

CITY OF SEASIDE

LINCOLN CUNNINGHAM PARK BASKETBALL COURT IMPROVEMENTS

Technical Specifications

100% Construction Documentation
April 3, 2023

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SECTION 01 57 23

TEMPORARY WATER POLLUTION CONTROL

PART 1 - GENERAL

1.01 SUMMARY

- A. Work in this section includes furnishing all labor, equipment and materials necessary for the implementation of temporary Water Pollution Controls, including implementation, monitoring, and maintenance of Best Management Practices (BMPs).
- B. The anticipated area of disturbance for this project is less than one acre. If the area of disturbance will exceed one acre, the OWNER must obtain coverage under the State's Construction General Permit. The CONTRACTOR shall notify the ENGINEER in the event he anticipates the area of disturbance will exceed one acre. The CONTRACTOR shall not disturb more than one acre on the site, including staging, material lay-down, and equipment storage areas, if the OWNER has not gained coverage under the Permit
- C. Principal items of work include:
 - 1. Training employees and subcontractors in stormwater Best Management Practices (BMPs)
 - 2. Stormwater site inspections
 - 3. Reporting and recordkeeping
 - 4. Implementing and maintaining BMPs, and removing BMPs when no longer needed.
 - 5. Non-stormwater management and good housekeeping practices
 - 6. Final site cleanup

1.02 REFERENCES

- A. Standard Specifications, State of California, Department of Transportation (Caltrans), 2018 edition
- B. Standard Plans, State of California, Department of Transportation (Caltrans), 2018 edition
- C. Construction Site Best Management Practices Manual (BMP Manual), State of California, Department of Transportation (Caltrans), 2003 edition

1.03 QUALITY ASSURANCE

- A. CONTRACTOR's Water Pollution Control Manager (WPCM) is responsible for overseeing the implementation of Temporary Water Pollution Control (WPC) work on a day-to-day basis. The WPCM shall be an employee of the Contractor and shall be on site regularly.
- B. The WPCM shall educate, direct and enforce compliance with WPC requirements by all employees and subcontractors.
- C. All contractor employees, subcontractors, and heavy equipment operators shall attend a pre-construction WPC training session conducted by the Contractor's WPCM.

1.04 GENERAL PERFORMANCE REQUIREMENTS

- A. All storm water and non-storm water discharges shall be in compliance with all applicable federal, state, and local requirements.

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- B. This Section outlines the contract minimum requirements, and does not relieve the Contractor of his responsibilities for protection of water quality in accordance with all federal, state, and local requirements.
- C. Additional BMPs shall be required if the BMPs which are utilized are not adequately protecting water quality.
- D. The Contractor shall update the Water Pollution Control Drawings to indicate current operations, equipment used, sequence of work, and other aspects of the project.
- E. Contractor is responsible for the performance of subcontractors. Contractor's WPCM shall inspect and monitor all subcontractors' work and storage areas for compliance with this Section.

1.05 FINES AND PENALTIES

- A. Contractor shall pay any fines and be liable for any other penalties that may be imposed by any federal, state, or local regulatory agency for non-compliance with any water quality requirement during the course of work.
- B. Contractor is responsible for implementing any and all BMP corrective measures, at his own expense, as may be directed by the regulatory agencies.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Provide all temporary and permanent water pollution control measures, equipment and materials as required by this Section and the Construction Drawings.
- B. Materials shall conform to the Caltrans Standard Specifications and Caltrans Standard Plans including Standard Specifications sections:
 - 1. 13-4 Job Site Management
 - 2. 13-5 Temporary Soil Stabilization
 - 3. 13-6 Temporary Sediment Control
 - 4. 13-7 Temporary Tracking Control
 - 5. 13-8 Temporary Active Treatment System
 - 6. 13-9 Temporary Concrete Washouts
 - 7. 13-10 Temporary Linear Sediment Barriers
 - 8. 14-9 Air Quality
 - 9. 14-10 Solid Waste Disposal and Recycling
 - 10. 14-11 Hazardous Waste and Contamination

2.02 SUBMITTALS

- A. Provide documentation for WPCM, employee and subcontractor training, including pre-construction WPC training.

PART 3 - EXECUTION

3.01 MONITORING, INSPECTIONS AND REPORTING

- A. Monitor the National Weather Service (NWS) forecast on a daily basis during the rainy season.
- B. Conduct inspections:

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1. Within 72 hours prior to predicted rain events to ensure that the site is prepared for the rain event
 2. Within 48 hours after a rain event to evaluate BMP performance and identify corrective actions
 3. Conduct daily inspections of adjoining public roadways, material storage areas, and vehicle and equipment areas.
- C. Implement identified corrective actions within 72 hours, unless a later date is authorized.
- D. Notify the OWNER of any site visits by or correspondence received from any federal, state, or local agency, which are related to activities under this Section.

3.02 BEST MANAGEMENT PRACTICES

- A. Implement Best Management Practices as required by Sections 13 and 14 of the Caltrans Standard Specifications.
- B. Work shall comply with the following Caltrans Standard Specifications Sections, as applicable:
1. 13-4 Job Site Management
 2. 13-5 Temporary Soil Stabilization
 3. 13-6 Temporary Sediment Control
 4. 13-7 Temporary Tracking Control
 5. 13-8 Temporary Active Treatment System
 6. 13-9 Temporary Concrete Washouts
 7. 13-10 Temporary Linear Sediment Barriers
 8. 14-9 Air Quality
 9. 14-10 Solid Waste Disposal and Recycling
 10. 14-11 Hazardous Waste and Contamination
- C. Best Management Practices shall be implemented concurrent with the commencement of construction, shall be maintained throughout construction, and shall be removed when no longer required, when approved by the ENGINEER.

3.03 COMPLETION OF WORK

- A. Final site cleanup and stabilization shall be considered complete when all of the following have been achieved:
1. The site will not pose any additional sediment discharge risk than it did prior to the commencement of construction activity;
 2. There is no potential for construction-related storm water pollutants to be discharged into site runoff;
 3. Final stabilization has been reached;
 4. Construction materials and wastes have been disposed of properly;
 5. Post-construction storm water management measures have been installed;
 6. All construction-related equipment, materials and any temporary BMPs no longer needed are removed from the site.

END OF SECTION

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SECTION 01 71 23

FIELD ENGINEERING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Work in this section includes surveying and engineering services required for the execution of work
- B. Contractor must:
 - 1. Provide SURVEYOR to perform construction staking as outlined herein
 - 2. Locate utilities by an appropriate combination of potholing and electronic detection
 - 3. Verify horizontal and vertical locations of all utility crossings and points of connection
 - 4. Verify horizontal and vertical elevations of existing improvements at match points
 - 5. Provide any engineering calculations and/or plans required for execution of CONTRACTOR's construction methods
- C. Principal items of work include:
 - 1. Field location of existing on-site utility lines and improvements required for the execution of the work under this contract.
 - 2. Surveying and construction staking work required for the execution of the work under this contract.
 - 3. Civil, structural or other professional engineering services required to execute Contractor's construction methodsParagraph.

1.02 EXISTING DATA

- A. Review and verify the existing horizontal and vertical controls within two (2) weeks of Notice to Proceed, and prior to the start of work.
- B. Review all record documents provided by the OWNER within two (2) weeks of Notice to Proceed, and prior to the start of work,
- C. Site data given herein and on the Drawings are as exact as could be secured, but their absolute accuracy cannot be guaranteed. Exact locations, distances, elevations, etc., shall finally be governed by field conditions and the ENGINEER'S instructions.
- D. In the event there is any conflict between actual conditions and the Drawings, notify the ENGINEER immediately and do not proceed with the work until directed by the ENGINEER.

1.03 QUALIFICATIONS OF SURVEYOR

- A. California registered civil engineer or California licensed land surveyor, acceptable to OWNER

1.04 QUALIFICATIONS OF ENGINEER

- A. California registered engineer of the appropriate discipline, acceptable to OWNER.

1.05 SUBMITTALS

- A. Submit the name, address, and license number of the ENGINEER to the OWNER, if CONTRACTOR-provided.

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PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 PROTECTION OF SURVEY REFERENCE POINTS

- A. Locate and protect existing survey reference points prior to starting site work, and preserve all permanent reference points during construction.
- B. All stakes, boundary lines, corner markers, benchmarks survey markers, etc., which have been or may be established in any part of the site, must be carefully preserved and respected by the CONTRACTOR and must be restored at the CONTRACTOR's expense if lost or destroyed as a result of the CONTRACTOR's operations.

3.02 CONSTRUCTION STAKING

- A. Prior to the start of work, SURVEYOR shall review and verify the existing horizontal and vertical controls. Report any discrepancies to the ENGINEER.
- B. Establish and safeguard a minimum of two permanent benchmarks on the project site.
- C. SURVEYOR shall establish all necessary horizontal and vertical survey control lines and points on site prior to commencement of CONTRACTOR's work, as outlined below. These controls shall be maintained by the CONTRACTOR throughout the course of construction.
- D. The following survey stakes shall be provided by the CONTRACTOR-PROVIDED SURVEYOR for use in constructing the improvements as shown on the contract documents.
 - 1. Rough Grade Stakes for areas to be paved and play area to be excavated.
 - 2. Finish Grade Stakes for curbs, gutters, slabs and sidewalk areas – Provide stakes at grade breaks and angle points, at beginning and end of horizontal and vertical curves, at maximum 25' spacing on curved alignments, at 50' spacing on tangent alignments, and as generally necessary for construction of the work.

3.03 RECORDS

- A. Maintain a complete, accurate log of all control and survey work as it progresses.
- B. Upon completion of final site improvements, prepare record (as-built) drawings including locations and elevations of all underground utilities, site drainage piping and structures, points of connection, manholes and drain inlets, and locations of utility stub outs.

END OF SECTION

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SECTION 11 68 33

SPORTS EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to the work of this Section.

1.02 DESCRIPTION OF WORK

- A. Extent: Work in this section includes, but is not limited to, the provision and installation of all sports equipment including but not limited to the following with all miscellaneous hardware, foundations, footings and miscellaneous appurtenances thereto:
 - 1. Basketball Goal System
- B. Related Work:
 - 1. Field Earthwork and Grading
 - 2. Site Concrete

1.03 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. American Society for Testing and Materials (ASTM).
 - 2. National Federation of State High School Associations (NFHS).
- B. Submittals:
 - 1. Submit manufacturer's product literature, technical specifications, and other data required to demonstrate compliance with specified requirements for all sports equipment.
- C. Review:
 - 1. All site accessories and locations shall be reviewed by the Architect prior to installation.

1.04 FIELD MEASUREMENTS

- A. Contractor shall verify position and layout of sports equipment. Verify dimensions by field measurements.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. SportsEdge, Troutman NC, 28166. Contact Greg Norfleet, 925-250-9565. (www.sportsedge.com)
- B. PW Athletic, IL and AZ, 800-710-3390 (www.pwathletic.com)
- C. www.JayProSports.com
- D. Approved equal, prior to the Bid.

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2.02 SPORTS EQUIPMENT

- A. General: Provide equipment complying with requirements of NFHS rules.
- B. Approved equals: All equipment specified herein is subject to approved equals as manufactured by specified Acceptable Manufacturers.
- C. List of Equipment:
 - 1. Provide two outdoor Basketball Goal Systems (post, backboard, rim, net, and post pad):
 - a. Model #Tyrant Max with 36"x54" aluminum, fan shaped backboard, by SportsEdge.
 - b. Model #656 gooseneck post, #UBG-500 playground goal and net, and #ALB-24BT aluminum fan backboard, by JayProSports.com.
 - c. Post Pad: Provide 6' high post pad per manufacturer, standard color per Owner.

PART 3 - EXECUTION

3.01 JOB CONDITIONS

- A. Inspection: Verify that earthwork is completed to correct line and grade. Notify Architect of any incomplete work by previous Contractors.

3.02 INSTALLATION

- A. Sub-grade Preparation: Refer Earthwork and Grading, Section 312213.
- B. Install all equipment per manufacturer's recommendations and details, and as shown on the Drawings.
 - 1. Install posts, poles, and footings as shown on the Drawings.
- C. Concrete foundations and footings: Refer Site Concrete, Section 321900.
 - 1. Forms shall be set accurately to line and grade. If the forms are set more than 0.01 foot (3 mm) above or below grade or more than 0.02 foot (6 mm) from prescribed alignment, they shall be corrected before any concrete is placed.
- D. Clean Up: The Contractor shall remove excess excavated material from the site of the work. He shall clean up and dispose of rubble and construction debris, and leave the site of the work in a condition satisfactory to the Owner.

END OF SECTION

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SECTION 12 93 00

SITE FURNISHINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to the work of this Section.

1.02 DESCRIPTION OF WORK

- A. Extent: Furnish all labor, material, equipment, tools, and incidentals necessary for the provision and installation of Site Furnishings as shown on the Drawings and as specified in this Section. The work includes all miscellaneous hardware, foundations, footings and miscellaneous appurtenances associated with the installation. Items to be installed include:
 - 1. Bench
- B. Related work includes but is not limited to:
 - 1. Aggregate Base
 - 2. Site Concrete

1.03 STANDARDS

- A. Unless otherwise shown or specified, all materials and methods shall conform to the appropriate current sections of: the State of California Department of Transportation (CALTRANS) Standard Specifications, latest edition, except for measurement and payment requirements.
- B. Applicable ASTM International Standards (latest revisions) as they apply to this work and related test methods, including:
 - 1. C1107 Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
- C. Applicable ISO Testing Standards (latest revisions) as they apply to this work.
- D. California Building Code (CBC) Chapter 11B for accessibility to Site Furnishings.

1.04 SUBMITTALS

- A. Documentation: product data for all standard site furnishings and accessories. Include material descriptions, recycled content, dimensions of individual components and profiles, finishes, field-assembly requirements, installation hardware, and installation details as applicable.
- B. Samples:
 - 1. If the Drawings and/or Specifications note that the color(s) is/are to be selected from the Manufacturer's standard range, the submit original color chart(s) or standard color sample chips. Digital files or prints are not acceptable.
 - 2. If the Drawings and/or Specifications note that the color(s) is/are custom, then submit custom sample chips of all the selected finishes and colors.
- C. Shop Drawings: for all custom site furnishings and accessories. Show all locations, markings, quantities, materials, sizes, and shapes and indicate all methods of connecting, anchoring,

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fastening, bracing, and attaching to the work of other trades. Revise and resubmit if required per review by the Owner's Representative.

- D. Maintenance Data: At Substantial Completion submit maintenance information for site furnishings and accessories where applicable for inclusion in the Owner's maintenance manuals.

1.05 REVIEWS

- A. Review and Adjustment: Review all site furnishing locations with the Owner's Representative prior to proceeding with any installation. Make adjustments to locations as approved by the Owner's Representative.
 - 1. Use stakes / flags / spray paint in unpaved areas, tape / removable paint in paving areas. For furniture that requires concrete slab footings, markings should outline the edge of the foundations.
 - 2. The Owner's Representative may require the site furnishings to be placed in their proposed locations to make visual adjustments.
 - 3. Mark-up the as-built plans prior to project completion with final locations, unless the revisions were already recorded by the Owner's Representative.

1.06 QUALITY ASSURANCE

- A. Manufacturer's Instructions: Materials, products, processes, equipment or the like shall be installed or applied in strict accordance with printed instructions furnished by the manufacturer of the material for use under conditions similar to those at the job site.
- B. Perform all work in accordance with all applicable State and local laws, codes and regulations.

1.07 DELIVERY, STORAGE & HANDLING

- A. Delivery & Handling: Transport and handle new site furnishings and accessories in a manner to avoid hairline cracks, staining or other damage.
- B. Storage & Protection: Store all site furnishings and accessories free of the ground and protected from mud or rain splashes. Cover units, secure covers firmly, and protect the units from dust, dirt or other staining material.
 - 1. Coordinate with the Owner's Representative for appropriate locations to store existing salvaged site furnishings and accessories, until required for reinstallation.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Location: Where shown located in unpaved areas adjacent to accessible paved areas and the distance to the edge of paving is not shown on the Drawings, install all site furnishings so that they comply with the requirements of 11B-308.2.1 Unobstructed Forward Reach and 11B-308.3.1 Unobstructed Side Reach of the CBC.
 - 1. A wheelchair should remain on the accessible paved surface at all times while the occupant is accessing the site furnishings.

2.02 FURNISHINGS

- A. Bench with back:
Manufacturer: DuMor, Inc.
Model #: 11 Series PL, 6 long

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Description: Recycled plastic bench with back, surface mounted install.
Finish / color: Boards to be plastic in Cedar. Posts to be Black.
Distributor/Contact: Ross Recreation, Casey Hilbert (831-689-9110).

2.03 FOOTINGS

- A. Dimensions: As shown on the Drawings. If not shown on the Drawings, then the furnishing manufacturer's standard footing design.
- B. Aggregate Base: See Specification Aggregate Base if included in these Specifications. If not included, then Caltrans Standard Specifications, Section 26, Class-2, 3/4" maximum. Recycled aggregate base complying with the same requirements is acceptable.
- C. Concrete: See Specification Site Concrete if included in these Specifications. If not included, then a pre-blended mix, 4000 PSI at 28-days, Quikrete or approved equal, is acceptable for footings for site furnishings.

2.04 FASTENERS

- A. Fasteners, Fittings, and Hardware: Stainless steel or noncorrodible materials; commercial quality; tamperproof, vandal and theft resistant; concealed, recessed, and capped or plugged. Provide as required for site furnishings' assembly, mounting, and secure attachment.

PART 3 - EXECUTION

3.01 GENERAL

- A. Pre measure: Measure installed features of the project critical to the correct off-site fabrication of custom furnishings.
- B. Work Conditions: Examine areas and conditions for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Install all embedded site furnishings in concrete paving areas prior to the concrete pour. Schedule the receiving of equipment in conjunction with the concrete pour. Any block outs of concrete pour due to scheduling conflicts shall be approved by the Owners Representative and at no additional cost to the Owner. Finish of any block out areas shall match adjacent paving.
 - 1. Furnishings damaged due to the concrete pour shall be replaced at the discretion and to the satisfaction of the Owners Representative, and not repaired or cleaned.

3.02 INSTALLATION

- A. General: install site furnishings as shown on the Drawings and as specified herein.
- B. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.
- C. Install site furnishings plumbed to the vertical and securely anchored. Provide spacers under the bases / legs, as acceptable to Owner's Representative, to level the furnishings. Install seats to heights shown on the details, or at 18" above finish grade.

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- D. Cast-in place posts: Set cast-in-place support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

3.03 REPAIR, CLEAN-UP AND PROTECTION

- A. Repair damaged site furnishing finishes to match original finish or replace damaged products prior to Substantial Completion.
- B. Clean site furnishings of construction materials, dirt, stains, filings, and blemishes due to shipment or installation. Clean in accordance with manufacturer's instructions, using cleaning agents as recommended by manufacturer.
- C. Restore adjacent areas that have been damaged from the installation of playground equipment.
- D. Cleaning: After installation of site furnishings, remove all excess soil, packaging, and other debris and legally dispose off-site. Clean all walks, walls, pavements, and planting areas leaving the entire area in a neat, orderly condition.
- E. Graffiti Removal: Suggested product is available at <https://www.graffitiremovalinc.com/> check with the furniture manufacturer(s) as to whether this is appropriate for their surfaces.

3.04 CLOSEOUT

- A. Maintenance Data: cleaning and maintenance information for site furnishings and accessories.
- B. If available, provide 1 can of each specified site furnishing paint color for future touchup work to the Owner.

END OF SECTION

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SECTION 31 11 13

SITE CLEARING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to the work of this Section.

1.02 DESCRIPTION OF WORK

- A. Extent: Furnish all labor, material, equipment, tools, and incidentals necessary for Site Clearing work as shown on the Drawings and as specified in this Section. The work includes but is not limited to:
 - 1. Clearing and Grubbing.
- B. Related work includes but is not limited to:
 - 1. Demolition
 - 2. Earthwork and Grading

1.03 DEFINITIONS

- A. Existing Topsoil: The top layer of existing soil in unpaved / planting areas, containing minerals and organic materials including humus, and completely free of weeds, roots, rocks/clods over one cubic inch and other objectionable material. Depth of existing topsoil shall be taken to be 2-4 inches deep on average or as determined by the Owner's Representative at the time of construction after clearing and grubbing.
 - 1. At turf areas, existing topsoil starts below the grass root zone.
 - 2. At unpaved / planting areas other than turf, existing topsoil starts below the mulch layer.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.01 SITE CLEARING

- A. General
 - 1. Protection measures for trees to be preserved are to be in place and reviewed by the Owner's Representative prior to any clearing and grubbing. See Specification Section Tree Protection.
 - 2. For removal of trees see Specification Section Tree Removal and Pruning
 - 3. Clear and grub only areas as necessary to construct improvements shown on the Drawings.
 - 4. Use only hand methods for grubbing inside the drip line of trees indicated to be preserved, unless otherwise approved by the Owners Representative.
- B. Clearing and Grubbing

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1. Remove vegetation, improvements, and obstructions protruding through the ground surface and/or interfering with installation of new construction. Removal includes complete root systems.
2. Removal of sod includes plastic netting / mesh used as sod backing.
3. Remove all organic matter in unpaved / planting areas to be replanted, to a sufficient depth to remove such material. Replanting includes areas with mulch-only applications. The depth of removal will vary with the type and density of vegetation across the project site and with the time of year.

C. Stripping

1. Remove all vegetation and grass before stripping existing topsoil.
2. Strip existing topsoil from all unpaved areas to be improved with paving, structures. Average depth of topsoil is specified elsewhere in this Specification. Additional topsoil may be required to be removed in localized areas to depths encountered to prevent intermingling with underlying subsoil or other waste materials.
3. Remove all vegetation matter from collected existing topsoil and stockpile for re-use in proposed planting areas unless otherwise instructed by the Owner's Representative. See Specification Section Soil Preparation. Do not use stockpiled existing topsoil as structural fill and/or under proposed paving.

3.02 CLEAN-UP

- A. Disposal: Remove cleared & grubbed material, waste, unsuitable, and excess material from the Owner's property and dispose of legally or as directed by the Owner's Representative.

END OF SECTION

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SECTION 31 11 16

DEMOLITION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to the work of this Section.

1.02 DESCRIPTION OF WORK

- A. Extent: Furnish all labor, material, equipment, tools, and incidentals necessary for Demolition work as shown on the Drawings and as specified in this Section. The work includes:
 - 1. Demolition of concrete walks and asphalt paving, including aggregate base.
 - 2. Demolition of steps and walls, including concrete footings and aggregate base.
 - 3. Saw-cutting asphalt as required.
 - 4. Irrigation adjustment.
 - 5. Demolition of benches and footings.
 - 6. Demolition of volleyball posts, basketball post, and footings.
- B. Related work includes but is not limited to:
 - 1. Site Clearing
 - 2. Earthwork and Grading

1.03 DEFINITIONS

- A. Topsoil: See Specification Section Earthwork and Grading.

1.04 SUBMITTALS

- A. Indicate on the project schedule submittal, proposed time for demolition work in this Section, including shut-off time and capping of utility service.

1.05 QUALITY ASSURANCE

- A. Reviews: Prior to any site clearing or demolition work, prepare protection measures of items indicated to be preserved and protected for review by the Owner's Representative.

1.06 SITE CONDITIONS

- A. Occupancy: Paving areas and structures to be removed or demolished will be vacated and discontinued in use prior to the start of work.
- B. Explosives: Use of explosives for demolition work is not permitted.
- C. Traffic: Conduct demolition operations and the removal of debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks, or other occupied facilities without permission from Owner.

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- D. Protection: Ensure the safe passage of persons around the area of demolition. Conduct operations to prevent damage to adjacent buildings, structures, other facilities, and injury to persons. See Special Provisions for additional information regarding building access.
- E. Construction Fence: Contractor is required to fence site and provide an adequate level of safety and protection at all times during construction
- F. Protection of existing vegetation – see Specification Section Site Clearing.
- G. Damage: Promptly repair damages caused to adjacent facilities by demolition operations at no cost to Owner.

PART 2 - PRODUCTS

Not Applicable.

PART 3 - EXECUTION

3.01 GENERAL

- A. Clearing and Grubbing: See Specification Section Site Clearing.

3.02 DEMOLITION

- A. Pollution Controls:
 - 1. Use water sprinkling, temporary enclosures, and other suitable methods to limit the amount of dust and dirt rising and scattering in the air to the lowest practical level.
 - 2. Comply with governing regulations pertaining to environmental protection. Do not use water when it may create hazardous or objectionable conditions such as flooding.
 - 3. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations, as directed by the Owner or governing authorities.
- B. General: Remove above and below grade pavements, curbing and other conditions necessary to permit new construction and other work as indicated on the Drawings. Removal of underground pipe or conduit interfering with construction is included under this Section.
- C. Damage: Return adjacent areas to condition existing prior to the start of the work.
- D. Saw-cutting: Saw-cut all asphalt and concrete to interface with new planting or paving areas. Concrete interfaces are to be saw-cut with a diamond tipped blade. Use the correct blade for the application as determined by the Blade Application Code for Diamond Saw Blades, 2004 edition, developed by the Masonry and Concrete Saw Manufacturers Institute.

3.03 IRRIGATION ADJUSTMENT

- A. General:
 - 1. Trench as required to access only those parts of the irrigation system to be adjusted.
 - 2. Cap all sprinkler heads / lines as necessary.
 - 3. Adjust, repair and/or replace sprinkler heads / lines as necessary.
 - 4. Salvage irrigation equipment needed to be removed for new construction.
 - 5. Backfill and restore adjusted and adjacent areas to condition existing prior to the start of the work. Includes replacing removed turf with sod to match existing turf.

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3.04 CLEAN-UP

- A. Disposal Waste materials are defined as all materials generated by demolition or excavation that are not identified for salvage or re-use by the Owner. Dispose of waste materials legally off-site.

END OF SECTION

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SECTION 31 22 13

EARTHWORK AND GRADING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to the work of this Section.

1.02 DESCRIPTION OF WORK

- A. Extent: Furnish all labor, material, equipment, tools, and incidentals necessary for Earthwork and Grading as shown on the Drawings and as specified in this Section. The work includes but is not limited to:
 - 1. Rough grading and excavations
 - 2. Providing, processing, placement, and compaction of any fill materials necessary to meet the designed lines and grades.
- B. Related work includes but is not limited to:
 - 1. Site Clearing
 - 2. Demolition
 - 3. Erosion and Sediment Control
 - 4. Drainage Facilities
 - 5. Soil Preparation

1.03 STANDARDS AND DEFINITIONS

- A. Unless otherwise shown or specified, all materials and methods shall conform to the appropriate current sections of the State of California Department of Transportation Standard Specifications (DTSS) as they reasonably apply to this work, except for measurement and payment requirements.
- B. Applicable ASTM International Standards (latest revisions) as they apply to this work and related test methods, including:
 - 1. D1557 Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort
- C. Relative compaction: is defined as the in-place dry density of the compacted soil divided by the laboratory compacted maximum dry density determined in accordance with ASTM D1557, expressed as a percentage.
- D. Finish Grade: is defined as the finished top surface of the soil after all grading and soil preparation activities, and prior to installation of mulch.

1.04 QUALITY ASSURANCE

- A. Tolerances: No combination of high and low tolerances that compromise pavement cross-section shall be permitted. Final grades after compaction and/or excavation shall conform to the grades shown on the Drawings, with a maximum tolerance of 0.10 foot for non-paved areas and 0.05 foot for paved areas, plus or minus.

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- B. Geotechnical Monitoring / Testing: Coordinate with the Owner's Geotechnical Engineer for compaction testing for earth base under all paving areas and foundations. At the Owner's discretion, the Engineer may also monitor site preparation, foundation excavations, placement of engineered fill and trench backfill.

1.05 REVIEWS

- A. Notify the Owner's Representative at each stage of the operation indicated below and allow such reasonable time to observe excavation and trenching, and for testing and inspection as the Owner's Representative may require. Do not proceed with any portion of the work until authorization has been received from the Owner's Representative.
1. Site Preparation Review – Prior to any earthwork and grading. See Specification Section Landscape Irrigation for other items to be inspected during this review.
 2. Preliminary Review - After all rough grading is complete and sub-grade is prepared.
 3. Each review shall be conducted only after all items pertaining to that review as noted above and in related Sections have been completed.

1.06 SPILLAGE AND DUST CONTROL

- A. Spillage: Prevent spillage when hauling on or adjacent to any public street or highway. In the event that such occurs, remove all spillage and sweep, wash, or otherwise clean such streets or highways as required by local City and County authorities and/or the State of California, and in compliance with applicable Best Management Practices (BMPs).
- B. Dust: Take all precautions needed to prevent a dust nuisance to adjacent public and private properties and to prevent erosion and transportation of soil to downstream of adjacent properties due to their work under this contract. Correct or repair any damage caused in this manner at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Fill Material: Selected on-site excavated/sub-soil material is considered suitable fill material for embankment construction, subject to prior approval by the Owner's Representative.
- B. Inorganic on-site fill and sub-soil may be used as structural fill to achieve final grades, provided the fill contains no debris and is free of rocks or clods greater than 6-inches in maximum dimension, and no more than 15 percent by weight of rocks larger than 3-inches. Submit samples of any proposed imported fill to the Owner's Representative for appropriate testing and approval no less than (5) five working days prior to the anticipated job site delivery. Fill material shall meet the following requirements:
1. Have a sand equivalent greater than 20%
 2. Have not more than 15% passing the 200 sieve.
 3. Have an R-Value of not less than 50.

- C. Sand: for bedding and backfill for underground utilities including water service lines shall conform to the sieve analysis below:

Sieve Size:	Percent Passing:
#30 (600 um)	At least 75%
#100 (150 um)	Less than or equal to 5%

- D. Topsoil: the top layer of existing soil in planting areas, containing minerals and organic materials including humus. Depth of topsoil shall be taken to be 4-6 inches deep or as determined by the

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Owner's Representative at the time of construction after clearing and grubbing. See Specification Section Site Clearing.

1. Topsoil is a sandy type.
2. At turf areas topsoil starts below the grass root zone.
3. At planting areas other than turf, topsoil starts below the mulch and organic matter layer.
4. Soil underneath paving and aggregate base areas shall not be considered as top soil.

- E. Sub-soil: the remaining existing soil on the site after clearing & grubbing, after topsoil has been removed, and after all rocks over one cubic inch and all foreign debris and organic material have been removed.
1. Soil under paving and aggregate base areas can be considered as subsoil provided contamination testing as specified elsewhere in this section indicates that it is free of contaminants that are harmful to plant growth.

PART 3 - EXECUTION

3.01 GENERAL

- A. Keep all excavations (including, pits, trenches, footings, etc.) entirely free from water. Protect excavations from rain or water from any source during construction. Use suitable pumping equipment or other means as required by the conditions. Continue pumping as necessary until the completion of the project. When operations are interrupted by unfavorable weather conditions, prepare areas by grading and compaction to avoid ponding and prevent surface drainage over fill slopes, in order to avoid erosion. Grading operations for erosion control shall be as approved by the Owner's Representative. Once excavation and grading commence, do not allow surface drainage to flow onto adjacent properties.
- B. Seasonal Limits: Do not place, spread, or roll fill material during unfavorable weather conditions. When work is interrupted by heavy rains, do not resume fill operations until field density tests indicate the moisture content and density of fill meet the specified requirements and approved by the Owner's Representative.
- C. Unusual Conditions: In the event that any unusual soil conditions are encountered during grading operations, notify the Owner's Representative immediately. Excavate and dispose of unsuitable material encountered below the natural grade as directed by the Owner's Representative and paid for as Extra Work. Unsuitable material is defined in DTSS Section 19 Earthwork Clause 1.01B.
- D. Provide satisfactory pollution and dust abatement and control measures continuously during the course of the work.
- E. Utilize reclaimed water or dust palliatives if required by the applicable Water Conservation Ordinance.

3.02 TOPSOIL STOCKPILE & PROTECTION

- A. Stripping: Strip the topsoil on the site after clearing and grubbing and stockpile it for future use in this project. Install topsoil in planting and turf areas as per finish grading directions in the Specification Section Soil Preparation. Stripping depth shall be as specified herein.

3.03 SITE PREPARATION, EXCAVATION & GRADING

- A. Depressions, voids, or unsuitable material encountered shall be excavated to expose firm soil as directed by the Owner's Representative. Backfill and compaction to design grade shall be approved by the Owner's Representative. When earthwork or trenching conditions are

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determined by the Owner's Representative to be unsuitable material, perform the work as defined in DTSS Section 19-2.02 Unsuitable Material.

- B. Excavation work shall include sloping and rounding tops and ends of excavations.

3.04 FILL PLACEMENT AND COMPACTION

- A. Place the fill in maximum 6-inch lifts (compacted layers) and compact the fill by mechanical means only. Fill shall be conditioned, at time of compaction, to 1% to 3% above the optimum moisture content of the soil.
 1. For non-porous paving, compact each lift to minimum 95% relative compaction.
 2. Carry out and document field density tests to ensure proper compaction.
 3. The placement and spreading of fill materials and its processing and compaction of fill materials by flooding, ponding, or jetting shall not be permitted without the prior approval of the Owner's Representative.

3.05 SUB-GRADE PREPARATION

- A. A minimum of 8-inches of the in-place sub-grade soil shall be scarified, moisture conditioned to 1%-3% above optimum value, and compacted to a relative compaction of at least 95% under all paving including concrete slabs-on-grade, asphalt concrete pavements, and foundations/footings. This depth of densified soils is in addition to additional fill material required to bring the sub-grade to grade.
- B. Compact a minimum of 6-inch of sub-grade soil in all planting areas to maximum 85% relative compaction.
- C. All soft or wet sub-grade soil encountered during earthwork and grading should be stabilized prior to placement of fill and further construction. This may involve scarifying and air-drying of the soil, or excavation and replacement of the wet soil with dry soil. Obtain prior approval of proposed method of stabilization from the Owner's Representative.

3.06 TOPSOIL PLACEMENT

- A. See Specification Section Soil Preparation for topsoil installation.

3.07 FINISH GRADING

- A. Finish grade all areas, including those indicated to be planted on the Drawings, and remove all rocks and clods over one cubic inch. Grade all areas smoothly and uniformly. Repair all erosion damage during the construction period.
- B. Unless otherwise shown on the Drawings, all soil finish grades shall be one-inch (1") below finish surface of walks, pavements, and curbs.

3.08 EXCESS SOIL DISPOSAL

- A. Excess excavation material shall be disposed of at an off-site location, disposal facility to be approved by the Owner's Representative. Pay for any analytical testing of the excess material that may be required by the disposal facility. These tests may include
 1. CAM-17 Testing Waste for Hazardous Metals
 2. BTEX (Benzene, Toluene, Ethylbenzene, Xylene) Test
 3. TPH (Total Petroleum Hydrocarbon) Test

END OF SECTION

SECTION 31 23 33

TRENCHING

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes:
 - 1. Trench excavation, shoring, and dewatering
 - 2. Pipe bedding, installation, and alignment
 - 3. Concrete encasement
 - 4. Warning tape and tracer wire
 - 5. Trench backfilling and compaction
 - 6. Surface restoration
 - 7. Record drawing requirement

1.02 RELATED SECTIONS

- A. Section 312213 – Earthwork
- B. Division 33 – Utilities

1.03 REFERENCES

- A. California Code 4216 – Protection of Underground Infrastructure
- B. California Occupational Safety and Health Administrative Code
- C. Standard Specifications, State of California, Department of Transportation (Caltrans), 2022 Edition
- D. ASTM C 136 – Standard Test Method for Sieve Analysis of Fine and Course Aggregates
- E. ASTM D1556 – Standard Test Method for Density of Soil in Place by the Sand - Cone Method
- F. ASTM D 1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort
- G. ASTM D 2321 – Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
- H. ASTM D 2419 – Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
- I. ASTM D 2487 – Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
- J. ASTM D 2922 – Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
- K. ASTM D 3017 – Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
- L. ASTM F 1668 – Standard Guide for Construction Procedures for Buried Plastic Pipe

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1.04 SUBMITTALS

- A. Submit proposed foundation, bedding, and backfill materials to the GEOTECHNICAL ENGINEER at least 2 weeks prior to planned delivery or use.
- B. Submit manufacturer's cut sheets for all other materials to the ARCHITECT
- C. Submit samples and test results at least two weeks prior to planned purchase/delivery.

1.05 DEFINITIONS

- A. Relative Compaction, R.C., or Percent Compaction: Dry density expressed as a percentage of the maximum dry density at optimum moisture content obtained in accordance with ASTM D1557.
- B. Remove: Demolish, remove and dispose of off-site in a legal manner.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Pipe: as specified for the utility being installed.
- B. Foundation, bedding and backfill materials shall be as noted on the Plans and as specified for the type of facility being installed.
- C. Concrete: Minor concrete conforming to Section 90 of the Caltrans Standard Specifications.
- D. Controlled density fill (CDF): 2-sack slurry cement backfill conforming to Section 19 of the Standard Specifications.
- E. Aggregate base: Class 2 aggregate base conforming to Section 26 of the Standard Specifications.
- F. Clean Sand: Natural river or bank sand; free of silt, clay, loam, friable or soluble materials, or organic matter; maximum particle size and volume of 1/2" and 18% respectively, with minimum Sand Equivalent value of 30 per California Test 217 or ASTM D2419
- G. Select native material may be used for bedding and/or backfill only if approved by the GEOTECHNICAL ENGINEER.

2.02 ACCESSORIES

- A. Detection tape: Polyethylene plastic warning tape, minimum 3.5 mils thick, 6" wide, appropriately labeled and color coded.
- B. Tracer wire: Insulated No. 10 copper wire.
- C. Geotextile fabric: as shown on the Plans and as approved by the GEOTECHNICAL ENGINEER.

PART 3 - EXECUTION

3.01 GENERAL

- A. All improvements shall be constructed in accordance with the California Building Standards Code, the Geotechnical Report, the Drawings, and these Specifications.

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- B. Onsite grading and earthwork, site preparation, excavation, trenching and compaction shall be observed and tested by the GEOTECHNICAL ENGINEER. All grading and earthwork shall be done to the satisfaction of the GEOTECHNICAL ENGINEER.
- C. In the event that any unusual conditions are encountered during grading operations which are not covered by the Geotechnical Report or these Specifications, the GEOTECHNICAL ENGINEER shall be immediately notified such that additional recommendations may be made.
- D. Where work is performed in public streets or rights of way, or on public utilities, perform the work in accordance with the requirements of the authority having jurisdiction and/or utility owner, if such requirements are more stringent than the requirements of this section.

3.02 SAFETY

- A. Work shall comply with all federal, state, and local safety requirements
- B. Except by permission of the OWNER, no trench shall remain open overnight.

3.03 PROTECTION

- A. Protect trees, shrubs, lawns, rock outcropping, and other landscape features to remaining as portion of final landscaping.
- B. Protect benchmarks, existing structures, fences, roads, sidewalks, paving, curbs and other improvements to remain.
- C. Locate and protect above and below grade utilities which are to remain.
- D. Document all pre-existing surface defects by photographic means prior to conducting trenching operations. Upon completion of construction, all surfaces showing non-documented settlement, spalls, gouges, cracks or other defects shall be repaired or replaced to the satisfaction of the ARCHITECT.
- E. Return all surface improvements designated to remain, which are removed for excavation, to their original condition, except as required to comply with other portions of the contract.
- F. Utility trenches which are parallel to the side of a footing shall be placed so that the trench bottom does not extend below a plane sloping downward and away from the building/footing at an inclination of 2:1 (H:V) from the bottom outside edge of the footing.

3.04 POTHOLING

- A. Pothole utility lines in advance of construction to determine if adjustment in horizontal or vertical location of pipe line is required. Submit drawing to Architect showing located utility locations and elevations.
- B. If potholing indicates a conflict between existing and proposed facilities, notify the ARCHITECT immediately. Do not perform work on systems which may be affected by the conflict until a resolution has been reached and you have been notified by the ARCHITECT.
- C. The Contractor shall locate existing utilities, including water, sewer, storm drain, gas, electric, and telecommunications prior to performing trenching work or any excavation.

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- D. The Contractor shall notify the Owner's Representative a minimum of two weeks prior to planned utility location work. The Owner may identify areas for underground utility location, other than those shown on the Plans.
- E. The precise locations and elevations of all utility crossings and points of connection must be verified by the Contractor prior to construction of systems which may be affected by the existing utility's location. Utilities shall be located by potholing where location and/or grade is critical

3.05 EXCAVATION, BEDDING, PIPE PLACEMENT AND BACKFILLING

- A. Trenching
 - 1. Excavate to the lines and grades indicated on the Drawings. The OWNER reserves the right to make changes to lines, grades, and depths when required due to field conditions.
 - 2. The excavation and the preparation of the trench shall be completed a sufficient distance in advance of pipe laying to prevent dislodged material from entering the pipe.
 - 3. If the foundation soil is soft, wet, spongy or unstable, the trench shall be excavated to stable soil as determined by the Geotechnical Engineer, and the excavation backfilled with pipe bedding material.
- B. Shoring
 - 1. The sides of all excavations shall be laid back or supported in the manner set forth by CAL/OSHA.
 - 2. Sheet piling and other shoring shall be withdrawn in such a manner as to prevent caving of the walls of excavations or damage to piping or other structures.
 - 3. Whenever timber or other sheeting is driven to a depth below the elevations of the top of the pipe, that portion of the sheeting below the elevation of the top of the pipe shall not be disturbed or removed.
- C. Dewatering
 - 1. Remove all water which may accumulate in the excavation during progress of the work so that all work can be done under dry conditions. Trenches shall be kept free from water while the pipe or other structures are installed, while concrete is setting, and until backfill has progressed to a sufficient height to anchor the work against possible flotation or leakage.
 - 2. Dewatering shall conform to the best management practices as outlined in the California Stormwater Quality Association's *Stormwater Best Management Practice Handbook: Construction*, latest edition.
- D. Pipe bedding
 - 1. Bedding shall be placed in such a manner that the pipe may be laid true to line and grade. When the pipe is bedded, it shall be brought into true alignment and secured.
 - 2. Place and compact the initial backfill material to the pipe spring line in maximum 8" lifts. Carefully compact this material around and under the pipe.
 - 3. Place and compact the initial backfill material to 12" above the top of the pipe in maximum 8" lifts. Carefully compact this material around and under the pipe.
 - 4. Place and compact final trench backfill material in maximum 8" lifts to the final grade or subgrade elevation.
 - 5. Bedding and backfill shall be compacted to at least 95% relative compaction in improved areas, and 90% in landscaped or unimproved areas.
 - 6. Where slurry cement is utilized for pipe bedding, the pipe shall be set on precast mortar blocks or similar devices to allow for placement of required thickness of material under and around the pipe. The Contractor must take the necessary steps to avoid pipe flotation or mis-alignment.
- E. Pipe Installation:
 - 1. Pipe installation shall be in accordance with the manufacturer's instructions.

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2. All pipe handling shall be done in a manner that will not damage the materials. Pipe shall be carried into position, not dragged, and shall be carefully lowered into the trench. Under no circumstances shall the pipe or accessories be dropped into the trench.
3. Before lowering into the trench, and while suspended, the pipe shall be inspected for defects. Any defective, damaged or unsound pipe shall be rejected and replaced with sound material. The interior of the pipe shall be clean and free of debris.
4. Joints shall be centered and tight. Cutting of pipe for inserting fittings or for pipe connections shall be done in a neat and skillful manner without damage to the pipe. Each joint shall be inspected to ensure it is properly made before backfilling is done.
5. The pipe shall be laid true to line and grade. When completed, the pipe shall have a smooth and uniform invert. Care shall be taken to prevent any dirt or foreign matter from entering the open end of the pipe.
6. Where piping is installed on curves, the maximum deflection of each joint shall be no more than 80% of the maximum deflection recommended by the pipe manufacturer.

F. Trench Backfill and Compaction:

1. All backfill shall be placed in a manner to avoid rock pockets, voids, or other conditions that could lead to future settlement of the backfill.

3.06 TEMPORARY PIPE COVER

- A. Provide temporary backfill or other means as necessary to protect underground utilities from heavy construction loads.

3.07 CONCRETE BACKFILL

- A. Place concrete backfill where indicated on the Drawings.
- B. If pipe will be partly or entirely embedded in concrete, support and brace the pipe in a manner that will prevent movement or displacement of the pipe during testing and during placement and consolidation of the concrete. Consolidate concrete under and around the pipe without displacing the pipe.

3.08 WARNING TAPE

- A. Provide warning tape for
1. All exterior gas pipes
 2. All other pipes which are 2"-diameter and larger
- B. Install 12" above the pipe.

3.09 SURFACE RESTORATION

- A. Any pavement, curb, walk or any other surface or subsurface improvement removed or damaged during progress of the work, shall, before termination of the contract, be restored to its original condition whether or not such restoration is shown on the Drawings.
- B. The trench patch structural section shall be equivalent to the existing structural section, or 2½" Hot Mix Asphalt (Type A) on 8" Class 2 Aggregate Base, whichever is greater. Trench patch shall extend min 6" beyond trench wall ("tee cut").
- C. All street cuts shall be neatly sawcut on true line to 1½" minimum depth at a minimum of.

END OF SECTION

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SECTION 32 11 23

AGGREGATE BASE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to the work of this Section.

1.02 DESCRIPTION OF WORK

- A. Extent: Work in this section includes, but is not limited to, providing all labor, materials, and equipment necessary for the complete installation of a stable, compacted aggregate base layer, as shown on the Drawings.
- B. Related Work:
 - 1. Earthwork and Grading
 - 2. Asphalt Concrete Paving

1.03 STANDARDS AND DEFINITIONS

- A. State of California, Department of Transportation Standard Specifications, referred to in this Specification as 'Caltrans Standard Specifications'.
- B. Applicable ASTM International Standards (latest revisions) as they apply to this work and related test methods, including:
 - 1. C131 Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
 - 2. C136 Test Method for Sieve Analysis of Fine and Coarse Aggregates
 - 3. D448 Classification for Sizes of Aggregate for Road and Bridge Construction
 - 4. D1557 Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort
 - 5. D2940 Specification for Graded Aggregate Material for Bases
- C. Relative compaction or compaction: is defined as the in-place dry density of the compacted soil divided by the laboratory compacted maximum dry density as determined by ASTM Test D1557 latest edition, expressed as a percentage.

1.04 QUALITY ASSURANCE

- A. Layout Review: Stake and layout all paving installations for review by the Owners Representative prior to excavation.
- B. Tolerances: Install the aggregate base and concrete to the minimum thickness shown and maintain tolerances for sub-grade, sub-base and finished grade as specified by Caltrans Standard Specifications. No combination of high and low tolerances will be permitted.

1.05 SUBMITTALS.

- A. Sieve analysis: Sieve analysis for aggregate base.

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1.06 STORAGE

- A. Store aggregate at site on a hard, dry and level patch of ground. Prevent contamination of the material with clay, dust, vegetable or other foreign matter.
 - 1. Maintain sufficient distance between stacks of fine and coarse aggregates, and any permeable aggregates if present, to prevent the material at the edges of the stock piles from getting intermixed.
 - 2. Stack fine aggregate in such a place where loss due to effect of wind is minimum.

1.07 TESTING

- A. General: Test installed aggregate base per the requirements of Caltrans Standard Specifications.
- B. Inspection: Notify the Owner's Representative at the completion of the various stages of the operation as indicated below and allow such reasonable time for testing and inspection as the Owners Representative may require. Do not proceed with the next stage until authorization to proceed has been received from the Owners Representative.
 - 1. After all rough grading is complete and sub-grade has been prepared to receive aggregate base.
 - 2. After each course of aggregate base has been placed and compacted and is ready for the following course.
 - 3. After final placement and compaction of aggregate base has been prepared to receive paving operations.
- C. Testing: document and submit all tests for aggregate base to the Owner's Representative.
 - 1. Cost of all tests to be borne by the Contractor.
 - 2. If at any time the aggregate base does not meet the Specifications, restore the aggregate base, at no additional cost to the Owner, to the required grade, cross-section and density.

PART 2 - PRODUCTS

2.01 AGGREGATE BASE

- A. Delivery Moisture Content: Aggregate base is to contain 90% to 110% of the optimum moisture content to ensure that fines do not migrate in transit or during placement and to facilitate proper compaction. Ensure that aggregate leaving the source plant meets this requirement. Apply water to the aggregate base on site to attain and maintain this minimum moisture content.
- B. Sieve: Caltrans Standard Specifications, Section 26, Class-2, 3/4" maximum.

Sieve Sizes	Percentage Passing			
	1 1/2 "Maximum		3/4 " Maximum	
	Operating Range	Contract Compliance	Operating Range	Contract Compliance
2"	100	100		
1 1/2 "	90-100	87-100		
1"			100	100
3/4 "	50-85	45-90	90-100	87-100
No. 4	25-45	20-50	35-60	30-65
No. 30	10-25	6-29	10-30	5-35
No. 200	2-9	0-12	2-9	0-12

Quality Requirements

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Test	Operating Range	Contract Compliance
Resistance (R-value)		78 min.
Sand Equivalent	25 min.	22 min.
Durability Index		35 min.

PART 3 - EXECUTION

3.01 JOB CONDITIONS

- A. Protection: Take all steps necessary not to damage existing improvements. If damage occurs, repair immediately and if repair cannot be made to the satisfaction of the Owners Representative, remove and replace at no expense to the Owner.

3.02 SUB-GRADE PREPARATION

- A. General: See Specification Section Earthwork and Grading for sub-grade preparation and compaction requirements.
- B. Verify that sub-grade preparation, compacted density and elevations conform to the Project requirements and Specifications.
1. In the event of over-excavation, use select-fill materials to achieve design sub-grade elevations. Materials and compaction as specified in Specification Section Earthwork and Grading.
- C. Verify that subgrade is free of rocks, depressions, voids, organic materials, and irregularities. Remove any excess or contaminated backfill from the drainage trenches. Re-compact and re-grade as necessary to place aggregate base.

3.03 AGGREGATE BASE INSTALLATION

- A. Place and compact aggregate base as specified in Caltrans Standard Specifications Section 26, to at least 95% relative compaction in accordance with ASTM D1557, and to a depth as noted on the Drawings. Verify grades to allow for finish paving.
- B. Roll the aggregate base until entire surface is firm, dense, and free from rock pockets and mud pads; do not slurry the base course. Clean the surface of all loose and extraneous material. Water the base course after compaction.

3.04 PROTECTION AND CLEAN-UP

- A. Protect the installed aggregate base from contamination by the work of other trades until paving is installed.
- B. Disposal: Upon completion of the work and transport excess material from the job site and dispose of in a legal manner.

END OF SECTION

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SECTION 32 12 16

ASPHALT CONCRETE PAVING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to the work of this Section.

1.02 DESCRIPTION OF WORK

- A. Extent: Furnish all labor, material, equipment, tools, and incidentals necessary for the installation of Asphalt Concrete Paving as shown on the Drawings and as specified in this Section.
- B. Related work includes but is not limited to:
 - 1. Earthwork and Grading
 - 2. Aggregate Base

1.03 STANDARDS

- A. Unless otherwise shown or specified all materials and methods shall conform to the appropriate current sections of the State of California, Department of Transportation (CALTRANS) Standard Specifications (Standard Specifications) as they reasonably apply to this work, except for measurement and payment requirements.
- B. Applicable ASTM International Standards (latest revisions) as they apply to this work and related test methods, including:
 - 1. D522 Test Methods for Mandrel Bend Test of Attached Organic Coatings
 - 2. D711 Test Method for No-Pick-Up Time of Traffic Paint
 - 3. D2369 Test Method for Volatile Content of Coatings

1.04 SUBMITTALS

- A. Sieve data: asphalt and base materials.
- B. Documentation: Manufacturer's information on all products related to the asphalt paving specified herein. Include proof of compliance with applicable local or regional air pollution or air quality management district VOC requirements.

1.05 QUALITY ASSURANCE

- A. Tolerances: For sub-grade, sub-base and finished grade, tolerances, shall be as specified by the Caltrans Standard Specifications except that Contractor shall deliver the full asphaltic concrete thickness shown. No combination of high and low tolerances that comprise the cross-section will be permitted.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Packing, Shipping, Handling, and Unloading: Deliver material in sealed containers with labels legible and intact.
- B. Storage and Protection: Follow manufacturer's recommendations.

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PART 2 - PRODUCTS

2.01 ASPHALT MATERIALS

- A. Asphaltic Emulsion for Paint Binder: Caltrans Standard Specifications, Section 94, SS1.
- B. Asphalt: Caltrans Standard Specifications, Section 92, Viscosity Grade AR 4000.
- C. Asphalt Aggregates: Grading requirements as given below:
 - 1. Basketball Court paving: Caltrans Standard Specifications, Section 39. Bottom 2" course - 3/4" maximum, medium grade. Top 1" course - 3/8" aggregate maximum, with 6% oil content.

³/₄ inch Maximum, Medium

Sieve Sizes	Limits of Proposed Gradation	Operating Range	Contract Compliance
1"		100	100
³ / ₄ "		95-100	90-100
³ / ₈ "		65-80	60-85
No. 4	49-54	X±5	X±8
No. 8	36-40	X±5	X±8
No. 30	18-21	X±5	X±8
No. 200		3-8	0-11

³/₈ inch Maximum

Sieve Sizes	Limits of Proposed Gradation	Operating Range	Contract Compliance
1/2"		100	100
³ / ₈ "		95-100	95-100
No. 4	73-77	X±6	X±10
No. 8	58-63	X±6	X±10
No. 30	29-34	X±6	X±10
No. 200		3-10	0-14

- 2. Pathways: Caltrans Standard Specifications, Section 39, 1/2" maximum, medium grade.

¹/₂ inch Maximum, Medium

Sieve Sizes	Limits of Proposed Gradation	Operating Range	Contract Compliance
³ / ₄ "		100	100
1/2"		95-100	89-100
³ / ₈ "		80-95	75-100
No. 4	59-66	X±5	X±8
No. 8	43-49	X±5	X±8
No. 30	22-27	X±5	X±8
No. 200		3-8	0-11

2.02 STRIPING

- A. Asphalt Striping: White, exterior type, fast dry, lead-free, water-based acrylic copolymer based traffic paint by Bauer, Ennis Paint, D.J. Simpson Company, or approved equal. Paint shall meet State of California V.O.C. limit of 250 g/l. Width per the Drawings.

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2.03 HEADER BOARD FOR PUBLIC PROJECTS

- A. Header board shall be pressure treated doug fir, or approved equal.
 - 1. See Plans for installation and sizes.
 - 2. Stakes: 2"x 4", 18" long minimum.
 - 3. Fasteners: hot dipped galvanized.

PART 3 - EXECUTION

3.01 GENERAL

- A. Protection: Take all steps necessary not to discolor or damage existing improvements. If damage occurs, repair immediately and if repair cannot be made to the satisfaction of the Owners Representative, clean-up and/or remove and replace at no expense to the Owner.

3.02 SITE PREPARATION

- A. Verify that aggregate base preparation and elevations conform to the Project requirements and Specifications. Do not install work specified in this Section prior to acceptance of aggregate base.
- B. Clear aggregate base surface of all loose or unsuitable material.

3.03 HEADER BOARD INSTALLATION

- A. Header board shall have straight-line joints less than three feet long; curved-line joints being laminated in a staggered pattern with ends no closer than eighteen inches.
 - 1. Install stakes not further than five feet on center at all ends, splices and joints.
 - 2. Splice all joints with 2 x 4 x 24" with top of splice plate 3/4" below top of header.
 - 3. Trim all stakes to 3/4" below top of header.
 - 4. Locate stakes at all ends, joints, and splices. Clinch over all nails.

3.04 ASPHALT CONCRETE INSTALLATION

- A. Apply paint binder in accord with Caltrans Standard Specifications, Section 39.4. Dilute paint binder with equal parts of water and applied to all vertical surfaces for existing pavement, curbs, gutters, catch basins, manhole frames, and construction joints in the surfacing, existing bases and pavements to be surfaced, and other surfaces designated by the Owners Representative. Provide asphaltic paint binder in sufficient quantity to produce a thin, uniform black, glossy coat of asphalt satisfactory to the Owners Representative. Redistribute pools in unevenly distributed areas by means of hand brooms. Verify exact rate of application with the Owners Representative.
- B. Spread asphalt concrete and compact uniformly to a closed, smooth surface and a layer of uniform density, in accord with Caltrans Standard Specifications, Section 39.6, in thicknesses noted on plans.
- C. Finish grades shall be as shown, smooth and without sharp breaks, and shall allow the pavement to drain. Upon completion of the paving, flood the area as directed by the Owners Representative. Reconstruct any low areas as directed by the Owners Representative.

3.05 STRIPING

- A. Solvent-based striping: Prepare surface in conformance with Caltrans Standard Specifications Section 84 "Traffic Stripes and Pavement Markings". Paint only when air and surface temperatures are above 50 degrees F. Line width shall not vary more than plus or minus 1/4". Apply two coats of paint per manufacturer's instructions.

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3.06 REPAIR AND CLEAN-UP

- A. Protect the installed paving from contamination by the work of other trades until review and approval by the Owner's Representative.
- B. Repair: If damage to the asphaltic concrete paving occurs, repair same, and if repair cannot be made to the satisfaction of the Owner's Representative, remove and replace the section.
- C. Disposal: Segregate surplus material and debris remaining upon completion of the work as to type, and transport from the job site and dispose of in a legal manner.

END OF SECTION

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SITE CONCRETE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to the work of this Section.

1.02 DESCRIPTION OF WORK

- A. Extent: Furnish all labor, material, equipment, tools, and incidentals necessary for the installation of plain Site Concrete, including where reinforced, as shown on the Drawings and as specified in this Section.
- B. Related work includes but is not limited to:
 - 1. Earthwork and Grading
 - 2. Aggregate Base
 - 3. Site Furnishings
 - 4. Sports Equipment

1.03 STANDARDS AND DEFINITIONS

- A. Unless otherwise shown or specified all materials and methods shall conform to the appropriate current sections of the State of California, Department of Transportation Standard Specifications (Caltrans Standard Specifications) as they reasonably apply to this work, except for measurement and payment requirements.
- B. Portland Cement Association, Design and Control of Concrete Mixtures, latest edition.
- C. American Concrete Institute (ACI) specifications, latest editions, including:
 - 1. ACI 211.1 Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
 - 2. ACI 301 Specifications for Structural Concrete
 - 3. ACI 302 Guide to Concrete Floor and Slab Construction
 - 4. ACI 304 Guide for Measuring, Mixing, Transporting and Placing Concrete
 - 5. ACI 318 Building Code Requirements for Structural Concrete
 - 6. ACI 347 Guide to Formwork for Concrete
- D. Applicable ASTM International Standards (latest revisions) as they apply to this work and related test methods, including:
 - 1. A615 Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
 - 2. A1064 Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
 - 3. C33 Specification for Concrete Aggregates
 - 4. C39 Test Method for Compressive Strength of Cylindrical Concrete Specimens
 - 5. C94 Specification for Ready-Mixed Concrete
 - 6. C114 Test Methods for Chemical Analysis of Hydraulic Cement
 - 7. C131 Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
 - 8. C136 Test Method for Sieve Analysis of Fine and Coarse Aggregates
 - 9. C143 Test Method for Slump of Hydraulic-Cement Concrete

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10. C150 Specification for Portland Cement
 11. C157 Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete
 12. C171 Specification for Sheet Materials for Curing Concrete
 13. C173 Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
 14. C260 Specification for Air-Entraining Admixtures for Concrete
 15. C309 Specification for Liquid Membrane-Forming Compounds for Curing Concrete
 16. C311 Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete
 17. C330 Specification for Lightweight Aggregates for Structural Concrete
 18. C494 Specification for Chemical Admixtures for Concrete
 19. C618 Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
 20. C778 Specification for Standard Sand
 21. C881 Specification for Epoxy-Resin-Base Bonding Systems for Concrete
 22. C920 Specification for Elastomeric Joint Sealants
 23. C979 Specification for Pigments for Integrally Colored Concrete
 24. C989 Specification for Slag Cement for Use in Concrete and Mortars
 25. C1240 Specification for Silica Fume Used in Cementitious Mixtures
 26. C1602 Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
 27. C1603 Test Method for Measurement of Solids in Water
 28. D1751 Specification for Preformed Expansion Joint Filler for Concrete Paving
 29. D1883 Test Method for California Bearing Ratio (CBR) of Laboratory-Compacted Soils
- E. California Air Quality Management District (AQMD) Rule 1113 Volatile Organic Compound (VOC) Limits.
- F. California Building Code (CBC), Part 2 of California Code of Regulations, Title 24: Walking surface finishes are to comply with accessibility provisions of the CBC, applicable edition.

1.04 QUALITY ASSURANCE

- A. Layout Review: Stake and layout all site concrete installations for review by the Owners Representative prior to excavation.
- B. Inspection: Notify the Owners Representative 24 hours prior to placement of any concrete to inspect sub-grade, forms, and reinforcement.
- C. Substitutions: shotcrete / gunite will not be permitted as a substitute for cast-in-place concrete.

1.05 SUBMITTALS

- A. Product data:
 1. Steel reinforcement (mill certificates). Any fiber reinforcement / expansion joint filler, metal-key joints, reinforcement / mesh chairs.
- B. Concrete Mix: Proposed mix design of each class of concrete, indicating name of batch plant, date and # of mix design, project location, Contractor requesting delivery.
 1. Mix design: state the following:
 - a. Proportions of all materials used
 - b. Compressive strength in PSI at 28 days.
 - c. Slump
 - d. Water-cement ratio
 - e. Color, if applicable
 2. Slump Test Data in support of submitted concrete mix

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3. Cylinder Report in support of submitted concrete mix
4. Strength Performance Reports per ASTM C39 and ACI 301 of submitted concrete mix
5. Sieve data / certification for coarse and fine aggregate
6. Test report / certification for cement and fly ash.
7. Admixture data.
8. Water test report for ready mix concrete.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store materials in a dry and protected location. Protect reinforcing steel, dowels, and welded wire mesh from rusting, deformation, staining, and moisture damage.

1.07 TESTS

- A. Testing and analysis of concrete will be performed under provisions of Caltrans Standard Specifications Section 6-3.
- B. Testing firm shall take cylinders and perform slump, compression strength, and air entrainment tests in accordance with ASTM C143, C39 and C173.
 1. Testing shall be carried out for vertical surfaces equal to or greater than 48" as measured from bottom of footing to top of wall, and for vehicular concrete subject to increased loading conditions such as stress pads.
 2. All testing shall be at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 FORMWORK AND REINFORCEMENT

- A. Formwork: Steel or wood, of size and strength to resist movement during concrete placement and to retain straight, true, and to proper elevation, horizontal and vertical alignment until removed. Use forms that are straight and free of distortion and defects. Use flexible spring steel forms or laminated boards to form radius bends as required.
 1. Form lumber: #2 or better grade wood. Do not use used form lumber.
- B. Reinforcement Bars and Dowels: ASTM A615. Clean and free of paint, grease, oils, and loose rust scale. Deformed steel bars, Grade 60 for bars #5 and larger; Grade 40 minimum for bars #4 and smaller.
 1. Tie Wire: 16-gauge plain cold-drawn steel conforming to ASTM A1064, clean and free of rust, dirt, grease or oils.
 2. Supports: bolsters, chairs, dobies, spacers and other devices for spacing, supporting and fastening reinforcing bars in place.
 3. Sleeves: for doweling across expansion joints and cold joints: Sika Speed Dowel or equal, sized for round dowel diameter and length.
- C. Welded Wire Mesh: Welded plain cold-drawn steel wire fabric, ASTM A1064 by Davis Wire Corporation or approved equal. Clean and free of paint and rust. Furnished in flat panels, not rolls.

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1. Supports: Chairs or dobies to support welded wire mesh reinforcement at half the depth of the paving.

D. Form-release: form release agent, California AQMD Rule 1113 VOC-limits compliant.

2.02 CONCRETE

A. Cementitious Materials:

1. Portland Cement: ASTM C150. Type-II. Use single source throughout entire project.
2. Fly Ash: ASTM C618 & C311. Class C, F, or N.
 - a. Source fly ash from an experienced producer, conforming to all applicable standards.
 - b. At no time during the course of the project will a change of fly ash source (plant) be permitted without the prior written consent of the Owners Representative.
3. Slag: ASTM C989 if specified in the concrete mix design.

B. Coarse Aggregate: ASTM C33 and Caltrans Standard Specifications Section 90. Gravel, crushed gravel, crushed rock, or combinations thereof, free from organic matter and other deleterious substances, from an approved source. Use single source throughout entire project.

C. Fine Aggregate: ASTM C33 and Caltrans Standard Specifications Section 90. Natural sand or a combination of not less than 50% natural and manufactured sand, free from deleterious coatings, roots, bark, sticks, rags, and other extraneous material. Thoroughly and uniformly washed. Use single source throughout entire project.

D. Water: ASTM C1602, clear and free from injurious amounts of oil, salts, acid, alkali, organic matter, or other deleterious substances. For ready-mix concrete water density shall be monitored with an automated device conforming to ASTM C1603.

E. Chemical Admixtures:

1. All admixtures: California AQMD Rule 1113 VOC-limits compliant
2. Air Entraining: ASTM C260. Use five percent (5%) air entrainment: Manufactured by BASF, Sika, W.R. Grace or approved equal.
3. Water Reducing / Plasticizer: ASTM C494, manufactured by BASF, Sika, W.R. Grace or approved equal.
4. Shrinkage Reducing: ASTM C494. Capable of reducing drying shrinkage up to 80% at 28 days per ASTM C157, BASF, W.R. Grace or approved equal.
5. Accelerating: ASTM C494, non-corrosive admixture manufactured by BASF, W.R. Grace or approved equal.
6. Hydration Controlling: ASTM C494, Type B, and Type D by BASF, or approved equal.
7. Calcium chloride is not permitted in the manufacture of chemical admixtures.
8. Admixtures batched, mixed and transported in accordance with ASTM C94

F. Cure: ASTM C309 Type 1, Class A&B, California AQMD Rule 1113 VOC-limits compliant, clear membrane curing compound, by W.R. Meadows, L.M. Scofield, or approved equal.

1. Do not use white liquid membrane curing compound.
2. For colored concrete, see clause on Concrete Colors in this Specification for cure-sealers that are applied to freshly placed concrete. Do not use this cure.

2.03 CONCRETE MIX DESIGN

A. Concrete mix: conform to applicable industry standards for concrete materials, admixtures, bonding materials, curing and other except as noted.

1. Concrete mixes shall be properly proportioned for yield.
2. Water / cement ratio: 0.50 max unless otherwise approved by the Owners Representative

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3. Slump: maximum four (4") inches. A tolerance of up to one (1") inch above the maximum indicated is allowed for one batch in any five consecutive batches tested.
- B. Strength: ASTM C39 designated by class based on 28-day compressive strengths when tested:
1. Class-2 (590 lbs of cementitious material per cubic yard) for curbs, walls, footings, and all above-grade structures unless otherwise noted. Minimum compressive strength of 3000 PSI at 28-days.
 2. Class-3 (505 lbs of cementitious material per cubic yard) for all sidewalks, pavements, sub-pavements, and sub-slabs unless otherwise noted. Minimum compressive strength of 2500 PSI at 28-days.
- C. Fly Ash: Incorporation of fly ash into the concrete mix is at the Contractor's discretion. If fly-ash is to be used in the mix, substitute up to 25% of Portland cement with fly ash for all classes of concrete, final proportions to be determined by the concrete supplier.
1. Concrete mixtures with fly ash must be properly designed for the application, and finishing procedures must be appropriately applied.
- D. Slag: Incorporation of slag into the concrete mix is at the Contractor's discretion. If slag is to be used in the mix, substitute up to 25% of Portland cement with slag for all classes of concrete, final proportions to be determined by the concrete supplier.
1. Concrete mixtures containing slag cement should be proportioned according to ACI 211.1, be properly designed for the application, and finishing procedures must be appropriately applied.
- E. Chemical Admixtures
1. Concrete mixes for walls and/or structures equal to and over 4'-0" in height: do not include Air Entraining Mixtures.
 2. Concrete mixes for walls and/or structures equal to and over 4'-0" in height: include Water Reducing Admixtures.
 3. Chemical admixtures: at the Contractor's discretion or the mix design submitted by the concrete ready-mix supplier, with the two exceptions noted above.
 4. Chemical admixtures: specified within the range of the manufacturer's recommended concentration.

2.04 CONTROL JOINTS

- A. General: All adhesives, fillers, sealants: California AQMD Rule 1113 VOC-limits compliant

PART 3 - EXECUTION

3.01 JOB CONDITIONS

- A. Weather Conditions: Construct concrete paving only when atmospheric temperature is above 40 degrees F., when the underlying base is dry, and when weather is not rainy.
- B. Grade Control: Establish and maintain the required lines and grades, including cross-slope during construction operations.
- C. Protection: Take all steps necessary not to discolor or damage existing improvements. If damage occurs, repair immediately and if repair cannot be made to the satisfaction of the Owners Representative, remove and replace at no expense to the Owner.

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3.02 SITE PREPARATION

- A. Verify that aggregate base preparation and elevations conform to the Project requirements and Specifications. Do not install work specified in this Section prior to acceptance of aggregate base.
- B. Clear aggregate base surface of all loose or unsuitable material.

3.03 INSTALLATION

- A. Form Construction: Set forms to the required grades and lines, rigidly braced and secured; work conforming to ACI 347.
 - 1. Construct walls and seat walls less than 18" above finish grade without form ties unless essential for stability of formwork. Align form ties horizontally and vertically.
 - 2. Install sufficient quantity of forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.
 - 3. Remove forms without damage to the placed concrete.
 - 4. Do not use form ties for exposed portions of sand-blasted walls and structures where the holes will be visible after the form ties are removed. Use form braces only.
 - 5. Install form ties and similar accessories such that all metal will be at least 1 inch from surface when forms are stripped.
- B. Reinforcement: Install per the Drawings, and secure in place. Do not pour concrete prior to the inspection by the Owners Representative.
 - 1. Use reinforcement (rebar) chairs to ensure that bar reinforcement / welded wire mesh has the required clearance off the bottom of the slab and installed parallel to the bottom of the slab and without dents. See Drawings for recommended spacing.
 - 2. Install reinforcement / welded wire mesh with minimum cover as shown on the Drawings. A single cut through reinforcing materials in full depth vertical joints in paving as a means of separation is not acceptable.
- C. Placement: Moisten aggregate base as required to provide a uniform, dampened condition at the time concrete is placed. Place concrete using methods which prevent segregation of the mix, with as little re-handling as possible. Consolidate concrete along the face of forms and adjacent to transverse assemblies, reinforcement, or side forms. Use care to prevent dislocation of reinforcing, dowels, and joint devices. Deposit and spread concrete in a continuous operation between transverse joints. If interrupted for more than 1/2 hour, place a construction/cold joint.
- D. Control Joints: Construct control joints true-to-line with face perpendicular to surface of the concrete, unless otherwise shown. Construct transverse joints at right angles to the centerline, unless otherwise noted. See Control Joint Types specified herein for specific guidelines.
 - 1. Set all joints accurately to grade and straight in alignment as shown on the Drawings. Alignment shall not vary more than 1/8" in 10' length.
- E. Finishing: After striking-off and consolidating concrete, smooth the surface by screeding and floating. Use hand methods only where mechanical floating is not possible. Distribute concrete as required to remove surface irregularities, and re-float repaired areas to provide a continuous, smooth finish. Work edges of slabs, gutters, back top edge of curb, and formed joints with an edging tool, and round to 1/2" radius, unless otherwise shown. Eliminate any tool marks on concrete surface.
 - 1. After floating, test concrete surface for trueness - maximum 1/8" variation in 10' length in any direction.
 - 2. After completion of floating and when excess moisture or surface sheen has disappeared, complete surface finishing, as specified herein.
 - 3. During finishing, do not apply cement to the dry concrete surface.
 - 4. See Concrete Finishing elsewhere in this Specification

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- F. Curing: Protect and cure finished concrete, conforming to applicable requirements of Caltrans Standard Specifications.
 - 1. Cure all concrete for at least 7 days after placing.

3.04 CONTROL JOINTS

- A. General: Work under this Section to comply with ACI 302.
- B. Expansion Joints: locate as shown on the Drawings.
 - 1. Dowels: grease both ends.
 - 2. Joint fillers: one-piece lengths for the full width being placed wherever possible. Where more than one length is required, lace or clip joint filler sections together. Form top edge of filler to conform to top profile of concrete.
- C. Construction (Cold) Joints:
 - 1. At old and new concrete pours. Drill the existing concrete to accept dowels and embed. Grease both ends of dowel, or epoxy end in existing concrete and grease end in new concrete.
 - 2. At previous day's pour and fresh pour: Grease both ends of dowel.
 - 3. When curb and/or gutter and pedestrian paving are poured separately, provide #3 dowels, 8" length 24" O.C.
- D. Weakened Plane Joints: locate as shown on the Drawings.
 - 1. Pedestrian paving: construct tooled as shown on the Drawings, or as specified.
 - 2. Joint Width & Depth: Per Drawings. Do not exceed 3/16-inch in width.
 - 3. Do not end completed joints short of vertical surfaces.

3.05 CONCRETE FINISHING

- A. General: finishes as specified on the Drawings. Walking surfaces including curbs: slip-resistant and comply with accessibility provisions of CBC.
 - 1. Prior to finishing, fill in form holes flush with concrete surface. Excludes Form Finish.
 - 2. Remove all imperfections and blemishes that cannot be removed by specified finish type.
- B. Finish types:
 - 1. Broom finish - draw a stiff fine-hair broom across concrete surface, perpendicular to line of traffic. Repeat operation if required to provide a fine line texture. Texture must be true and straight across entire width of concrete slab.

3.06 REPAIR AND CLEAN-UP

- A. Repair: repair or remove and replace defective work such as under-strength concrete, concrete out of line, level or plumb, or showing objectionable cracks, honeycomb, rock pockets, voids, spalling, exposed reinforcing, etc., directed by the Owners Representative and at no additional cost to the Owner. All cleaning, patching, and repairs shall be subject to approval and acceptance by the Owners Representative.
- B. Protect new concrete from all construction activities for 72 hours; from construction material or equipment movement for 7 days; and from heavy vehicular movement for 28 days. Any activity on new concrete prior to 28 days is at the Contractor's discretion and risk.
- C. Clean up and remove from the site all spillage, overpour, discarded forming materials, rejected work or materials, and any other refuse or debris resulting from the work. Sweep concrete and wash free of stains, discolorations, dirt and other foreign materials just prior to final inspection.

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- D. Disposal: Segregate surplus material and debris remaining upon completion of the work as to type, and transport from the job site and dispose of in a legal manner.

END OF SECTION

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SECTION 32 91 13

SOIL PREPARATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to the work of this Section.

1.02 DESCRIPTION OF WORK

- A. Extent: Furnish all labor, material, equipment, tools, and incidentals necessary for Soil Preparation of planting areas as shown on the Drawings and as specified in this Section. The work includes installation of amendments including compost, fertilizers, finish grading and plant pit backfill.
- B. Related work includes but is not limited to:
 - 1. Site Clearing
 - 2. Demolition
 - 3. Earthwork and Grading
 - 4. Hydroseeding

1.03 QUALITY ASSURANCE

- A. Finish Grade: is defined as the finished top surface of the soil after all grading and soil preparation activities, and prior to installation of hydroseed, sod, or mulch.
- B. Applicable ASTM International Standards (latest revisions) as they apply to this work and related test methods, including:
 - 1. C602 Specification for Agricultural Liming Materials
- C. Fertilizers: Comply with the requirements of the Fertilizing Materials Inspection Program of the California Department of Food and Agriculture.

1.04 SUBMITTALS

- A. Product Data: to be approved by the Owners Representative before the material is delivered to the site.
 - 1. Amendments fertilizers, and chemicals
- B. Samples: to be approved by the Owners Representative before the material is delivered to the site.
 - 1. 1-quart bag of compost

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- C. Testing - General: Provide samples, as specified herein, to an agricultural soil testing laboratory approved by the Owners Representative, referred to herein as the Test Lab, unless delivered to the site in original, unopened containers, each bearing the manufacturer guaranteed analysis.
1. Pre-approved Test Labs include:
 - a. Waypoint Analytical 4741 E Hunter Ave Suite A, Anaheim, CA 92807, (714)282-8777
 - b. Wallace Laboratories LLC, 365 Coral Circle, El Segundo, CA 90245, (310) 615-0116
 - c. Soil Control Lab, 42 Hangar Way, Watsonville CA 95076, (831) 724-5422
 2. The Owners Representative reserves the right to reject the analysis from an alternate soil Test Lab without prior approval.
 3. Do not deliver any soil or amendment to the site without approval of test results by the Owner's Representative.
 4. Pay for all testing fees from the Test Lab for all tests specified herein.
- D. Testing – Sequence:
1. Submit compost test report for review and approval as noted below.
 - a. Since compost is a natural material whose chemical properties changes with time, initial approval may be conditional; final approval to be based on Test Lab recommendations for existing soil including proportion of the compost, additional amendments, and watering / leaching.
 - b. On approval of the test report, submit a sample for review and approval - this can be done concurrently with the data submittal at the Contractor's discretion.
 2. On approval of the proposed compost, submit sample(s) of existing soils to the Test Lab or an existing soils test report if provided
 3. Test Lab recommendations for amendments and fertilizers to be used in planting are to be:
 - a. Specific to the approved compost. Reference the compost test report by test number / sample ID and testing date. Recommendations referencing a generic compost will be rejected and will require specific recommendations to be re-obtained from the Testing Lab.
- E. Testing – Compost: Provide, along with a sample, latest analysis of compost / bulk organic materials by the Test Lab for verification of conformance to this Specification.
1. Analysis is to be carried out / reported no more than three months prior to the date of compost installation, not the start of the project.
 2. US Composting Council technical data sheets for compost are not sufficient as a submittal – the complete analysis on the dated letterhead of the laboratory is required, plus pages which fully interpret the results.
 3. Analysis is to conform to physical and chemical properties specified herein.
 4. Analysis is to assume tilling of the compost into the existing soil as described elsewhere in this Specification
- F. Testing – Existing Soil:
1. Prior to finish grading operations or at least four weeks before proposed planting operations, take samples of planting area soil, from 0"-12" deep, as shown on the Drawings and described below, or as directed in the field by the Owners Representative.
 - a. Contiguous planting areas - at least (3) three separate locations, mixed to form (1) composite sample, to be representative of the entire site.
 2. Combined volume of each composite sample noted above to be not less than 1-quart.

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3. Forward the composite soil samples to the Test Lab for testing and their recommendations as to exact amendments and fertilizers to be used in planting, Waypoint Analytical A05-2 complete analysis or approved equal. Test report is to:
 - a. Reference the sample location numbers in the case of multiple samples.
 - b. Include a recommendations summary – separate paragraph for each sample in case of multiple samples.
 - c. Testing results, including estimated infiltration rate, in tabular form – separate column / table for each sample in case of multiple samples.
 - d. Note the proposed planting types specific to the project - turf, groundcovers, trees, hydroseed.
 - e. If each composite sample is for a different type of planting, each set of recommendations is to reference that planting type.

- G. Delivery tags for all amendments and fertilizers delivered to the Site for the Project.
 1. Fertilizer delivery tags should clearly indicate the product and NPK designation.
 2. Amendment delivery tags should clearly indicate the lab test number corresponding to the approved amendment test report.

1.05 REVIEWS

- A. Specifically request at least (2) two days in advance the following review prior to progressing with the work:
 1. Intermediate Review – completion of site grading, topsoil placement amendment depths, finish grade.
 2. See Specification Sections Irrigation and Planting for other items to be inspected during this review.
 3. The review shall be conducted only after all items pertaining to the review as noted above and in related Sections have been completed.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver fertilizers and manufactured amendments to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis. Materials in broken containers or which become caked or contaminated making them unsuitable for use will not be accepted and are to be removed from the site.

PART 2 - PRODUCTS

2.01 EXISTING SOIL

- A. Topsoil: The top layer of existing soil in planting areas, containing minerals and organic materials including humus, and completely free of weeds, roots, rocks/clods over 1 cubic inch and other objectionable material. Depth of topsoil shall be taken to be 4-6 inches deep or as determined by the Owners Representative at the time of construction after clearing and grubbing.
 1. Topsoil is a sandy type.
 2. At turf areas topsoil starts below the grass root zone.
 3. At planting areas other than turf, topsoil starts below the mulch and organic matter layer.
 4. Soil underneath paving and aggregate base areas will not be considered as top soil.

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- B. Sub-soil: The remaining existing soil on the site after clearing & grubbing, after topsoil has been removed, and after all rocks over 1 cubic inch and all foreign debris and organic material have been removed.
 - 1. Soil under paving and aggregate base areas may be considered as subsoil provided contamination testing as specified elsewhere in this section indicates that it is free of contaminants that are harmful to plant growth.

2.02 FERTILIZER

- A. Soil amendment fertilizer: commercial fertilizer, 16-6-8 (N-P-K) uniform pellet. For bidding purposes only, exact fertilizer type and quantity to be determined by Test Lab analysis.
- B. Plant fertilizer: commercial fertilizer packets / tablets, two-year controlled-release 20-10-05 (N-P-K). Best Tabs by Simplot Professional Products, Agriform by The Scotts Company, or equal.

2.03 SOIL AMENDMENTS

- A. Compost: nitrogen stabilized organic compost produced only from landscape / yard trimmings, grass clippings, food scraps or agricultural residues.
 - 1. Nitrified bark, nitrified sawdust, wood-based soil conditioners will not be permitted.
 - 2. Compost to be supplied by a producer who participates in the U.S. Composting Council's Standard Testing Assurance (STA) program.
 - 3. Compost is to have a dark brown color, does not exhibit a sour or putrid smell, does not contain recognizable grass or leaves, and is not hot upon delivery or rewetting.
 - 4. Compost gradation:

<u>Sieve Size</u>	<u>Percent Passing</u>
3/8 inch (9.5 mm)	100%
1/4 inch (6.25 mm)	At least 95%
#8 (2.36 mm)	At least 60%
#16 (1.18 mm)	20% - 70%
#32 (500 um)	0% - 30%

- B. Compost Chemistry – Suitability Considerations
 - 1. Nitrogen (dry weight basis): 0.4 to 0.6%
 - 2. Iron (minimum): 0.08%
 - 3. Organic content: above 17%
 - 4. Carbon-Nitrogen Ratio: below 25
 - 5. pH: below 8.0
 - 6. Salinity (ECe): a value such that when combined with the existing site soil at a use rate determined by the Test Lab Analysis, the salinity of the amended soil / backfill mix shall not exceed 4.0 dS/m (mmhos/cm).
- C. Gypsum (if required by existing soils test): agricultural grade, OMRI listed.
 - 1. Cal-Sul Pelletized Gypsum by North Pacific, Portland OR
 - 2. Ultra Fine AG Gypsum by Western Mining & Minerals
 - 3. Approved equal.

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- D. Sulfur (if required by existing soils test): granular degradable sulfur product, Tiger 90CR Organic 0-0-0-90 Sulfur by TigerSul.com, or approved equal.

PART 3 - EXECUTION

3.01 GENERAL

- A. Limits and Grades Prior to commencing soil preparation operations, request a review by the Owners Representative to verify rough / mass grading work completed to date and verify specified limits of soil preparation work to commence.
- B. Finish grade all non-hardscape areas to round the top and toe of all slopes, providing natural contouring to integrate newly graded areas with the existing natural topography.
- C. Finish grade all non-hardscape areas to smoothly integrate newly graded areas with the existing grades.
- D. Protect concrete from any sulfate-based amendments that may be specified from soils analysis to avoid staining. Replace any concrete damaged from amendment placement at the no additional cost to the Owner.

3.02 SOIL PREPARATION SCHEDULE

Planting Type	Minimum Cultivation Depth	Amendments (compost)	Amendments (gypsum, sulfur)	Commercial Fertilizers
Native Grass Hydroseed	3-inches	None (**)	Per lab report	None (**)

(*) For bidding purposes only, exact amendment / fertilizer type and quantity to be determined by Test Lab analysis.

- A. (**) Test Lab may recommend compost and amendments to improve soil texture and address alkalinity for native grass and restoration areas. Lab recommendations supersede this table.

3.03 SOIL PREPARATION

- A. Install existing stockpiled topsoil as necessary to produce final finish grade requirement as shown on the Drawings, minimum depth of imported top soil as noted in the Soil Preparation Schedule in this Specification section.
 - 1. Existing undisturbed landscape areas that are not to be regraded and only to be replanted (excluding bio-retention areas) as shown on the Drawings, do not require topsoil across the areas, only individual plant pit preparation per Specifications.
 - 2. Proposed landscape areas including areas to be graded or that have been disturbed by construction that are to be planted as shown on the Drawings require topsoil across the entire planting areas. Amended excavated subsoil cannot be used as topsoil for these areas.

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- B. Cross-rip or cultivate sub-grade to the minimum depth specified in the Soil Preparation Schedule. Add water if necessary and continue ripping or cultivation until the entire specified depth is loose and friable. Place 2-inches of topsoil uniformly over sub-grade and thoroughly cultivate before placing remaining topsoil. Place topsoil and bring to a smooth, even grade. Settle the soil with water as needed and regrade high/low areas in accordance with paragraph "Finish Grading" this Section.
- C. Existing Stockpiled Topsoil: See Specification Section Earthwork and Grading

3.04 AMENDMENT PLACEMENT

- A. See Soil Preparation Schedule in this Specification section for requirements, adjustments to the bidding formula to be determined by Owner's Representative based on the Test Lab analysis and provided to the Contractor in writing.
- B. Cross-rip (cultivate) all planting areas and hydroseed areas thoroughly to the minimum depths specified in the Soil Preparation Schedule.
 - 1. Cross-ripping includes areas in between tree and plant pits.
 - 2. Upon completion of cross-ripping apply the amendments as specified in the Soil Preparation Schedule.
- C. Uniformly spread and incorporated the materials to obtain a homogeneously blended soil, 6-inches in depth. If amendments are to be added to lower alkalinity / pH / Sodium / SAR values per existing soils report from the Testing Lab, manually water the amended soil / backfill mix using impact sprinklers, hose-end sprinklers, or existing / designed sprinkler system if applicable - to apply 1/2-inch of water over all planting areas.
 - 1. Existing soils with high salinity as determined by the existing soils report from the Test Lab will be required to be similarly manually watered to leach the salts deeper into the soil, amount of water to be determined by the Testing Lab.
- D. Plant pits: Use soil which has been amended in the above manner as the backfill mix around the sides of the root balls. See Specification Section Planting for plant pit requirements.
- E. Watering: Apply water to areas to be drip irrigated to thoroughly mix in amendments and fertilizers immediately after amending soil, and a minimum of 24-hours prior to planting, unless rain is forecast for that period.
 - 1. Water may be manually applied by spray attachments or impact sprinklers on stands.
 - 2. Connect hose pipes to quick couplers or hose bibs. If neither is available or the main line has not been pressurized, use a portable lawn sprinkler pump connected to a water tank.
 - 3. The cost of watering to mix in amendments is at no additional cost to the Owner.

3.05 FINISH GRADING

- A. Finish grade all planting areas smoothly and uniformly, including those indicated to be only mulched on the Drawings.
 - 1. In all planting areas including mulch-only areas, remove all rocks and clods over 1 cubic inch, as well as all construction aggregates and construction gravel.
 - 2. Repair all erosion damage during the construction period.

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- B. Unless otherwise shown on the Drawings, all soil finish grades after watering and / or natural settlement shall be 1-inch below finish surface of walks, pavements, and curbs.

3.06 CLEAN UP

- A. After completion of all soil preparation operations, remove all trash, excess soil and other debris. Sweep and wash clean all walks, walls, and pavement. Leave the entire area in a neat, orderly condition.

END OF SECTION

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SECTION 32 91 16

BIORETENTION SOIL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. General: Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to the work of this Section.

1.02 DESCRIPTION OF WORK

- A. Extent: Furnish all labor, material, equipment, tools, and incidentals necessary for supply, preparation and installation of Bioretention Soil in storm water treatment measures as shown on the Drawings and as specified in this Section.
- B. Related work includes but is not limited to:
 - 1. Earthwork and Grading
 - 2. Soil Preparation
 - 3. Bioretention Soil Certification
 - 4. Planting

1.03 STANDARDS AND DEFINITIONS

- A. State of California, Department of Transportation Standard Specifications, referred to in this Specification as 'Caltrans Standard Specifications'.
- B. Applicable ASTM International Standards (latest revisions) as they apply to this work and related test methods, including:
 - 1. C33 / C33M Specification for Concrete Aggregates
 - 2. D422 Test Method for Particle Size Analysis of Soils
 - 3. D1557 Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort
 - 4. D2434 Test Method for Permeability of Granular Soils (Constant Head)
- C. Relative compaction: is defined as the in-place dry density of the compacted soil divided by the laboratory compacted maximum dry density determined in accordance with ASTM D1557, expressed as a percentage.

1.04 SUBMITTALS

- A. Samples: Provide one-quart samples each of compost, mulch, and mixed Bioretention Soil to the Owners Representative for review.
- B. Certification, signed and dated, in Specification Section Bioretention Soil Certification:
 - 1. Attachment A: Supplier Analysis of Biotreatment Soil Mix
 - 2. Attachment B: Lab Analysis OR supplier/quarry sieve analysis of Sand Component of Biotreatment Soil Mix
 - 3. Attachment C: Lab Analysis of Compost Component of Biotreatment Soil Mix. Include the full analysis report with sample ID and date on testing lab letterhead, along with this attachment.
 - 4. Attachment D: Supplier Analysis of Compost Component of Biotreatment Soil Mix

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- C. Compost & Mulch Testing: Laboratory (Lab) separate analyses for compost & mulch noted above performed by either:
1. Pre-approved Lab – Soil Control Lab, 42 Hangar Way, Watsonville, CA 95076, (831)724-5422
 2. A Lab that is enrolled in the US Composting Council Compost Analysis Proficiency (CAP) program and using approved Test Methods for the Evaluation of Composting and Compost (TMECC). Lab qualifications:
 - a. Address, phone number, email address.
 - b. Qualifications of Lab personnel
 - c. Date of current certification by STA, ASTM, or approved equal.
 3. Quality analysis results for compost performed by an independent STA Program approved lab in accordance with US Composting Council's Seal of Testing Assurance (STA) standards. Samples are to be taken using the STA sample collection protocol. (Sample collection protocol can be obtained from the U.S. Composting Council, 4250 Veterans Memorial Highway, Suite 275, Holbrook, NY 11741, (631)737-4931 www.compostingcouncil.org).
 4. Organic content test results of mixed Bioretention Soil: Organic content test shall be performed in accordance with by Testing Methods for the Examination of Compost and Composting (TMECC) 05.07A, "Loss-On Ignition Organic Matter Method".
 5. Tests must be conducted within 120 calendar days prior to the installation date of bioretention soil in the Project site.
 6. The Owners Representative reserves the right to reject the analysis from an alternate soil testing lab without prior approval.
 7. Pay for all testing fees from the Lab for all tests specified herein.
 8. Do not deliver any soil or amendment material to the site without approval by the Owners Representative.
- D. Permeability (Laboratory) Testing: Certificate from an independent testing laboratory for a Constant Head Permeability Test complying with ASTM D2434.
- E. Other Testing: Laboratory analysis for bioretention soil texture and amendments if required:
1. Waypoint Analytical (formerly Soil & Plant Laboratory) 4741 E Hunter Ave Suite A, Anaheim, CA 92807, (714)282-8777 or prior approved equal.
 2. The Owners Representative reserves the right to reject the analysis from an alternate soil testing lab without prior approval.
 3. Do not deliver any soil or amendment material to the site without approval by the Owners Representative.
 4. Pay for all testing fees from the Lab for all tests specified herein.

1.05 REVIEWS

- A. See Specification Section Soil Preparation.

PART 2 - PRODUCTS

2.01 BIORETENTION SOIL

- A. General: Bioretention soil to have sufficient moisture and nutrients to support healthy vegetation.
- B. Composition: a mixture of 60%-70% sand, and 30%-40% compost, measured on a volume basis.
1. Bioretention Soil may be prepared on site, or Contractor may elect to provide it pre-mixed to the Project.
- C. Permeability: Bioretention Soil mixture to show a minimum permeability of 10 inches / hour in saturated condition per ASTM 2434.

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- D. Approved Suppliers of pre-mixed Bioretention Soil: pre-approval does not release the compost supplier from complying with this Specification including submittal requirements.
1. Vision Recycling, Fremont, CA (510) 429-1300
 2. TMT Enterprises, San Jose, CA (408)432-9040
 3. Lennox Blend, by L.H.Voss Materials Inc, Concord, CA
 4. Approved Equal
- E. Depth: minimum 18" (eighteen-inches) depth unless otherwise noted on the Drawings.

2.02 SAND

- A. General: free of wood, waste, coating such as clay, stone dust, carbonate, etc., or any other deleterious material. All aggregate passing the No. 200 sieve size shall be non-plastic.
- B. Grain size / texture: ASTM D422. All sands conforming to ASTM C33 for fine aggregate comply with these gradation requirements.

<u>Sieve Size</u>	<u>Percent Passing (by weight)</u>	
	<i>Min</i>	<i>Max</i>
3/8"	100%	100%
No.4	90%	100%
No.8	70%	100%
No.16	40%	95%
No.30	15%	70%
No.40	5%	55%
No.100	0%	15%
No.200	0%	5%

2.03 COMPOST

- A. General: a well decomposed, stable, weed free organic matter source derived from waste materials including yard debris, wood wastes or other organic materials. Manure or bio-solids in the compost is not permitted.
1. Meet the standards developed by the US Composting Council (USCC), and becertified through the USCC Seal of Testing Assurance (STA) Program.
- B. Approved Suppliers: pre-approval does not release the compost supplier from complying with this Specification including submittal requirements.
1. Vision Recycling, CA (510) 353-6030, www.visionrecycling.com
 2. Zanker Recycling, San Jose, CA, (408) 263-2385, www.zankerrecycling.com
 3. Republic Services, Fremont, CA www.republicservices.com
 4. Approved Equal
- C. Feedstock materials: as specified by the compost supplier and include one or more of the following - landscape/yard trimmings, grass clippings, food scraps, and agricultural crop residues.
- D. Quality Analyses (Lab Reports) for compost (items 1-12), and mulch (items 8-12)
1. Nutrient Content: provide analysis detailing nutrient content including N-P-K, Ca, Na, Mg, S, and B.
 - a. Total Nitrogen content 0.9% or above preferred.
 - b. Boron: Total < 80 ppm (mg/Kg)
 2. Moisture Content: between 30% - 55% of dry solids.
 3. pH: between 6.5 and 8. May vary per requirements of plant species.
 4. Bulk density: between 500 and 1100 dry lbs/cubic yard (18.5 – 40.7 lbs/cu.ft)
 5. Salinity (electrical conductivity): Must be reported; < 6.0 mmhos/cm

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6. Organic Matter Content: 35% - 75% by dry wt.
 7. Carbon and Nitrogen Ratio: C:N >15:1 and < 25:1
 8. Maturity/Stability: dark brown color and a soil-like odor. Compost exhibiting a sour or putrid smell, containing recognizable grass or leaves, or is hot (120F) upon delivery or re-wetting is not acceptable. In addition any one of the following is required to indicate stability:
 - a. Oxygen Test < 1.3 O₂ /unit TS /hr
 - b. Specific oxy. Test < 1.5 O₂/ unit BVS /
 - c. Respiration test < 8 C / unit VS / day
 - d. Dewar test < 20 Temp. rise (Celsius)
 - e. Solvita® > 5 Index value
 9. Toxicity: anyone of the following measures is sufficient to indicate non-toxicity.
 - a. NH₄- : NO₃-N < 3
 - b. Ammonium < 500 ppm, dry basis
 - c. Seed Germination > 80 % of control
 - d. Plant Trials > 80% of control
 - e. Solvita® > 5 Index value
 10. Select Pathogens: Salmonella <3 MPN/4grams of TS, or Coliform Bacteria <10000 MPN/gram.
 11. Inerts: relatively free of inert ingredients, including glass, plastic and paper, < 1 % by weight or volume.
 12. Trace Contaminants/Metals (Lead, Mercury, Etc.): must pass US EPA, 40 CFR 503 regulations.
- E. Weed seed/pathogen destruction: provide proof from the compost supplier, if requested by the Owners Representative, of process to further reduce pathogens (PFRP). For example, turned windrows must reach min. 55C for 15 days with at least 5 turnings during that period.

2.04 SOIL TEXTURE

- A. Soil texture: sieve analysis for particle size distribution, in accordance with ASTM D422 or as approved by local agency), and meet the following gradation below:

Sieve Size	Percent Passing (by weight)	
	<i>Min</i>	<i>Max</i>
1-inch	99%	100%
1/2-inch	90%	100%
1/4-inch	40%	90%
No.200	2%	10%

2.05 MULCH

- A. Aged mulch / compost mulch.
1. Pathogen free / weed free as specified for compost above, free of inorganic impurities, with a dark brown to black color and semi-fine (1/2"-1-1/2") texture.
- B. Approved Suppliers: pre-approval does not release the supplier from complying with this Specification including submittal requirements.
1. Midnight Composted Mulch, supplied by Vision Recycling, CA (510) 429-1300
 2. Prior-approved Equal

2.06 PERMEABLE AGGREGATE

- A. Permeable Aggregate Base: Class 2 Permeable, three fourths inch (3/4") maximum, gradation in accordance with Caltrans Standard Specifications 68-2.02F (3), thickness as shown on the Drawings.

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Sieve Size	Percent Passing
1" (25.0 mm)	100%
3/4" (19.0 mm)	90-100%
3/8" (9.5 mm)	40-100%
#4 (4.75 mm)	25-40%
#8 (2.36 mm)	18-33%
#30 (600 um)	5-15%
#50 (300 um)	0-7%
#200 (75 um)	0-3%

R-value		78 Min.
Sand Equivalent CTM# 217		75 Min.
Durability Index CTM #229	Fine	40 Min.
	Coarse	40 Min.

Class 2 Permeable Material shall be an imported material consisting of durable crushed rock or gravel and sand that is free from slaking and decomposition under the action of alternate wetting and drying.

PART 3 - EXECUTION

3.01 GENERAL

- A. Prevent over-compaction of native soils in the Bioretention facility. Delineate the facility area as outside the limit of disturbance and keep construction traffic off. Protect soils with fencing, plywood, etc.
- B. Provide erosion control if necessary in the contributing drainage areas of the facility. Stabilize upslope areas. Do not use bio-retention facilities as sediment control facilities.
- C. If drainage is to be allowed through the facility during construction, leave or backfill at least 6" above the final grade. Temporarily cover the under drain with plastic or fabric. Line or mulch the facility.
- D. Verify that Bioretention Soil meets this specification prior to delivery.
- E. Install the permeable aggregate drainage layer and perforated pipe under drain as shown on the Drawings, or if by other sub-contractor, then verify that installation of the drainage layer and perforated pipe under drain is correct prior to placing Bioretention Soil.
- F. Limits and Grades: Prior to installing prepared Bioretention Soil, request a review by the Owners Representative to verify grading work completed to date and verify specified limits of Bioretention Soil.
- G. If mixing bio-retention media onsite, use an adjacent impervious area or on plastic sheeting to prevent contamination by other materials and soil.

3.02 BIORETENTION SOIL PLACEMENT

- A. Do not excavate, place soils, or amend soils during wet or saturated conditions.
- B. If required, or as determined by the Owners Representative, rip or scarify the bottom soils to promote greater infiltration or excavate any sediment that may have built up during construction.

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- C. Place Bioretention Soil in 12" lifts with machinery operated adjacent to, and not in, the Bioretention facility. If working within the facility, avoid over compaction of the soil, using light weight, low ground-contact pressure equipment.
- D. Allow Bioretention Soil lifts to settle naturally, and achieve 83%-87% relative compaction. Review the method to achieve required compaction with the Owners Representative before the Bioretention Soil is installed.
 - 1. Bioretention Soils may alternatively be compacted by lightly watering until soils are just saturated. Allow for extra time to let soils dry between each lift. Note that Bioretention Soil cannot be worked when saturated.
- E. After all lifts are placed, wait a few days to check for settlement, and add additional material as needed to meet the finished grades as shown on the Drawings.
- F. Verify Bioretention Soil elevations before applying mulch or installing plants.
- G. Install mulch over all Bioretention Soil areas with the exception of hydroseeded areas. See Specification Section Planting for mulch thickness.

3.03 PERCOLATION (PERMEABILITY) FIELD TESTING

- A. If required by the Owners Representative in addition to the specified laboratory test, demonstrate in-situ percolation of each Bioretention Soil area for design storm flows through the installed soil. The material shall have an on-site tested percolation rate of 10-inches per hour initial rate and minimum 5-inches per hour sustained rate.
 - 1. Install a 1-foot diameter pipe, 2.5 feet long, driven 1.5 feet deep into the Bioretention Soil area for the field percolation test.
 - 2. Fill the pipe with 1 foot of water after the Bioretention Soil area has been wetted.
 - 3. The pipe should empty 1 foot of water above the wetted soil layer in no less than 1 hour and 12 minutes, and no longer than 2 hours and 24 minutes.
 - 4. If the in-situ test fails then remove and reinstall the entire soil within the Bioretention Soil area(s).

3.04 FINISH GRADING

- A. See Specification Section Soil Preparation for finish grade requirements if Bioretention Soil is part of, or adjacent to, planting areas.

3.05 PROTECTION

- A. Direct drainage away from Bioretention facilities until upslope areas are stabilized, if applicable.

END OF SECTION

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BIORETENTION SOIL CERTIFICATION

Attachment A

Supplier Analysis of Biotreatment Soil Mix

The table below shall be completed by the Biotreatment Soil Mix Supplier.

Date: (All lab tests must be done within the last 120 days)		Name of Person Filling Out This Form:		
Title:		Signature:		
Phone:		Email:		
Company Name:		City:		
Street Address:		Zip:		
I certify that the provided Biotreatment Soil Mix meets the requirements of Attachment L of the MRP.		<input type="checkbox"/> Yes (Pass)		
		<input type="checkbox"/> No (Fail)		
Describe the equipment and methods used to mix the compost and sand components of the Biotreatment Soil Mix.				
Material	Standard Percent (by volume)	Actual Mix %	Pass	Fail
Sand	60% - 70%		<input type="checkbox"/>	<input type="checkbox"/>
Compost	30% - 40%		<input type="checkbox"/>	<input type="checkbox"/>
Does the soil mix have a permeability of at least 5 inches per hour? ¹			<input type="checkbox"/> Yes (Pass)	
			<input type="checkbox"/> No (Fail)	
Will the soil mix support vigorous plant growth?			<input type="checkbox"/> Yes (Pass)	
			<input type="checkbox"/> No (Fail)	

¹Soil mix permeability testing is only required for alternative biotreatment soil mixes. Soil permeability tests must be conducted on a minimum of two samples using constant head permeability in accordance with ASTM D2434 with a 6-inch mold and vacuum saturation.

Attachment B

Lab Analysis of Sand Component of Biotreatment Soil Mix

The table below shall be completed by the laboratory conducting the sand analysis.

Name of Person Filling Out This Form:		Signature:		
Title:		Date:		
Phone:		Email:		
Company:		City:		
Street Address:		Zip:		
Qualifications & relevant certifications (ASTM, CTM or approved equivalent certifications):				
Is sand free of wood, waste, coating (such as clay, stone dust, carbonate, etc.), or any other deleterious material?		<input type="checkbox"/> Yes (Pass)		
		<input type="checkbox"/> No (Fail)		
Is all aggregate passing the No. 200 sieve non-plastic?		<input type="checkbox"/> Yes (Pass)		
		<input type="checkbox"/> No (Fail)		
Particle size analysis shall be conducted in accordance with ASTM D 422 (Standard Test Method for Particle Size Analysis of Soils) or CTM 202. Other equivalent methods acceptable only if approved.				
Sieve Size	Standard Percent Passing (% by weight)	Testing Results (%)	Pass	Fail
3/8 inch	100%		<input type="checkbox"/>	<input type="checkbox"/>
No. 4	90% - 100%		<input type="checkbox"/>	<input type="checkbox"/>
No. 8	70% - 100%		<input type="checkbox"/>	<input type="checkbox"/>
No. 16	40% - 95%		<input type="checkbox"/>	<input type="checkbox"/>
No. 30	15% - 70%		<input type="checkbox"/>	<input type="checkbox"/>
No. 40	5% - 55%		<input type="checkbox"/>	<input type="checkbox"/>
No. 100	0% - 15%		<input type="checkbox"/>	<input type="checkbox"/>
No. 200	0% - 5%		<input type="checkbox"/>	<input type="checkbox"/>

Attachment C

Lab Analysis of Compost Component of Biotreatment Soil Mix

The table below shall be completed by the laboratory conducting the compost analysis.

Name of Person Filling Out This Form:	Signature:
Title:	Date:
Phone:	Email:
Company:	City:
Street Address:	Zip:
Qualifications & relevant certifications: (STA, ASTM or approved equivalent certification)	

Specification	Standard	Testing Results	Pass	Fail
Organic Matter Content	35% - 75% (by dry weight)	%	<input type="checkbox"/>	<input type="checkbox"/>
Carbon-to-Nitrogen Ratio	15:1 to 25:1 (C:N)	C:N	<input type="checkbox"/>	<input type="checkbox"/>
Salinity	< 6.0 mm hos/cm	mm hos/cm	<input type="checkbox"/>	<input type="checkbox"/>
pH	6.5 - 8	pH	<input type="checkbox"/>	<input type="checkbox"/>
Bulk Density	500 – 1100 dry lbs / yd ³	dry lbs / yd ³	<input type="checkbox"/>	<input type="checkbox"/>
Moisture Content	30%-55% (of dry solids)	%	<input type="checkbox"/>	<input type="checkbox"/>
Percent inert ingredients (incl. plastic, glass, paper)	< 1% (by weight or volume)	%	<input type="checkbox"/>	<input type="checkbox"/>

Provide the results of at least one of the following analyses to indicate compost stability:

Specification	Standard	Testing Results	Pass	Fail
Oxygen Test	< 1.3 O ₂ /unit TS/hr	O ₂ /unit TS/hr	<input type="checkbox"/>	<input type="checkbox"/>
Specific Oxygen Test	< 1.5 O ₂ /unit BVS/hr	O ₂ /unit BVS/hr	<input type="checkbox"/>	<input type="checkbox"/>
Respiration Test	< 8mg CO ₂ -C/g VS/day	mgCO ₂ -C/g VS/day	<input type="checkbox"/>	<input type="checkbox"/>
Dewar test	< 20 °C Temp. rise e.	°C Temp. rise e.	<input type="checkbox"/>	<input type="checkbox"/>
Solvita® Index value	> 5 Index value	Index value	<input type="checkbox"/>	<input type="checkbox"/>

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Provide the results of <u>at least one</u> of the following analyses to indicate compost toxicity:					
Specification	Standard	Testing Results		Pass	Fail
Ratio of NH ₄ ⁻ : NO ₃ -N	NH ₄ ⁻ : NO ₃ -N < 3		NH ₄ ⁻ : NO ₃ -N	<input type="checkbox"/>	<input type="checkbox"/>
Ammonium	< 500 ppm, dry basis		ppm, dry basis	<input type="checkbox"/>	<input type="checkbox"/>
Seed Germination	> 80% of control		% of control	<input type="checkbox"/>	<input type="checkbox"/>
Plant Trials	> 80% of control		% of control	<input type="checkbox"/>	<input type="checkbox"/>
Solvita® Index value	> 5 Index value		Index value	<input type="checkbox"/>	<input type="checkbox"/>
Provide the analysis of the nutrient content of the compost, including the following:					
Specification	Standard	Testing Results		Pass	Fail
B (total, in ppm)	< 80 ppm		ppm	<input type="checkbox"/>	<input type="checkbox"/>
B (soluble, in ppm)	< 2.5 ppm		ppm	<input type="checkbox"/>	<input type="checkbox"/>
Nitrogen (N)(total %)	> 0.9% preferred.		%		
Phosphorus (as P ₂ O ₅)	<i>[not specified]</i>		%		
Potassium (as K ₂ O)	<i>[not specified]</i>		%		
Calcium (Ca)	<i>[not specified]</i>		%		
Sodium (Na)	<i>[not specified]</i>		%		
Magnesium (Mg)	<i>[not specified]</i>		%		
Sulfur (S)	<i>[not specified]</i>		ppm		
Provide the results of <u>at least one</u> of the following select pathogens:					
Specification	Standard	Testing Results		Pass	Fail
Salmonella	< 3 MPN/4 grams TS		MPN/4 grams TS	<input type="checkbox"/>	<input type="checkbox"/>
Coliform Bacteria	< 10,000 MPN/gram		MPN/gram	<input type="checkbox"/>	<input type="checkbox"/>
Does the product meet US EPA, 40CFR 503 regulations regarding trace contaminants metals (Lead, Mercury, etc.)?				<input type="checkbox"/> Yes (Pass)	
				<input type="checkbox"/> No (Fail)	
Particle size analysis shall be conducted in accordance with ASTM D 422 (Standard Test Method for Particle Size Analysis of Soils)-washing not required. Equivalent methods acceptable if approved.					
Sieve Size	Standard Percent Passing (by weight)	Testing Results (%)		Pass	Fail
1 inch	99% - 100%			<input type="checkbox"/>	<input type="checkbox"/>
½ inch	90% - 100%			<input type="checkbox"/>	<input type="checkbox"/>
¼ inch	40% - 90%			<input type="checkbox"/>	<input type="checkbox"/>
No. 200	2% - 10%			<input type="checkbox"/>	<input type="checkbox"/>

Attachment D

Supplier Analysis of Compost Component of Biotreatment Soil Mix

The table below shall be completed by the Compost Supplier providing the compost for the mix.

Name of Company:	Date of Delivery:
Qualifications & relevant certifications: (STA, ASTM or approved equivalent certifications)	Date of the Compost Lab Analysis Report: (Must be dated within 120 days prior to delivery)
Name of Person Filling Out This Form:	Date:
Signature:	Street Address:
Email address:	City:
Phone:	Zip:
Feedstock materials have been specified and include only the following: Landscape/yard trimmings, grass clippings, food scraps, or agricultural crop residues?	<input type="checkbox"/> Yes (Pass)
	<input type="checkbox"/> No (Fail)
Compost has a dark brown color and a soil-like odor, does not exhibit a sour or putrid smell, does not contain recognizable grass or leaves, and is not hot (120°F) upon delivery or rewetting?	<input type="checkbox"/> Yes (Pass)
	<input type="checkbox"/> No (Fail)
The compost has gone through the process to further reduce pathogens (PFRP)? For example, turned windrows must reach a minimum temperature of 55°C for 15 days with at least 5 turnings during that period.	<input type="checkbox"/> Yes (Pass)
	<input type="checkbox"/> No (Fail)

END OF SECTION

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SECTION 32 9213

HYDROSEEDING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to the work of this Section.

1.02 DESCRIPTION OF WORK

- A. Extent: Furnish all labor, material, equipment, tools, and incidentals necessary for hydroseeding erosion control and bioswale areas as shown on the Drawings, and as specified in this Section.
- B. Related work includes but is not limited to:
 - 1. Soil Preparation

1.03 QUALITY ASSURANCE

- A. Cellulose Fiber shall be certified to indicate that laboratory and field testing of the product has been accomplished and meets all requirements specified herein based on testing. Weight specifications from the supplier for this material shall refer only to air dry weight of the fiber material.
- B. Seed shall be delivered in original sealed packages bearing supplier's certificate – lab analysis for purity, germination, weed seed content, and inert material. Seed bags shall include manufacturer's tags in conformance with Federal Seed Act (FSA) and applicable state laws. Wet, moldy, or otherwise damaged seed will be rejected by the Owner's Representative.
- C. Seed Suppliers:
 - 1. Pacific Coast Seed
533 Hawthorne Place
Livermore, CA 94550
(925) 373-4417
www.pcseed.com
- D. Fertilizers and manufactured amendments are to be delivered to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis. Materials which become caked or contaminated making them unsuitable for use will not be accepted.
 - 1. Fertilizers shall comply with the requirements of the Fertilizing Materials Inspection Program of the California Department of Food and Agriculture.
- E. Hydraulic equipment used for the application of the fertilizer, seed and slurry of prepared wood pulp is subject to approval by the Owners Representative.

1.04 SUBMITTALS

- A. Documents:
 - 1. Qualifications / current licenses / previous experience of the hydroseeding company.
 - 2. Description of hydraulic equipment proposed to be used.

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3. Hydroseeding Schedule. For projects with non-continuous installations of hydroseed, submit all proposed installation dates. See discussion for non-irrigated hydroseed elsewhere in this Specification.
4. Dated letter from the seed supplier indicating availability of proposed seed mix and sources, and suggested substitutions if any.
5. Product cut-sheets on any fiber, fertilizer, tackifier, inoculant, etc.
6. Prior to installation - seed labels for each native plant species in the supplied hydroseed mix.

B. Samples:

1. Fiber: 4 oz sample – if not a pre-approved product as noted. For pre-approved products submit only product data sheet.
2. Tackifier / binder: 4 oz sample – if not a pre-approved product as noted. For pre-approved products submit only product data sheet.

C. Delivery tags for fiber, binder, fertilizer, seed, and inoculant as delivered to the Site for the Project.

1.05 REVIEWS

A. See Specification Section Planting

PART 2 - PRODUCTS

2.01 HYDROSEED APPLICATORS

A. General: if the hydroseeding work is part of restoration / mitigation planting, then the applicator shall be experienced in working under such conditions as stipulated by the permitting agency.

B. Pre-approved applicators:

1. Superior Hydroseeding, Inc. Watsonville, CA (831) 763-1811, www.superiorhydroseeding.net. Contact Morgan Kost / Jeff Kost.
2. Freedlun Hydroseeding Inc., Vacaville, CA (707) 448-9423.

C. Approved Equal.

2.02 MATERIALS

A. Seed Mixes: in general, shall be from the local watershed of the project or watershed with similar climate conditions. For the Monterey area, coastal watersheds of Santa Cruz, San Mateo, San Francisco, Sonoma and Mendocino counties may be considered.

1. Erosion Control Grass Mix:

<u>Botanical Name</u>	<u>Rate: lbs/acre</u>	<u>% Pure</u>	<u>% Germ</u>
Bromus carinatus	8	95	85
Eschscholzia californica 'Maritima'	2	95	85
Elymus glaucus	12	95	85
Elymus multisetus	6	95	85
Nassella pulchra	10	95	85
Sisyrinchium bellum	2	95	85
Total	40		

2. Bioswale Grass Mix:

<u>Botanical Name</u>	<u>Rate: lbs/acre</u>	<u>% Pure</u>	<u>Min % Germ</u>
Deschampsia cespitosa 'Holciformis'	8	95	85
Hordeum brachyantherum	12	95	85
Leymus triticoides	12	95	85

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Muhlenbergia rigens	5	95	85
Sisyrinchium californicum	3	95	85
Total	40		

- B. Fiber: 100% virgin natural wood fiber mulch, free from synthetic paper or plastic materials, and atmospherically processed.
1. Fiber must disperse into a uniform slurry when mixed with water.
 2. Colored with a non-toxic, water-soluble green dye to provide a proper visual gauge for metering of material over ground surfaces.
 3. Manufactured in such a manner that after addition and agitation in slurry tanks with fertilizer, seed, water and other approved additives, the fibers in the material will become uniformly suspended to form a homogeneous slurry; and that when hydraulically sprayed on the ground, the material will form a blotter-like ground cover impregnated uniformly with seed; and which after application, will allow the absorption of moisture and allow the rainfall to percolate to the underlying soil.
 4. Materials that inhibit germination or growth will not be permitted in the mixture.
 5. Pre-approved atmospherically processed wood products: Second Nature Wood Fiber by Profile Products.
- C. Fertilizer:
1. For seed mix areas: Biosol Forte 7-2-1 (N-P-K) as manufactured by Rocky Mountain Bio Products www.rockymtnbioproducts.com, and distributed by Pacific Coast Seed, Inc. Tracy, CA (925) 373-4417 and S&S Seeds, Carpinteria, CA (805) 684-0436.
- D. Tackifier/Binder: 100% psyllium fiber derived from the outer coating of the plantago seed. Available in powder form and packed in clearly marked bags stating the contents of each package. The tackifier will require no curing time, shall remain soft and rewettable, and shall not inhibit seed germination. All ingredients shall be biodegradable. Pre-approved products:
1. Ecology Control M-Binder by S&S Seeds, Inc, Carpinteria, CA (805)684-0436
 2. Plantago Binder by Northstar Impex Corpn. Moreno Valley CA (951)486-0441.
 3. Approved equal.
- E. Mycorrhizal Inoculant: for naturalized areas – AM 120 Standard by Reforestation Technologies International (RTI), Gilroy CA, (408) 848-9604, and distributed by Pacific Coast Seed, Inc. Tracy, CA (925) 373-4417 and S&S Seeds, Carpinteria, CA (805) 684-0436.
- F. Equipment: Use hydraulic equipment with a built-in agitation system and operating capacity sufficient to agitate, suspend and mix homogeneously the slurry mixture.
1. Slurry distribution lines are to be large enough to prevent stoppage.
 2. Discharge line is to be equipped with a set of hydraulic spray nozzles capable of providing a continuous non-fluctuation discharge and delivery of the slurry in the prescribed quantities uniformly, without misses, waste, or erosion.
 3. Slurry tank with a minimum capacity of 500 gallons and mounted on a traveling unit which may be either self-propelled or drawn with a separate unit which will place the slurry tank and spray nozzle within sufficient proximity to the areas to be seeded so as to provide uniform distribution.
 4. If using equipment with smaller tank capacity then demonstrate to the Owners Representative that it has the necessary agitation system and sufficient pump capacity to spray the slurry in a uniform coat.

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2.03 CHEMICALS

- A. Insecticides, fungicides, herbicides registered with the California Department of Pesticide Regulation (DPR) and recommended by licensed Pest Control Operator and approved by the Owners Representative.
 - 1. Post-emergent broad-leaf herbicides:
 - a. Selective herbicide, Speedzone or approved equal. Note: this product is stated by its manufacturer to be harmful to aquatic life and is not permitted to be used on areas draining directly to aquatic / riparian areas.
 - b. Rodeo, Round-up Custom or approved equal. These herbicides are permitted to be used in aquatic / riparian areas per the manufacturer's instructions. They are non-selective herbicides so only spot-treatment with extreme care is permitted.

PART 3 - EXECUTION

3.01 GENERAL

- A. Carry out hydroseeding during a windless period using approved equipment and materials.
- B. Preparation of Surfaces: At the time of hydroseeding the surfaces shall be even and free of deleterious material and weeds and cultivated per Specification Section Soil Preparation. Ensure that soil is moist to a depth of at least 1/2".

3.02 SCHEDULE (NON-IRRIGATED HYDROSEED)

- A. Hydroseeding between October 15th and December 15th, within five days of the first rainfall of the season, is required. If not within this period, carry out the following:
 - 1. December 16th to April 15th – after hydroseeding, depending on the ground moisture, provide supplemental water as required to germinate and establish the hydroseed at no additional cost to the Owner.

3.03 CHEMICALS

- A. Herbicides: Verify compatibility, dosage and other application procedures with the manufacturer. All chemicals shall be applied by a pest control operator licensed in the State of California.
 - 1. Do not use chemicals stated by their manufacturers to be harmful to aquatic life in any areas draining directly to aquatic / riparian areas.
 - 2. Do not mix the herbicide with surfactants in dry upland areas.
- B. After cross-ripping / loosening the soil per Specification Section Soil Preparation, and after weed germination from first rains or water applied for establishment - spray naturalized areas with post-emergent herbicides. Spray weeds prior to going to seed and that are at least 2" tall, over a minimum of two weeks. Upon weed kill, apply hydroseeding a minimum of 4 weeks after last herbicide application.

3.04 MIXING

- A. With agitation system operation at part speed, add water to the tank, and establish good circulation. Add materials in such a manner that they are uniformly blended into the mixture. Add the seed first; then fiber. Do not add the fiber until the tank is at least one-third filled with water. Agitate the mixture at full speed when the tank is two-thirds to three-fourths full.
 - 1. Do not allow seed to remain in the seeder longer than one hour. Seed kept longer will be rejected by the Owners Representative, disposed of off-site, replaced at no additional cost to the Owner.

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2. A dispersing agent may be added, provided that documented evidence is furnished that the additive is not harmful to the mixture.

B. Mixing / Application Rates per Acre:

Grass Mix Areas: (One-Stage Application)	
Fiber	2,000 lbs.
Seed	As specified above
Fertilizer: Biosol Forte	1000 lbs / 2000 lbs (SELECT ONE higher value for non-amended soils)
Tackifier/Binder	Per manufacturer's recommendations
Water	As needed for application

3.05 APPLICATION

- A. Apply the hydroseed slurry within one hour of mixing, with a sweeping and arched technique with no slumping or shadowing to insure uniform coverage and to ensure that material is spread evenly at the required rate as noted above.
- B. Apply the hydroseed in one-stage as specified under Mixing in this Specification.
- C. Wherever possible, locate equipment outside of the hydroseeded areas to minimize compaction. Do not allow hydroseeding equipment on to bioretention areas. Take preventive measures to avoid damage to adjacent vegetation.

3.06 CLEAN-UP AND REPAIR

- A. Remove all trash, seed containers, and ancillary material in and adjacent to the hydroseeded areas on completion of hydroseeding and leave the work area in a neat and orderly manner.
- B. Following application and clean-up minimize all activity on the hydroseeded areas.
- C. Re-apply hydroseed according to this Specification, and at no additional cost to the Owner, to any bare spots prior to final acceptance by the Owners Representative.

END OF SECTION

LINCOLN CUNNINGHAM PARK BASKETBALL COURT IMPROVEMENTS

SECTION 33 40 00

STORM DRAINAGE UTILITIES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Storm drain pipe and fittings
 - 2. Manholes, cleanouts, inlets, and other appurtenances

1.02 RELATED REQUIREMENTS

- A. Section 017123 – Field Engineering
- B. Section 312213 – Earthwork
- C. Section 312333 – Trenching

1.03 REFERENCES

- A. California Building Standards Code (CBSC), 2022 Edition.
- B. ASTM C478 – Standard Specification for Precast Reinforced Concrete Manhole Sections
- C. ASTM C 1244 – Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill
- D. ASTM D2241 – Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
- E. ASTM D 2321 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
- F. ASTM D 3034 – Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- G. ASTM D3212 – Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
- H. ASTM D2751 – Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings
- I. ASTM F1668 – Standard Guide for Construction Procedures for Buried Plastic Pipe

1.04 SUBMITTALS

- A. Submit testing results for proposed bedding, backfill and drain rock to the ARCHITECT and GEOTECHNICAL ENGINEER at least 2 weeks prior to proposed use.
- B. Submit samples of proposed bedding, backfill and drain rock to the GEOTECHNICAL ENGINEER at least 2 weeks prior to proposed use.

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- C. Submit manufacturer cut sheets for piping and appurtenances to the ARCHITECT.
- D. Submit concrete mix design and shop drawings for any cast-in-place concrete structures proposed.

PART 2 - PRODUCTS

2.01 BEDDING AND BACKFILL

- A. Pipe bedding and initial backfill: Clean Sand in accordance with Section 312333, or native material if approved by the GEOTECHNICAL ENGINEER.
- B. Final backfill: Clean Sand in accordance with Section 312333, or native material if approved by the GEOTECHNICAL ENGINEER.

2.02 STORM DRAIN PIPE

- A. 4" and 6" pipe: Rubber gasketed PVC gravity sewer pipe conforming to ASTM D-3034, SDR 35 or SDR 26.

2.03 CONCRETE DRAINAGE STRUCTURES

- A. Cast in place concrete and precast concrete drain inlets shall conform to Section 51, "Concrete Structures", Section 52 "Reinforcement", Section 70 "Miscellaneous Drainage Facilities", and Section 75 "Miscellaneous Metal" of the Standard Specifications, and these Specifications.
- B. Concrete drainage inlets shall be precast units conforming to the details shown on the plans.
- C. Concrete manholes shall be precast units conforming to ASTM C 478 and the details shown on the plans
- D. Precast unit joints shall be sealed with preformed butyl rubber joint sealant conforming to ASTM C-990.
- E. Pipe connections to concrete structures shall be fitted with a flexible, watertight elastomeric gasket conforming to ASTM C-923 (for PVC pipe), or ASTM F-2510 (for HDPE Type 'S' pipe).
- F. The flow line of concrete inlets, whether precast or cast in place, shall be formed in the field to provide a smooth flow line with bench at the pipe spring line. The invert paving thickness in precast structures shall be at least 3" below the bottom of the lowest pipe.
- G. Structures, grates, and covers shall be H-20 load rated if located in vehicular areas, and pedestrian load rated otherwise.
- H. Cast-in-place concrete may be utilized in lieu of specified precast units only if approved by the ENGINEER. Contractor shop drawings shall be required for approval for any cast-in-place concrete.
- I. ADA-compliant grates shall have less than 1/2" clear between bars, and the openings shall be aligned perpendicular to the path of travel. All grates within pedestrian areas shall be ADA-compliant.

2.04 GEOTEXTILE FABRICS

- A. Filter fabric: as indicated on the Drawings or in the Geotechnical Report.

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1. If not indicated, submit Mirafi 140N or equivalent for approval by the GEOTECHNICAL ENGINEER.
- B. Other geotextile fabrics: as indicated on the Drawings or in the Geotechnical Report.
 1. If not indicated, submit type appropriate for the intended use for approval by the GEOTECHNICAL ENGINEER
- C. Filter fabric is not used on subsurface drains constructed of Class 2 Permeable Material.

2.05 DRAIN ROCK

- A. Caltrans Permeable Material Class 1A, 1B or 2, as indicated on the Drawings. If not indicated, submit Class 2 for approval.

2.06 ACCESSORIES

- A. Provide warning tape as specified in Section 312333 – Trenching

PART 3 - EXECUTION

3.01 GENERAL

- A. All work shall be in accordance with:
 1. The California Plumbing Code
 2. Product manufacturer's recommendations
 3. ASTM D 2421

3.02 TRENCHING

- A. Perform trenching in accordance with Section 312333.

3.03 PIPE COVER

- A. Top of pipe to finished grade shall be 36 inches minimum for pipe located within vehicular areas, unless otherwise indicated on the Drawings or approved by the Engineer.
 1. Pipes which are located within paved areas and with less than 24" of cover measured from the top of pipe to the finished pavement grade shall be backfilled with minimum 2,500 psi concrete to 6" above the top of pipe. Pipe shall be adequately restrained to prevent floatation or movement during backfillingF

3.04 TESTING

- A. Following placement and compaction of backfill, and prior to the placement of permanent pavement, storm drains shall be cleaned and videoed to verify that the pipeline is free from obstructions (deflections, joint offsets, lateral pipe intrusions, etc.).

END OF SECTION