and support reinforcement to prevent displacement by construction traffic and during casting of concrete.

F. Splices not shown on the Drawings shall be accepted by District's Representative, in writing.

G. Unless permitted in writing, reinforcement shall not be bent after being partially embedded in hardened concrete.

H. Dowels shall be tied securely in place before concrete is deposited.

3.04 PLACING OF CONCRETE

A. Notify District's Representative minimum 5 working days prior to pour.

B. Preparation:
   1. Protect finished surfaces adjacent to areas to receive concrete.
   2. Verify that the Project Engineer and City Inspector, if required, have inspected reinforcement.
   3. Notify Project Engineer, City Inspector if required, and Contractor's testing laboratory at least two working days before placing concrete.

C. Placing:
   1. Moisten earth, and spray forms and reinforcement with water before placing concrete.
   2. Place concrete in continuous operation to permit proper and thorough integration and to complete scheduled placement.
   3. Hot-Weather Concreting: Conform to ACI 305 when mean daily temperature rises above 80 degrees F.
   4. Use vibrators for thorough consolidation of concrete.
      a. Provide vibrators at each point of deposit during simultaneous placing to ensure timely consolidation around reinforcement, embedded items, and into corners of forms; ensure availability of spare vibrators in case of failures.
      b. Do not place vibrators against reinforcement, attach to forms, or use to spread concrete.
   5. Distribute concrete in maximum 18-inch layers, unless otherwise accepted.
   6. Space points of deposit to eliminate need for lateral flow.

3.05 REMOVING AND REUSING FORMS

A. Formwork for a given area shall be removed at the same time to enhance uniformity of final appearance.

B. Formwork that does not support weight of concrete may be removed after cumulatively curing at not less than 50 degrees F for 24 hours after placing concrete provided concrete is hard enough to not be damaged by form-removal operations and provided curing and protection operations are maintained.

C. Remove forms for exposed concrete so as to avoid damage to finish. Do not use pinch bars and similar tools for prying against exposed surfaces.

D. Upon removal of forms, remove bolts, wires, and similar metal items not necessary to finished work to minimum 1 inch from surface. Remove them in such a way as to eliminate danger of rust stains from form-tie materials or other unprotected ferrous materials embedded in or adjacent to exposed concrete surfaces.

E. Re-use of forms will only be permitted as specified. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Apply new form-release agent. Align and secure joint to avoid offsets.

3.06 FINISHING FORMED SURFACES

A. Rough-Formed Finish on Unexposed Concrete: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched. Remove fins and other projections exceeding ACI 347R.

B. Formed Finish on Exposed Concrete: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.
   1. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch in height.
   2. Finish appearance shall match concrete on Building.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces.

Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

D. Adjusting:
   1. Remove projecting fins, bolts, wire, nails, and similar items not necessary for the work, or cut them back 1 inch from the surface and patch in an inconspicuous manner.
   2. Immediately after removal of forms, cut off snap ties extending from the face of concrete to at least 1 inch deep in the concrete. Fill or plug as detailed in Drawings.
   3. Remove in its entirety and replace defective concrete work which after corrective patching, rubbing, or similar procedures fail to duplicate the appearance of unpatched work, conform to the standards set forth in these Specifications, or is determined as unacceptable by the District's Representative.

3.07 FLATWORK FINISHING

A. General:
   1. Provide each concrete finish where shown in the Drawings.
   2. Provide samples and mockups as specified of all concrete finishes for review and acceptance prior to pouring concrete.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats.

C. Trowel Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.

3.08 EXPANSION JOINTS

A. General:
   1. Provide construction and expansion joints as shown. Where not shown, coordinate locations with the District's Representative.
   2. Form construction and isolation joints and tool edges true to line, with faces perpendicular to surface plane of concrete.
   3. Use only experienced personnel and forms or templates to achieve consistent lines.

B. Unless noted otherwise on the Drawings, expansion shall be 1/2-inch wide, the full depth of the concrete section and conforming to Section 51 of the Caltrans "Standard Specifications."
   1. Extend joint fillers full width and depth of joint.
   2. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
   3. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
   4. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
   5. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

C. Sealant Filling of Expansion Joints:
   1. After the curing period, strip out all depth gauge strips and carefully clean expansion joints.
   2. Fill with joint compound in accordance with sealant manufacturer's instructions and ASTM C1193. Avoid spilling compound on adjacent surfaces or overflowing from joint.

3.09 PROTECTION AND CURING

A. Protection:
   1. Protect concrete against rapid drying and damage by rain.

2. Keep concrete moist for at least 7 days.
3. Protect with liquid curing compound, or a covering that will not stain or discolor finished concrete surfaces.
4. Obtain acceptance of proposed method prior to use.

B. Curing: Cure concrete in accordance with the ACI Manual of Concrete Practice and all applicable requirements for curing and protection of concrete included in Sections 90-7 and 90-8 of the Caltrans "Standard Specifications."

C. Integral Color Concrete: Cure colored concrete with only products approved by the manufacturer of the integral color pigments.

3.10 FIELD QUALITY CONTROL

A. Samples: District's testing agency will take samples for laboratory testing during the course of the work when required by Code. Other specified and required testing shall be by the Contractor's testing laboratory.

B. Contractor shall pay for full costs of removal of rejected concrete and its replacement with concrete of specified strength and retesting.

END OF SECTION

SECTION 32 33 00

SITE FURNISHINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Site furnishings and installation accessories as shown on the Drawings including, but not necessarily limited to, the following:
      a. Soccer goals.
      b. Benches.
      c. Tables
   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 District's Representative of area to receive items.
   2. Coordinate construction timing of installation of site furnishings in conformance with other work interfacing with installation of the site furnishing items.

1.04 ACTION SUBMITTALS

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

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

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

1.05 INFORMATIONAL SUBMITTALS

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

1.06 CLOSEOUT SUBMITTALS

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

B. Extended warranties as specified.

1.07 QUALITY ASSURANCE

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

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

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

1.08 DELIVERY, STORAGE AND HANDLING

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

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

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

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

E. Protect wood materials from stains.

1.09 WARRANTY

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

PART 2 - PRODUCTS

2.01 SITE FURNISHINGS - GENERAL

A. In addition to those described in the following Articles, refer to the Site Furnishing Matrix included at the end of this Section for complete list of items to be provided.

2.02 SOCCER GOAL – YOUTH SIZE

A. Product and Manufacturer: Youth size (U8) round face soccer goal by Sportsfield Specialties.
   1. Size: 4' x 6'
   2. Model: SG46 with netting and 1 extra net for each goal
   3. Color: Powder Coated – White
   4. Quantity: 2 Set (4 Goals)

2.03 SOCCER CORNER FLAGS

A. Product and Manufacturer: Premier corner flags by Sportsfield Specialties.
   1. Model: SG6B1404
   2. Color: Yellow base with red flag
   3. Quantity: 2 sets (4 per set)

2.04 PICNIC TABLES

A. Product and Manufacturer: 8' Picnic tables by Wabash Valley
   1. Model: SG111PKKK04
   2. Color: Green top and seats, black powered coated legs
   3. Quantity: 5 sets

2.05 PICNIC TABLES ADA

A. Product and Manufacturer: ADA Picnic tables by Wabash Valley
   1. Model: SG115PKKK04
   2. Color: Green top and seats, black powered coated legs
   3. Quantity: 1 sets

PART 3 - EXECUTION

3.01 EXAMINATION

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

3.02 INSTALLATION - GENERAL

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

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

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 District's Representative.

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

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

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

3.04 SITE FURNISHINGS MATRIX

ITEM	DESCRIPTION	MANUFACTURER	MODEL NO.	QTY.	FINISH/COLOR	DISTRIBUTOR/CONTACT
A.	Youth Soccer Goal	Sportsfield Specialties	SG46	2 sets (4 Goals)	White Frame with Black Netting and 1 Extra Net Provided for Each Goal	Sportsfield Specialties Alex Fletcher (408) 728-0483
B.	Universal Corner Flags	KwikGoal	SG6B1104	X ea.	Red	Sportsfield Specialties Alex Fletcher (408) 728-0483
C.	Picnic Table	Wabash Valley	SG111PKKK04	5 ea.	Powder-Coat-Black (posts), Greed coated table and seats	Wabash Valley (800) 253-8619
D.	Picnic Table (ADA)	Wabash Valley	SG115PKKK04	1 ea.	Powder-Coat-Black (posts), Redwood Recycled Plastic, S-2 Install	Wabash Valley (800) 253-8619

END OF SECTION

SECTION 32 80 00

IRRIGATION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Landscape irrigation system work is shown on the Drawings including, but not necessarily limited to, the following:
   1. Automatic irrigation controls and systems.
   2. Line voltage connections to the irrigation controllers and low voltage control wiring from controllers to remote control valves.

B. Work Included Under Other Sections:
   1. Irrigation water stub-out.
   2. 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 District's Representative. The Drawings may be marked and used for marking layout and equipment locations.

B. Product Data: Manufacturer's literature or cut sheets of products specified and to be incorporated into the irrigation system. Specific products being submitted shall be highlighted or shown on boxes on cut sheets to designate which items are being submitted. Submittals not marked appropriately will be rejected.

C. Materials List: Prior to installation, submit a materials list. Include manufacturer, model number, and description of all materials and equipment. List shall also include sealants, cements, lubricants and other proprietary items.

1.05 CLOSEOUT SUBMITTALS

A. Record Drawings as specified.

B. Maintenance equipment as specified.

C. Warranties and Guarantees

1.06 RECORD DOCUMENTS

A. Comply with Section 01 78 39 – Project Record Documents.

B. Accurately record locations of all piping and equipment that varies from what is shown on the Drawings. Locations are to be clearly dimensioned horizontally to within 1 foot and vertically to within 0.5 feet from a hardscape edge or permanent site feature.
   1. The valve size, station number and gallons per minute shall be legible at each valve and shall match how the controller is wired.
   2. Additionally, each valve shall be annotated to describe which type of irrigation it is; rotor, rotator, spray, bubbler, drip tubing or other.
   3. Symbols for valves shall be annotated as: meter (M), backflow preventer device (BFP), master valve (MV), flow sensor (FS), hydrometer (H), quick coupler valve (QCV).

C. Contractor shall record and scan and submit PDF files of full size plan set of Record Drawings (As-builts Drawings) to the District's representative, and two sets of color coded plans shall be produced, one for placement at or within the irrigation controller cabinet reduced to 11" x 17", and one full size set for submittal to the District or stored at another location selected by the District's Representative.
   1. Both sets shall have all the irrigation valve zone lateral lines color-coded so as to readily distinguish between adjacent zones.
   2. The color-coded copies shall then be professionally laminated in minimum 5 mil clear plastic.

1.07 QUALITY ASSURANCE

A. Unless otherwise specified, install all materials in accordance with manufacturer's details, specifications and recommendations.

B. The Contractor shall be responsible to assure the irrigation installer personally or through an authorized and competent representative, supervises the work and retains the same supervisor on the job from commencement to completion.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Store PVC pipe in a neat and orderly manner fully supported and protected from sunlight.

B. Equipment and materials shall be delivered, unloaded, and handled so as to protect from damage at all times.

1.09 FIELD CONDITIONS

A. PVC shall not be cemented during wet conditions at the discretion of the District's Representative.

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

C. Water Supply: Connections to, or the installation of, the water supply shall be at the locations shown on the Drawings. Minor changes caused by actual site conditions shall be made at no additional expense to District.

D. Discrepancies: In the event of discrepancy, immediately notify the District's Representative. Do not proceed with installation or irrigation components or system in areas of discrepancy until discrepancies have been resolved.

1.10 MAINTENANCE EQUIPMENT

A. Turn-over Materials: Provide 1 each of the following to the District's Representative:
   1. One quick coupler attachment key equipped with standard thread hose bib for each 5 quick couplers installed on the project.
   2. One key for locking quick coupler covers for each 5 quick coupler valves installed on the project.
   3. One key for hose bib operation for each 5 hose bibs installed on the project.
   4. One set of keys to irrigation controller and other installed locking cabinets or pedestals.

B. Full set of remaining nozzles for each rotor sprinkler.

1.11 GUARANTY

A. Contractor: Provide District with a separate written guaranty for the entire irrigation system against defects in installation, workmanship and equipment, for a period of 1 year from the date of Final Acceptance.

B. Contractor shall make necessary repairs to the system as well as to other work affected by defects in the system during guaranty period. Repairs shall be made at the Contractor's sole expense.

PART 2 - PRODUCTS

2.01 GENERAL

A. Use only new materials of brands shown on Drawings, specified herein or as acceptable to the District's Representative.

2.02 PIPE

A. General:
1. Plastic pipe shall be extruded of an improved PVC virgin pipe compound in accordance with ASTM D2672, ASTM D2241 or ASTM D1785.
2. Pipe shall be marked continuously with manufacturer's name, nominal pipe size, schedule or class, PVC type and grade, National Sanitation Foundation approval, Commercial Standards designation, and date of extrusion.

B. Plastic Pipe: Polyvinyl chloride PVC (Type I) 1120.
1. Intermittent-Pressure Lateral Piping: 1120-Schedule 40 PVC plastic pipe with Schedule 40, Type 1, Grade 1, PVC solvent weld fittings.
2. Constant-Pressure Mainline Piping 2 inches and Smaller: Schedule 40 with solvent weld fittings.
3. Constant-Pressure Mainline Piping 2-1/2 Inches and larger: Class 200 SDR-21 or 2-1/2" to 3" Class 315 SDR-14, if requested by District, or C900 Class 200 DR-14, if the system is using recycled or well water.
4. Constant-pressure mainline piping 4 inches and larger shall be Class 200 PVC ring-tite with IPS ductile iron fittings and mechanical restraints at all bell fittings and fittings at changes in direction.
5. Constant-pressure mainline piping 3 inches and larger on systems with booster pumps shall be Class 200 PVC ring-tite with IPS ductile iron fittings and mechanical restraints at all bell fittings and fittings at changes in direction.

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. 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.

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 District for use on recycled water systems, the lids shall be purple or shall have a warning label or nameplate permanently molded into or attached onto the lid with rivets, screws, or bolts.
3. Warning labels shall be as specified on Drawings.
4. Valve boxes shall have locking or bolt down type lids.
5. Markings on valve box covers shall be "heat branded" onto the cover in 1-inch high letters.
6. Manufacturer: Carson Industries as specified and the basis of design, Applied Engineering Inc., NDS, Christy, or equal.

B. 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.

C. 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.

D. 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.

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

2.07 ELECTRICAL

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

B. Low Voltage Control Valve Wiring:
1. Conductors:
a. Control Wires: Type UF, 14-gauge wire. Insulating jacket color shall be red.
b. Common Wires: Type UF, 12-gauge wire. Insulating jacket color shall be white.
c. Spare Control Wires: Type UF, 14-gauge wire, insulating jacket color shall be blue.

d. Spare Common Wire: Type UF, 12-gauge wire. Insulating jacket color shall be green.

2. Splice connectors: 3M DBR-Y6 splice connectors, 3M Scotchcast #3570G-N Connector seal packs, or Spears DS-100 connectors with DS-300 sealant.

2.08 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.

2.09 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.

2.10 TREE AND SHRUB BUBBLERS

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

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

2.11 ADDITIONAL MATERIALS

A. Tape:
1. General:
a. On-site buried recycled water piping shall be identified by warning tape with a minimum width of 3 inches reading "caution – recycled water" (in black or white lettering on purple background). Tape shall run continuously on top of main line piping and shall be attached to piping with plastic tape banded around the warning tape and the pipe every 5 feet on center.
2. Pipe Detection Tape: 3-inch-wide, detectable type; "Terra Tape" "Sentry Line Detectable" from Reef Industries, Inc., 713.507.4251; or equal.
a. Text: "Caution Water Line Buried Below."

B. Tracer Wire: Polyethylene insulated, copperclad steel; "SoloShot XTreme Tracer Wire" by Copperhead Industries, LLC. 877-726-5644, or equal.

C. Sleeves: Class 200 PVC. Install sleeves in locations and at the depths shown on the Drawings. Sleeves shall extend a minimum of 6 inches past the edge of the above hard surface for ease of location.

D. Teflon Tape: Variety commonly used for wrapping threaded connections.

E. Valve Tags: Plastic pre-labeled station tags.

F. Drain Rock: 3/4-inch wash drain rock complying with requirement specified in Section 32 11 00 – Base Courses.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Prior to starting work, test and verify that water pressure levels meet the requirements specified on the Drawings. Notify the District's Representative immediately of any discrepancies.

B. Irrigation Drawings are diagrammatic. Main lines and lateral lines shown parallel in the Drawings may be placed in a common trench, provided that a minimum horizontal distance of 3 inches is maintained between buried lines, as per Drawings.

C. Sprinkler heads are shown schematically. Suspected discrepancies in coverage or sizes of areas to be irrigated shall be brought to the attention of the District's Representative prior to installation. Contractor shall re-direct work to avoid delay while awaiting resolution.

3.02 PREPARATION

A. Contractor shall make provisions and take necessary precautions to protect existing and completed work or features.

B. Layout:
   1. Prior to installation, the Contractor shall stake out all pressure supply lines, routing and location of backflow preventer, all valves, sprinkler heads, bubblers, drip tubing, and automatic controller for review by the District's Representative.
   2. Layout irrigation system and make minor adjustments required due to differences between site and Drawings. Where piping is shown on Drawings under paved areas, but running parallel and adjacent to planted areas, install the piping in the planted areas.

3.03 TRENCHING

A. Conform to Section 31 23 00 – Excavation and Fill.

B. Excavate trenches with vertical walls, uniform bottom, free of deleterious materials, and wide enough for pipes to lay side by side, fully supported on trench bedding. There shall be a minimum 3-inch clearance between all pipes.
   1. No lines shall be installed parallel to and directly over another line.
   2. When lines must cross, the angle shall be forty-five to ninety degrees, and a minimum of three inch (3") vertical clearance shall be maintained.

C. Provide minimum coverage depths as follows:
   1. Mainline: 24 inches in landscape areas, 30 inches in sleeves under paving.
   2. Lateral Lines: 18 inches in landscape areas, 30 inches in sleeves under paving.

D. Hydraulic driving methods shall not be used under paved surfaces.

3.04 PIPE INSTALLATION

A. Comply with manufacturer's instructions as applicable.

B. Rubber Ring Seal Joint:
   1. Use factory-made male end or prepare field-cut male end to exact specifications of factory-made end.
   2. Carefully clean bell or coupling and insert rubber ring without lubricant. Position ring carefully according to manufacturer's specifications.

3. Lubricate male end according to manufacturer's instructions and insert male end to specified depth. Use hands only when inserting PVC pipe.

C. Thrust Blocks:
1. Thrust blocks shall be provided on 3 inch and 4-inch main lines where specified and as necessary to resist system pressure on, and pipe movement of, pressurized lines and fittings. Thrust blocks shall be concrete and the size shall be based on an average soil safe bearing load of 3,000 pounds per square foot.
2. Form thrust blocks in such a manner such that concrete comes in contact only with the fittings, not over the fitting joint. Thrust blocks shall be between solid soil undisturbed and the fitting.
3. Install thrust blocks as shown in Drawings and as described above.
4. Main lines of 3 inches and 4 inches with operating pressures of 85 psi or more, and systems with a booster pump, shall have mechanical restraints at all fittings and changes of flow direction.
5. Main lines 6 inches and larger shall have ductile iron fittings with joint restraints installed at all couplings and changes in flow direction.

D. Solvent Welded Joints:
1. Assemble above ground where possible.
2. Cut square, ream, and thoroughly clean shavings and burs from pipe ends.
3. Make joint using specified primer and cement, continuously wiping off excess.
4. Allow 60 minutes of set-up time before handling and 24 hours curing before applying water pressure.

E. Threaded Joints:
1. Use Teflon tape on all pressurized, threaded plastic to plastic and plastic to metal joints.
2. Hand tighten and use only light strap-type friction wrench pressure to complete.

F. Snake pipe to provide a minimum of 1 additional foot for each 100 feet of pipe to allow for expansion and contraction.

G. Pipe shall be installed as specified and generally as shown in Drawings.

H. Cap or plug pipe openings as soon as pipes have been installed to prevent intrusions of debris.

I. Sleeves:
1. Install pipe sleeves where necessary, where shown and at all points where pipes pass through concrete or masonry. In footings, install sleeving that allows 1-inch minimum clearance around pipes.
2. Each end of sleeve shall extend a minimum of 6 inches beyond edge of paving or structure above. Provide removable non-decaying plug or cap at each end of sleeve, to prevent earth from entering pipe.

J. Thoroughly flush system prior to installing valves, screens and nozzles.

K. Install pipe detection tape and tracer wire above mainline.

3.05 EQUIPMENT AND INSTALLATION

A. Reduced Pressure Backflow Prevention Device: Install in accordance with local codes and as shown on the Drawings.

B. Gate Valves and Ball Valves:
1. Install as shown on the Drawings.
2. Valves shall be installed in valve boxes to provide a minimum of 2-inch clearance between the highest point of the valve and the bottom of the valve box lid.
3. Valves shall not be installed in any area that is within the athletic field of play. All valves shall be located within valve boxes set 12 inches from fencing or edge bands as shown.

4. Locate all boxes a minimum of 10 feet from striping of any field of play.

C. Remote Control Valves:
1. Install as shown in Drawings.
2. Valve boxes shall be set plumb, flush, and square with adjacent structures.
3. Valves shall be installed in valve boxes to provide 2-inch clearance between the highest point of the valve and the bottom of the valve box lid.
4. Install valve tags in an acceptable manner indicating valve station and controller number.
5. Provide 12-inch minimum separation when valve boxes are grouped together, and align in a straight, parallel, even, and orderly manner.
6. Locate all boxes a minimum of 10 feet from striping of any field of play.
7. Locate valves in shrub/ground cover areas whenever possible.

D. Quick Coupler Valves:
1. Install as shown on the Drawings.
2. Quick coupling valves shall be installed in valve boxes to provide 2-inch clearance between the highest point of the valve cover and the bottom of the valve box lid.
3. Locate all boxes a minimum of 10 feet from striping of any field of play.
4. Quick couplers in synthetic fields shall be located against synthetic turf edgeband and curbs.

E. 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.

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.

H. Shrub Bubbler Assemblies
1. Install as shown on the Drawings.

3.06 FIELD QUALITY CONTROL

A. General:
1. Notify District's Representative for the following reviews, with minimum 2 working days' notice:
   a. Pressure testing mains prior to installing heads.
   b. Coverage test prior to planting turf shrubs and or groundcover.
   c. Pre-maintenance observation prior to acceptance of installed irrigation system.
   d. Final observation prior to release of project to District.

2. Contractor shall provide all equipment and personnel required to conduct tests.
3. Provide up-to-date Project Record Drawings at each review.
4. If District's Representative is called out for review prior to the system being ready as specified, the contractor shall be back charged for the full cost of the review time, report, and travel.

B. Pressure Tests:
1. Testing shall occur with trenches open. Small amounts of backfill between fittings shall be allowed to prevent pipe displacement. All fittings shall be visible prior to testing.
2. Test all pressure supply lines under a minimum hydrostatic pressure of 125 psi. Pipe shall hold pressure for a period of 6 consecutive hours with no more than 5 psi loss in order to pass test.
3. Lateral lines shall be tested under full line pressure for a period of 1 hour prior to backfilling. Cap all heads and center load pipe between fittings prior to testing.
4. Correct all deficiencies revealed by tests to the satisfaction of the District's Representative.

C. System Flushing:
1. After lateral lines, swing joints and sprinkler heads are in place and connected, and prior to installation of sprinkler nozzles, thoroughly flush all lines with water to completely clean lines of debris.
2. Install sprinkler filters and nozzles only after lines have been flushed to the satisfaction of the District's Representative.

D. Coverage Tests:
1. Perform coverage tests after systems are completed and operational, after finish grading as specified in Section 32 90 00 - Planting has been completed, but prior to any planting, in the presence of the District's Representative.
2. Correct all deficiencies to the satisfaction of the District's Representative prior to planting.
3. No overspray or runoff of recycled water is allowed on any non-approved use area.

3.07 BACKFILLING

A. General:
1. Backfill only after specified tests have been performed and accepted.
2. Clean trenches of debris and deleterious material before backfilling.
3. Backfill as shown on the Drawings with native material granular in nature and free from deleterious material rocks and clods 2" or larger.
4. Install pipe detection tape over entire run of mainline as shown in Drawings.
5. Compact trenching to 95 percent relative density under pavement and 85 percent relative density within planting areas.
6. Dress off and compact trench surfaces with finish grade in a manner to ensure no settling of trenches will occur. If settling occurs, contractor is to bring in additional topsoil, recompact and grade to be flush with adjacent finish grade.
7. Comply with additional requirements specified in Section 31 23 00 – Excavation and Fill.

3.08 ADJUSTING

A. Adjust and balance system to eliminate overspray, fogging or misting and as directed by District's Representative.

3.09 DEMONSTRATION

A. Instruct District's personnel in complete and proper operation and maintenance of system prior to Final Acceptance.

3.10 MAINTENANCE

A. Contractor shall service and maintain irrigation system during specified Landscape Maintenance Period as specified in Section 31 01 90 - Landscape and Site Maintenance.

B. The entire irrigation system shall be under fully accepted automatic operations for a period of 2 days prior to commencement of planting.

C. Final Acceptance and start of guaranty period shall occur no later than the end of the specified Landscape Maintenance Period.

3.11 FINAL REVIEW

A. Provide District's Representative with Record Documents and other specified closeout submittals prior to Final Review.

END OF SECTION

SECTION 32 90 00

PLANTING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Landscaping as shown on the Drawings including, but not be limited to the following:
   1. Soil preparation.
   2. Fine grading of landscape areas.
   3. Plant material.
   4. Turf Establishment Period.
   5. Landscape Maintenance Period.

B. Related Requirements:
   1. Section 02 41 13 - Site Clearing and Demolition.
   2. Section 31 01 90 - Landscape and Site Maintenance.
   3. Section 32 80 00 – Irrigation.

1.02 REFERENCES

A. American Joint Committee on Horticulture Nomenclature (AJCHN): Standardized Plant Names.

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

C. Sunset Western Garden Book, Lane Publishing Company.

D. Agricultural Code of California.

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

1.03 ADMINISTRATIVE REQUIREMENTS

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

B. Coordination:
   1. Irrigation and drainage systems shall be inspected and tested before start of any Work of this Section. Before covering subsurface drains and any subsurface drainage weeps, Contractor shall inspect and be responsible for their performance.

1.04 ACTION SUBMITTALS

A. Plant Materials and Products:
   1. Thirty days prior to planting, submit 4 copies of documentation that plants specified have been ordered. Include names and addresses of suppliers.
   2. Substitutions: If substitutions are required, they shall be brought to the attention of the District's Representative, at time of submittal. Refer to Section 01 25 00 – Substitution Procedures for additional requirements.

B. Product Data:
   1. Manufacturer's descriptive literature for products proposed for use.

2. Certified chemical analysis of the following:
   a. Fertilizers.
   b. Herbicides.

C. Samples: Submit 4 samples of the following in minimum 1-quart size "zip-lock" plastic bag:
   1. Soil amendment. Include current evaluation and sieve analysis.
   2. Bark mulch top dress.
   3. Topsoil, as applicable.

1.05 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Perform work in accordance with all applicable laws, codes, and regulation required by authorities having jurisdiction over such work and provide for all review and permits required by Federal, State, and local authorities in furnishing, transporting, and installing materials.
   2. Certificates of review required by law for transportation shall accompany invoice for each shipment of plants. File copies of certificates with the District's Representative after acceptance of material. Review by Federal or State governments at place of growth does not preclude rejection of plants at project site.
   3. Control of Work: Comply with Section 5 of the Standard Specifications.
   4. Control of Materials: Comply with Section 6 of the Standard Specifications.

B. Contractor shall employ on-site supervisor at all times during execution of the planting. Supervisor shall be thoroughly familiar and experienced with the materials and products being installed and proper methods of their installation. Notify the District's Representative immediately of changes in supervisory personnel.

C. Products and materials shall be new, first quality, and acceptable to the District's Representative.

D. Tree, Shrubs and Plants: Provide trees, shrubs and plants of quantity, size, genus, species and variety shown and scheduled for landscape work and complying with recommendations and requirements of ANSI Z60.1 "American Standard for Nursery Stock." Provide healthy, vigorous stock, grown in a recognized nursery in accordance with good horticultural practice and free of disease, insects, larvae, and other defects such as girdling or bound roots, knots, 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 District's Representative will review trees and shrubs before planting for compliance with specified requirements for genus, species, variety, size and quantity. District's Representative retains right to further review trees and shrubs for size and condition of root systems, trunks, stems branches or structure, buds, and other required features, and to disqualify unsatisfactory or defective material at any time during the progress of work. Remove disqualified trees or shrubs immediately from project site and replace with materials acceptable to District's Representative.

1.06 DELIVERY, STORAGE, AND HANDLING

A. General:
   1. Ship plant material and seed with certificates of inspection required by governing authorities. Comply with regulations applicable to plant materials.
   2. Handle and store all products of this Section in such a manner as to protect them from damage at all times.
   3. Storage of products on-site shall be coordinated by the contractor in an orderly manner so as not to unnecessarily impede the work or reasonable use of project site.

B. Plants:
   1. Delivery: Coordinate with District's Representative. Provide proper identification for landscape labor force and vehicles at all times while on site.
   2. Storage: Coordinate with District's Representative. Provide exposure as required by plant variety and provide wind protection for all plants. Water regularly to maintain thorough moisture in root zone. Temporary, automatic irrigation system will be required at discretion of District's Representative if extended storage period becomes necessary. Protect dark colored plant containers from direct exposure to the sun.
   3. Labeling: At least one plant of each variety or type shall be legibly labeled at all times clearly indicating correct plant name as indicated on Drawings. Labels shall be durable with waterproof ink.

C. Fertilizers:
   1. Deliver in original, unopened containers with original labels intact and legible which state the guaranteed chemical analysis.
   2. Fertilizer, lime, soil sterilant, and all other potentially toxic products shall not be stored with any other landscape materials.

D. Bulk Material:
   1. Coordinate delivery and storage of bulk material with District's Representative.
   2. Confine materials to neat piles in areas acceptable to the District's Representative.

1.07 FIELD CONDITIONS

A. Planting operations shall not be conducted under the following conditions, subject to the discretion of the District's Representative:
   1. Freezing weather.
   2. Excessive heat.
   3. High winds.
   4. Excessively wet conditions.

1.08 WARRANTY

A. Contractor shall warrant work executed and all materials provided or used under this Section shall be free of defects and poor workmanship for a period of 1 year after Final Acceptance.

B. Contractor 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 District's Representative during Warranty Period.
   2. Replaced plants shall be subsequently guaranteed by the Contractor for an additional year following date of replacement.
   3. Repair defective materials and work shall be acceptable to the District's Representative.

1.09 TURF ESTABLISHMENT PERIOD

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

1.10 MAINTENANCE PERIOD

A. Refer to Section 31 01 90 - Landscape and Site Maintenance for information.

PART 2 - PRODUCTS

2.01 TOPSOIL

A. Topsoil shall be clean on-site material that has been previously stripped from the top 4 inches of grade after initial 2-inch stripping of organics. Acceptable topsoil shall be free from rocks, stones, rubble, and clay clods over 1.5 inches in diameter, roots, toxins, and any other deleterious materials.

B. Imported topsoil shall have an agricultural suitability test by a qualified soils laboratory, dated within 30 days of purchase.
   1. Import topsoil proposed for use shall be submitted to the District's Representative for review and acceptance prior to delivery to the Project site.
   2. Submit samples and current soil fertility and structure analyses in the quantity specified.

2.02 FERTILIZERS

A. General:
   1. Fertilizers shall be of an acceptable brand with a guaranteed chemical analysis as required by USDA regulations.
   2. Fertilizers shall be dry and (except plant tabs) free flowing.

B. Pre-Plant Fertilizer: Shall be of the following chemical analysis:

Nitrogen:	6 percent.
Phosphoric Acid:	20 percent
Soluble Potash:	20 percent

C. Post-Plant Fertilizer: Shall be of the following chemical analysis:

Nitrogen:	16 percent
Phosphoric Acid:	6 percent
Soluble Potash:	8 percent

D. Plant Tabs: 7-gram tabs designed for 12-month slow release with the following chemical analysis by weight; "Gro-Power" or equal:

Nitrogen:	12 percent
Phosphoric Acid:	8 percent
Soluble Potash:	8 percent
Humus:	20 percent
Humic Acid:	4 percent
Sulfur:	3.5 percent
Iron:	2 percent
Micronutrients	

2.03 SOIL ADDITIVES

A. Soil 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. Forest Floor Humus
    Aguiñaga Fertilizer
    (949) 786-9558

    d. Washed Steer Humus/WCP33
    Earthworks
    (951) 782-0260

    e. Garden Humus
    Agromin
    (805) 432-5265

    f. Superior Compost
    Whittier Fertilizers
    (562) 699-3461

    g. Humic Compost
    Agri Service
    (760) 643-4041

    h. Or approved equal.

    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 District’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 MULCH TOP DRESS

A. Material: Medium-sized, 3/4 inch to 2 inches, decorative chipped wood, homogenous in appearance, free of deleterious and inorganic material, sticks, shredded, stringy, and fibrous materials; "Golden Nuggets" from Sun Up, 800-222-255; "MBC Red" from My Bark Company, Inc., 209-786-4042; or equal.

2.05 PLANTS

A. General:
1. Plants shall conform to the species and minimum sizes shown on the Drawings.
2. Quantities shown on the Drawings are for the Contractors convenience only. Contractor shall provide plant material to fulfill the intent of the Planting Plan at the discretion of the District's Representative.

B. Condition: Plants shall conform to the following minimum requirements:
1. Nursery grown unless otherwise specified.
2. Supplied in appropriate container, balled and burlapped, or bare root as specified on Drawings.

2.06 SEED MIXES

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

B. Mix: Turf seed mix subject to acceptance by the District's Representative, shall be as follows:
1. Sports Field Turf: "Sportsclub 60/40 Tournament Blue/Rye Mix" from Pacific Coast Seed, Inc., 800-733-3462, or equal, in the following percentages and applied at a rate of 305 pounds per acre:

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

2. Native Grass and Wildflower Mix: The following applied in pounds per acre:

Pounds per Acre	Product
30	Festuca rubra, Molate Red Fescue
20	Festuca idahoensis, Idaho Fescue - Sonoma County Source
20	Festuca occidentalis, Western Fescue
1.5	Eschscholzia californica – Alameda County California Poppy
1.5	Lasthenia glabrata – Goldfields

Pounds per Acre	Product
3	Lupinus nanus - Sky Lupine
1.25	Clarkia bottae – Showy Clarkia
0.25	Castelleja exerta – Purple Owls Clover
1.5	Collinsia heterophylla – Chinese Houses
Note: Add 6 pounds of Vulpia microstachys or 20 pounds of Regreen per acre if erosion control is to be accomplished primarily through the growth of winter germinating plants.	

3. Quality:
   a. Seed shall be in conformance with the California State Seed Law of the Department of Agriculture.
   b. Each seed bag shall be delivered to the site sealed and clearly marked as to species, purity, percent germination, dealer's guarantee and dates of test. Prior to seeding at the request of District Representative, the contractor shall provide a letter of certification, original Association of Official Seed Analysts (AOSA) seed test results.
4. Mix Source: Pacific Coast Seed, Inc., 800-733-3462, or equal.

2.07 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	Native grass and wildflower seed mix
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.

2.08 HERBICIDES

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

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

2.09 ADDITIONAL MATERIALS

A. Water: Clean, fresh, and free of substances or matter which could inhibit vigorous growth of plants.

B. General: Products and materials shall be new, first quality as acceptable to the District's Representative.

C. Tree Stakes and Ties: As shown and specified on the Drawings.

D. Header Board: As shown and specified on the Drawings.

E. Root Barriers: Model #UB 24-2 "Universal Barrier" by Deep Root Partners L.P, 800-458-7668, or equal.

F. Weed Barrier: "Pro Weed Barrier" Model 24003080 DeWitt Co., Sikeston MO, 800-888-9669, or equal.
   1. Roll Size: 12 feet by 250 feet.
   2. Anchorage: 8 inch jute staples.

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 District's Representative, for tests.
      1) Testing agencies are as follows:
         a) Wallace Laboratories, El Segundo, CA, (310) 615-0116. Contact: Garn Wallace.
         b) WayPoint Analytical, Anaheim, CA, (714) 282-8777.
   b. The results of the testing will be reviewed by the District Representative and direction for amendment additives ratio will be provided.
   c. The Contract sum will be modified, in accordance with the procedures for changes in the work included in the Contract, if there is a variance from the above specified additives or quantities.
3. After additives are fully incorporated into the soil, the Contractor shall perform further testing to check conformance with the newly recommended materials and quantities. If deficiencies are found, the Contractor shall be solely responsible for the cost of adding deficient material as necessary and re-testing required to verify conformance.
4. Contractor shall also schedule 7 working days after soil samples have been taken to allow for receipt and evaluation of soil tests at no cost or delay to the project.

B. Planting Area Finish Grades:
1. After tilling in additives and re-compaction to 85 percent relative compaction, rake planting areas smooth and set finish grades as follows.
2. After soil preparation, finish grades of planting areas shall be 1 inch below adjacent paving, headers, utility boxes, irrigation boxes, and other in-grade items. Finish grade slopes shall be consistent.
3. Drainage structures, including catch basins, area drains, and concrete swales, shall be flush with finish grade to allow for proper drainage. Soil shall be sloped consistently from spot elevations provided to drain.
4. In planting areas to receive mulch, depth of mulch shall taper within 3 feet of paving edge to a depth from 3 inches to 1 inch at edge of pavement.
5. Irrigation head elevation relative to finish grade shall be installed as shown.
6. After sand channel drainage system, finish grade shall be re-established.
7. Infield fines and warning tracks shall be graded to be flush with depth of sod soil. If sod is at 3/4 inches, then that will be the difference of the sod subgrade to the infield fines finish grade prior to placement of the sod.

3.04 NATIVE GRASS AND WILDFLOWER HYDROSEEDING

A. Verify that soil is prepared and finish graded as specified prior to hydroseeding.

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.

3.05 TURF SEED INSTALLATION

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

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

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

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

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

3.06 TURF ESTABLISHMENT PERIOD

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

3.07 TREE, SHRUB AND GROUND COVER PLANTING

A. These areas shall receive specified topsoil and soil amendments prior to commencing with tree, shrub and ground cover planting.

B. Layout: Coordinate layout of plants with District's Representative for review and acceptance.

C. Plant Pit Excavation:

1. Excavate pits to sizes indicated in Drawings.
2. Thoroughly scarify all sides of plant pits to remove "auger slick" and encourage root penetration.

D. Set trees and shrubs in pit on tamped backfill base as per Details. Set plumb and face for best appearance. Thoroughly scarify all plant root balls to eliminate any circling roots and to encourage root growth. Set plant so root crown will level with or be slightly above surrounding grade after settlement.

E. Backfilling:
1. Backfill mix for 1 gallon size and larger shall consist of 100 percent native site soil with plant tabs added per manufacturer's recommendations.
2. Tamp backfill mix under and around root balls.
3. Flood plant pit when half backfilled; allow to drain.
4. Complete backfilling. Tamp as necessary, do not over compact.

F. Palm Pit Backfilling:
1. Fill the hole with washed plaster sand.
2. Water in as you fill hole with sand to wash the material around the exposed roots.
3. Avoiding leaving any air pockets or voids that will allow the roots to dry out.
4. The sand backfill should ensure good drainage plus provide rigidity so you may not have to brace the tree.

G. Watering:
1. Thoroughly water plants immediately after planting.
2. Construct water basins as specified in Drawings.

H. Finish Grade Restoration: Restore finish grades by hand raking. Dispose of excess subgrade soil.

3.08 TREE STAKING

A. Stake trees as shown in the Drawings.

B. Set stakes plumb, without damage to rootball and sufficiently deep to provide necessary support.

C. Tree ties shall be tied loosely enough to allow movement, yet taut enough to support tree.

3.09 HERBICIDE APPLICATION

A. Apply in accordance with manufacturers' recommendations.

B. Apply pre-emergent herbicide to soil prior to placement of bark mulch top-dress.

3.10 MULCH TOP DRESS

A. Install weed barrier in all planters to receive mulch. Weed barrier is to be installed prior to mulch installation and after acceptance of finish grade operations. Install with stakes 24" on-center.

B. 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.

C. 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.

D. Mulch shall dictate finish grade in planting areas.

3.11 INSTALLATION OF ADDITIONAL MATERIALS

A. Header Board: Install as shown on the Drawings.

B. Root Barriers: Install as shown on the Drawings.

3.12 FIELD QUALITY CONTROL

A. The District's Representative will review and accept the following prior to the Contractor proceeding with subsequent work:
   1. Preparation: At completion of finish grading and prior to planting, grading tolerances and soil preparation will be checked for conformance to Contract Documents.
   2. Layout of plants, header board, and other major items shall be as directed and accepted by the District's Representative.
   3. Pre-Maintenance Review: At completion of planting, work shall be reviewed for conformance with Contract Documents. Acceptance shall mark beginning of the specified maintenance period. If acceptance is not given, a punch-list of items requiring attention will be issued to the Contractor. One more review will be allowed after Contractor certifies in writing that the punch-list has been completed. Punch-list shall be completed to the satisfaction of the District's Representative prior to commencement of the Specified Maintenance Period.

B. 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

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. Cleanouts.
   4. Drains.
   5. Catch basins.

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

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. Catch basins Include plans, elevations, sections, details, frames, covers, and grates.

B. Product Data: Manufacturer's cut-sheets of products to be used.

1.05 INFORMATIONAL SUBMITTALS

A. Field Test Reports indicating and interpreting test results for compliance with performance.

1.06 CLOSEOUT SUBMITTALS

A. Record Drawings:
1. Accurately record location of new piping, drain structures, and connections to existing systems using horizontal dimensions, elevations, inverts, and slope gradients as applicable.
2. Comply with the additional requirements of Section 01 78 39 – Project Record Documents.

1.07 QUALITY ASSURANCE

A. Control of Work: Conform to Section 5 of the Standard Specifications.

B. Control of Materials: Conform to Section 6 of the Standard Specifications.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Store pipe neatly and orderly, stacked and blocked to prevent damage. Cracked, checked, spalled, or otherwise damaged pipe and precast concrete units shall be removed from site.

B. Use of chain slings shall not be permitted.

C. Piping, fittings, and related materials shall be carefully handled. Comply with manufacturer's rigging instructions for precast items. Use of chain slings is not be permitted.

D. All pipelines, fittings and drainage structures shall be kept clean and closed during construction.

1.09 FIELD CONDITIONS

A. Make provisions for, and take the necessary precautions to, protect existing and new work from damage during entire life of project.

B. Work of this Section shall not be executed when site conditions are detrimental to quality of work as determined by the District's Representative.

C. Do not interrupt service to facilities occupied or used by District without the District's written permission.

PART 2 - PRODUCTS

2.01 PIPE AND FITTINGS

A. General:
1. Pipe and fittings shall be clearly and permanently marked to identify manufacturer, type, class, or schedule and NSF approval as applicable.
2. Unless otherwise noted, Contractor has option of using either CHDPE or PVC pipe as specified.

B. Corrugated High Density Polyethylene (CHDPE) Pipe: Dual wall, perforated and solid with an integrally formed smooth waterway; "N-12 "drainage pipe by Advanced Drainage Systems, Inc., 510-913-2211, or equal.
   1. Nominal sizes shall have a full circular cross-section, with an outer corrugated pipe wall and an essentially smooth inner wall (waterway).
   2. Corrugations may be either annular or spiral.
   3. Sizes shall conform to the AASHTO classification "Type S."
   4. Pipe manufacturer for this specification shall comply with the requirements for test methods, dimensions, and markings found in AASHTO Designations M252 and M294.
   5. The minimum parallel plate stiffness values when tested in accordance with ASTM D2412 shall be as follows:

Diameter	Pipe Stiffness
4 inch (100 mm)	50 psi (340 kPa)
6 inch (150 mm)	50 psi (340 kPa)
8 inch (200 mm)	50 psi (340 kPa)
10 inch (250 mm)	50 psi (340 kPa)
12 inch (300 mm)	50 psi (340 kPa)
15 inch (375 mm)	42 psi (290 kPa)

   6. Fittings: Virgin PE compounds conforming with the requirements of ASTM D3350, cell class 324420C, and supplied or recommended by the pipe manufacturer.
      a. The fittings shall not reduce or impair the overall integrity or function of the pipeline.
      b. Common Corrugated Fittings:
         1) Couplers, reducers, and other in-line joint fittings.
         2) "Tees", "wyes", end caps, and other branch or complimentary assembly fittings.
      c. Acceptable Installation Methods: Snap-on, screw-on, bell and spigot, and wrap around.
      d. Couplings shall provide sufficient longitudinal strength to preserve pipe alignment and prevent separation at the joints.
      e. Where designated on the Drawings and as required by the manufacturer, a neoprene or rubber gasket shall be supplied.

2.02 DRAINAGE STRUCTURES

A. 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.

ITEM	DESCRIPTION	MANUFACTURER	MODEL NO.	GRATE INFORMATION
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.

B. 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.

C. Clean Outs: As shown or noted in the Drawings.

D. Trench Drains: Pre-sloped slot channel drain; Model KS 100S by ACO Polymer Products, Inc., 888-490-9552, or equal.
   1. Provide appropriate end connections and 600 series catch basin with in-line trash bucket and outlet connections.
   2. Grates:
      a. Pedestrian Locations: No. 494Q with quick lock locking device and complying ADA Standards for Accessible Design.
      b. Vehicular Traffic Locations: Galvanized, No. 411Q.

E. Perforated Vertical Drains: Multi-Flow Drainage System by Varicore Technologies, Inc., 800-978-8007, and distributed by Reed & Graham, 888-381-0800.
   1. Fittings, adaptors, and couplers shall be Multi-Flow components.

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. 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

2. 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.
3. Supplier: Stevens Creek Quarry, Inc., Cupertino, or TMT Enterprises, Inc., San Jose, or equal.

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

G. Impermeable Fabric:

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. Reinforcing Bars: As specified in Section 32 32 15 – Landscape Concrete.

K. 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 District's Representative.
   3. Prefabricated units not having a bottom shall be set on a poured-in-place concrete slab with smooth trowel finish. Mortar and properly seal unit to slab, making a 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. Cleanouts: Install as shown in the Drawings.

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

E. Vertical Drains:
   1. The trench excavations for the vertical drain shall be to the lines and grades shown in the Drawings. Over excavation in the bottom of the excavations shall be backfilled to the proper grade with excavated material prior to the placement of the drainage system.
   2. Fittings shall be installed in accordance with the manufacturer's recommendations. Use two-inch polyethylene tape provided by manufacturer to seal the filter fabric to the fittings and preclude intrusion of backfill between the core and filter fabric.
   3. No excavated material shall be used as backfill around geocomposite unless approved by the District's Representative. Do not use backfill that contains rocks, pieces of pavement or debris with a dimension greater than 1 inch.

3.04 IDENTIFICATION

A. Materials and their installation are specified in Section 31 20 00 - Earth Moving. Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.

B. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.05 FIELD QUALITY CONTROL

A. The District's Representative shall review and accept work at the following stages:
   1. Excavated trench with bedding in place prior to any pipe being laid.
   2. Pipe laid prior to backfilling. Pipe covered prior to review and acceptance shall be uncovered and re-backfilled at Contractor's expense.
   3. Drainage device location and pipe connection.
   4. New drainage system shall be flood tested and clean of debris.

END OF SECTION