

## **SECTION 11 66 13 – FITNESS EQUIPMENT**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes: All labor, materials, equipment, tools, accessories, transportation, and services as required to furnish and install Fitness Equipment, including signs.
- B. Related Requirements
  - 1. Section 312200, Grading
  - 2. Section 321100, Base Courses

#### **1.2 References**

- A. ASTM F2276-10(2015)
- B. ASTM F1292, Standard Specification for Impact Attenuation of Surfacing Materials Within the Use Zone of Playground Equipment, current version.
- C. ASTM F1951: Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment, latest edition.
- D. 2010 California Building Code (2010 CBC)
- E. Department of Justice Title II regulation of ADA (28CFR Part 35)
- F. Department of Justice Title III regulation of ADA (28 CFR Part 36)
- G. Department of Justice 2010 American Disabilities Act Standards for Accessible Design ('2010 ADA').

#### **1.3 PRICE AND PAYMENT PROCEDURES**

- A. Refer to Section 01 20 00, Price and Payment Procedures.

#### **1.4 SUBMITTALS**

- A. Fitness Equipment Shop Drawings: Prior to the purchase of the Fitness Equipment items and within ten (10) days after notice to proceed, Contractor shall submit the following items to Engineer for review and approval. No materials for this section shall be purchased until such approval is granted. Incomplete submittals shall be returned without review.
  - 1. Plan view drawing of playground equipment at eighth scale with overall dimensions, all components labeled, and deck heights shown.
  - 2. Isometric drawing of playground equipment.
  - 3. Listing of color and finish for posts, plastic components, decks and accessories.

4. Show locations and dimensions of footings and anchorage points.
  5. Clearly identify mounting elevations in relation to a fixed survey point on site and to sub-grade elevation and depth of playground protective surfacing.
  6. Show locations of underground utilities, storm drainage system, and irrigation system (where occurs).
  7. Show locations of related construction such as walkways and roadways, fences, site furnishings, and plantings.
  8. Indicate capacity and numbers of play activities.
  9. Shop drawings must be signed and sealed by a structural engineer registered in the State of California.
  10. Calculations and drawings for fitness equipment footings shall be submitted, signed and sealed, by a structural engineer registered in the State of California.
  11. Manufacturer's contact information.
  12. Maintenance / repair instructions.
  13. Manufacturer's Parts Lists.
  14. Manufacturer's Installation instructions
- B. Color chart showing full range of manufacturer's colors or six inches (6") length of actual units showing the full range of colors and textures available for components with factory applied color finishes.
- C. Certificates
1. Supplemental insurance coverage as offered by manufacturer and/ or manufacturer's sale representative for equipment and surfacing indicating a limit of product liability of not less than \$5,000,000.
- D. Manufacturer's Instructions and Details and Installation of playground equipment.
- E. Maintenance Data: Provide manufacturer's recommended maintenance instructions and list of replaceable parts for each equipment item, with address and phone number of source of supply.
- F. Proposals for Substitutions: Substitutions that will increase the fall height, platform height, or maximum equipment height will not be considered.

#### **1.5 PROPOSALS FOR MODIFICATIONS**

- A. Submit shop drawings with proposed modifications clearly identified and sufficient information to determine compliance with specified criteria.

#### **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications
1. Provide only playground equipment and play structure components bearing the IPEMA Certification Seal.
- B. Installer Qualifications
1. An experienced installer who has a minimum of 5 installations of similar size and scope over the past three (3) years and is specialized in installing work similar in

material, design, and extent to that indicated for this Project and who is acceptable to manufacturer of playground equipment.

- C. Testing Agency Qualifications
  - 1. An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E548.

### **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver manufactured products in manufacturer's unopened containers, fully identified with manufacturer's name, brand, type and grade.
- B. Protect from weather, soiling and damage using handling equipment and storage techniques recommended by manufacturer.
- C. Materials: All materials required to complete the work under this contract shall be furnished by the Contractor.

### **1.8 WARRANTY**

- A. Final Guarantee: Contractor shall provide guarantee
- B. Manufacturer's warranty: Submit manufacturer's warranty and ensure that forms have been completed in the Tribe's name and registered with manufacturer.
  - 1.

## **PART 2 - PRODUCTS**

### **2.1 PRODUCTS**

- A. Fitness equipment shall be manufactured by Greenfields Outdoors Fitness, Inc, 2617 West Woodland Drive, Anaheim, CA 92801. Contact: Frank Vasquez, 888-315-9037 or Approved Equal.
- B. Recumbent Bike (with resistance) (UBX249-01K), Color: Green
- C. Accessible Rower Adjustable Resistance (UBX290W-01), Color: Green

All Equipment shall be galvanized metal, ground mount installation method.

### **2.2 SIGNAGE**

- A. Instructional Sign
  - 1. Instructional sign shall consist of pipe frame and graphic panel. One piece pipe frame shall be 1-5/16" (33 mm) o.d. schedule 80 steel pipe formed into a "U" shape. Each frame leg shall embed 3'-0" (915 mm) below finished grade and have a 3/8" (10 mm) diameter hole to receive one No. 4 reinforcing bar (to be supplied by

installing contractor). Pipe frame shall be ground smooth, deburred, and powder coat finished in accordance with Section 4.0.

2. Sign panel shall be fabricated of 18 gauge (1.2 mm) mild steel plate and include a graphic illustration and written instructions for safe and proper use of the fitness apparatus. Panel shall be porcelain enamel finished BLUE or GREEN with white graphics in accordance with Paragraph 1.3. The manufacturer shall attach panels to sign frames with vandal-resistant fasteners.

B. Signage Finish

1. Graphic panel shall be coated on all sides with porcelain enamel, a colorful, glossy, tough, extremely weather-resistant finish. The porcelain enamel process shall permanently fuse a thick layer of glass to the metal substrate at temperatures exceeding 1,500°F (815°C). To assure adhesion, only glasses possessing thermal expansion qualities lower than those of the steel plate shall be accepted.

**2.3 METAL MATERIALS**

A. Posts

1. All posts shall be 4-1/2" (o.d.) schedule 40 steel galvanized pipe with a minimum wall thickness of 7/32" in accordance with ASTM A-53, Type E, Grade A. Thin wall tubing is not acceptable. Posts and their end caps shall be powder coat finished in accordance with Section 4.0.

B. End Treatment

1. Exposed ends of posts shall be fitted with a cast aluminum (384 alloy) hemi-dome end cap permanently adhered in place. Easily vandalized plastic and/or friction fit end caps are not permitted.

C. Post Embedment

1. Posts shall be embedded 3'-0" (915 mm) below grade in concrete footings as depicted on the erection drawings. Actual concrete footing sizes can vary and depend on job site and climatic conditions. Consult project engineer/owner for exact requirements. Posts shall include through holes to receive two No. 4 reinforcing bars (to be supplied by installing contractor).

D. Collars

1. Cast aluminum (384 alloy) two-piece attachment collars shall be provided in sufficient quantity to connect all rails to support posts. Collars must be formed to recess bolt fastener. Each collar set shall include two vandal-resistant stainless steel socket-head cap screws with nuts and two 1/4" x 1" drive rivets. Collars shall be Powder coat finished in accordance with Section 4.0.

E. Straight and Curved Rails

1. Unless otherwise noted, all steel straight and curved rails shall be 1-5/16" (33 mm) o.d. schedule 40 steel galvanized pipe in accordance with ASTM A-53, Type E, Grade A. Straight and Curved Rails shall be powder coat finished in accordance with Section 4.0.

- F. Fabrication
  - 1. All welds shall comply with AWS standard D1.1. All edges, ends, and welds shall be ground smooth by hand to a maximum grit of 36 and shotblasted to a uniform surface texture.
- G. Quality Control
  - 1. Inspectors shall examine metal components for correct fabrication, fastener hole alignment, and smoothness.
- H. Additional Hardware
  - 1. Additional hardware shall be provided in sufficient quantity to complete assembly of the fitness equipment. All hardware shall be non-ferrous, or color finished with powder coat, or galvanized, or electrostatic zinc plated in accordance with the manufacturer's standard.

## **2.4 METAL FINISH**

- A. Metal parts, except fasteners and sign panels, shall be finished with powder coat. Liquid, epoxy, or lead-containing powder coatings are not acceptable. The powder coat color shall be the manufacturer's standard or as selected by the owner's representative and designated on the project plans and/or specifications.
- B. Cleaning
  - 1. Substrate preparation shall consist first of mechanical cleaning to remove heavy mill scale, rust, varnish, grease, etc., then chemical cleaning in accordance with TT-C-490C, Methods I and III.
- C. Phosphate Application
  - 1. After cleaning, the metal substrate shall receive a corrosion-inhibiting iron phosphate coating in accordance with TT-C-490C, Type II, before application of the final color coat.
- D. Powder Application
  - 1. The coating powder shall be uniformly applied by the electrostatic method to a minimum thickness of six mils. Promptly after the application of the powder, the coating shall be oven-cured at 400°F (204°C) to chemically bond the finish to the substrate and to render the color finished surface resistant to abrasion, impact, household chemicals, weathering and rusting.
- E. Chronological Importance
  - 1. For a corrosion-inhibiting agent to be effective, all fabrication including cutting, coping, grinding, and welding must be completed before application of the corrosion-inhibiting agent. Corrosion-inhibiting agent applied prior to fabrication are not acceptable.
- F. Quality Control

1. The applicator shall test the finish of each lot for correct millage, chemical resistance, hardness, and internal bond in accordance with established industry standard test methods.
2. Records of this quality control procedure shall be made and retained for two years.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION INSTRUCTIONS AND AIDS**

- A. To guide installation, fitness equipment shall be accompanied by bills of materials, written instructions, and an erection plan view drawing to be furnished prior to or with the delivery of the fitness equipment. To facilitate assembly, each part shall be indelibly stenciled with an easily-read identification number keyed to the bills of materials and erection drawings. All components shall be shipped unitized, protectively wrapped, banded for mechanical handling and ready for assembly.

### **END OF SECTION**

## **SECTION 31 11 00 – SITE CLEARING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Furnish all labor, material, equipment and services necessary to provide all work, complete in place, as indicated on Drawings and specified herein.
- B. Work specified in this Section includes, but is not limited to the following:
  - 1. Site preparation.
  - 2. Tree protection
  - 3. Restore damaged improvements to original condition
  - 4. Existing Utilities
  - 5. Plant Salvage
  - 6. Clearing and Grubbing
  - 7. Salvaging topsoil
  - 8. Boulder salvage
  - 9. Site Improvements
  - 10. Backfill requirements
  - 11. Disposing of objectionable material
- C. Related Work Specified in Other Sections
  - 1. Section 01 50 00 – Temporary Facilities and Controls
  - 2. Section 02 41 00 – Demolition
  - 3. Section 31 23 00 – Excavation and Backfill
  - 4. Section 31 22 00 – Grading
  - 5. Section 32 93 00 - Plants
- D. Related Documents
  - 1. Landscape Plans, Notes 47-56 of Sheet L-002.

#### **1.2 Definitions**

- A. ANSI: American National Standards Institute.
- B. CAL-OSHA: California Occupational Safety and Health Administration.
- C. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2-inches in diameter; and free of weeds, roots, and other deleterious materials.

#### **1.3 PRICE AND PAYMENT PROCEDURES**

- A. Refer to Section 01 29 00, Payment Procedures.

#### **1.4 SUBMITTALS**

- A. Follow Submittal procedure outlined in Section 01 33 00 – Submittal Procedures.
- B. Project Record Documents: Record actual locations of pipe mains, valve, connections and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

#### **1.5 QUALITY ASSURANCE**

- A. Do not remove or prune trees without written approval from Owner.
- B. Prune to the standards of the International Society of Arborists and to ANSI 300.

#### **1.6 PROJECT CONDITIONS**

- A. Except for materials indicated to be stockpiled or to remain the Owner's property, cleared materials are the Contractor's property. Remove cleared materials from site and dispose of in lawful manner.
- B. Unidentified Materials; if unidentified materials are discovered, including hazardous materials that will require additional removal other than is required by the Contract Documents, immediately report the discovery to the Owner.
- C. If necessary, the Owner will arrange for any testing or analysis of the discovered materials and will provide instructions regarding the removal and disposal of the unidentified materials.

#### **1.7 EXISTING UTILITIES**

- A. Contractor is responsible to contact 811 U.S.A (800-642-2444) to stake and mark the location of all existing utilities before commencing Work. Pot hole as required to determine and verify location and depth.
- B. Retain and protect in operating condition all active utilities traversing the site designated to remain.

### **PART 2 - PRODUCTS**

#### **2.1 SOIL MATERIALS**

- A. Backfill excavations resulting from demolition operations with on-site or import materials conforming to structural backfill defined in Section 31 23 00 – Excavation and Backfill.

### **PART 3 - EXECUTION**

#### **3.1 SITE PREPARATION**

- A. Protect and maintain benchmarks and survey control points during construction.
- B. Locate and clearly flag trees and vegetation to remain or to be relocated.
- C. Protect existing site improvements to remain during construction.
- D. Verify existing conditions at the site and include all work evident by site inspection whether or not shown on the Drawings.
- E. Also see Site Preparation notes (notes 47 – 56, Sheet L-002) for ecological and cultural site management.

#### **3.2 TREE PROTECTION**

- A. Refer to Section 01 50 00 Temporary Facilities and Controls for additional instructions
- B. See Site Preparation notes (notes 47 and 48, Sheet L-002) for plant protection.

#### **3.3 PLANT SALVAGE**

- A. See Site Preparation notes (notes 47 and 49, Sheet L-002) for plant salvage.

#### **3.4 RESTORATION**

- A. Restore damaged improvements to their original condition, as acceptable to the Owner.
- B. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, as directed by the Owner.
  - 1. Employ a qualified, licensed arborist, to submit details of proposed repairs and to repair damage to trees and shrubs.
  - 2. Replace trees that cannot be repaired and restored to full-growth status, as determined by the Owner.

#### **3.5 UTILITIES**

- A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed or abandoned.
  - 1. If designated for partial removal, disconnect and seal or cap at terminations to remain.
- B. Arrange to shut off indicated utilities with utility companies or verify that utilities have been shut off.

- C. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless authorized in writing by the Owner, and then only after arranging to provide temporary utility services according to requirements indicated.
- D. Coordinate utility interruptions with utility company affected.
- E. Do not proceed with utility interruptions without the permission of the Owner and utility company affected. Notify Owner and utility company affected two working days prior to utility interruptions.
- F. Excavate and remove underground utilities that are indicated to be removed.
- G. Securely close ends of abandoned piping with tight fitting plug or wall of concrete minimum 6-inches thick.

### **3.6 CLEARING AND GRUBBING**

- A. Prior to undertaking site clearance, coordinate with the Tribe to perform a cultural burn of the site. See Site Preparation notes (notes 47 – 56, Sheet L-002) for ecological and cultural site management.
- B. Identify plant material for cultural reuse or reincorporation into the site prior to undertaking clearing and grubbing. See Site Preparation notes (notes 47 – 56, Sheet L-002).
- C. Clear the site and remove obstructions, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions and grubbing roots. Remove trash, debris, logs, concrete, masonry and other waste materials.
- D. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
- E. Completely remove stumps, roots, obstructions, and debris extending to a depth of 18-inches below subgrade.
- F. Use only hand methods for grubbing within drip line of remaining trees.
- G. In areas not to be further excavated, fill depressions resulting from site clearing. Place and compact satisfactory soil materials per the geotechnical investigation report.
- H. Clear undergrowth and deadwood without disturbing subsoil.

### **3.7 TOPSOIL SALVAGE**

- A. See Site Preparation notes (Note 51, Sheet L-002) for topsoil salvage and weed removal.
- B. Remove sod and grass before stripping topsoil.

- C. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
- D. Remove trash, debris, weeds, roots, and other waste materials.
- E. Stockpile topsoil materials designated to remain on site at a location approved by the Owner at a location away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
- F. Do not stockpile topsoil within drip line of remaining trees.
- G. Coordinate schedule to allow for a minimum of 3 to 6 months of thermosterilization of soil in accordance with Interim Weed Management Note 56 on Landscape Sheet L-002.

### **3.8 BOULDER SALVAGE**

- A. Stockpile boulders and rock encountered through site clearing and demolition for evaluation and potential reuse on site.

### **3.9 SITE IMPROVEMENTS**

- A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, and gutters, as indicated. Where concrete slabs, curb, gutter and asphalt pavements are designated to be removed, remove bases and subbase to surface of underlying, undisturbed soil.
- C. Unless the existing full-depth joints coincide with line of pavement demolition, neatly saw-cut to full depth the length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.
- D. Remove driveways, curbs, gutters and sidewalks by saw cutting to full depth. If saw cut falls within 30-inches of a construction joint, expansions joint, score mark or edge, remove material to joint, mark or edge.

### **3.10 BACKFILL**

- A. Place and compact material in excavations and depressions remaining after site clearing in conformance with Section 31 23 00 – Excavation and Backfill.

### **3.11 DISPOSAL**

- A. Remove surplus unsuitable soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off the Owner's property.

### **END OF SECTION**

## **SECTION 32 14 40 – STONE PAVING**

### **PART 1 - GENERAL**

#### **SUMMARY**

- A. SECTION INCLUDES
  - 1. Stone pavers set in aggregate setting beds.
  - 2. Concrete edge restraints.
  - 3. Joint Sand for Stone Pavers
- B. RELATED SECTIONS
  - 1. Section 32 11 23 – Base Aggregate

#### **REFERENCES**

- C. ASTM International (ASTM):
  - 1. ASTM C 33 – Standard Specification for Concrete Aggregates.
  - 2. ASTM C 97 – Standard Test Method for Absorption and Bulk Specific Gravity of Dimension Stone.
  - 3. ASTM C 99 – Standard Test Method for Modulus of Rupture of Dimension Stone. 4. ASTM C 170 – Standard Test Method for Compressive Strength of Dimension Stone.
  - 4. ASTM C 241 – Standard Test Method for Abrasion Resistance of Stone Subjected to Foot Traffic.
  - 5. ASTM C 615 – Standard Specification for Granite Dimension Stone.
  - 6. ASTM C 880 – Standard Test Method for Flexural Strength of Dimension Stone.
  - 7. ASTM D 698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort.
  - 8. ASTM D 1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil using Modified Effort.
  - 9. ASTM D 4491 – Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
  - 10. ASTM D 4751 – Standard Test Method for Determining Apparent Opening Size of a Geotextile.
- D. American Association of State Highway and Transportation Officials (AASHTO) M 288 – Standard Specification for Geotextile Specification for Highway Applications. C. Masonry Standards Joint Committee (MSJC):
- E. 1. ACI 530.1/ASCE 6/TMS 602 – Specification for Masonry Structures; Cold and hot weather requirements for mortar and grout.

#### **PRICE AND PAYMENT PROCEDURES**

- F. Refer to Section 01 29 00, Payment Procedures.

### **SUBMITTALS**

- G. Refer to Section 01 33 00 Submittal Procedures.
- H. Product Data: For materials other than water and aggregates.
- I. Samples for stone pavers

### **QUALITY ASSURANCE**

- J. Installer shall have a minimum 5 years experience with similar materials and shall have a record of successful projects of comparable size.
  - 1. Mock-up:
- K. Install mock-up using approved stone pavers including related accessories.
  - 1. Mock-up size: 10 feet by 10 feet
- L. Accepted Mock-up may remain as part of the work.
- M. Pre-installation Meeting:
  - 1. Hold a pre-installation conference, prior to start of stone paving installation. Attendees shall include Contractor, Architect, installer, Owner's Representative, and manufacturer's designated representative.
  - 2. Review all related project requirements and submittals, status of substrate work and preparation, areas of potential conflict and interface, availability of stone pavers and components, installer's qualifications, equipment, and coordinate methods, procedures and sequencing requirements for full and proper installation, integration and protection.

### **PROJECT CONDITIONS**

- N. Cold-Weather Protection: Do not use frozen materials or build on frozen subgrade or setting beds.
- O. Weather Limitations for Joint Sand:
  - 1. Joint Sand JS-1: Apply when ambient temperature is above 32 degrees F (15 degrees C), under dry conditions with no rain forecast for 24 hours and when surface of pavement is completely dry.
  - 2. Joint Sand JS-2: Apply when ambient temperature is above 40 degrees F (5 degrees C), under dry conditions with no rain forecast for 24 hours and when surface of pavement is completely dry.

## **PART 2 - PRODUCTS**

### **STONE PAVERS**

- A. Stone Pavers: As described in the Landscape Architecture Plans.

- B. Performance Requirements
1. Modulus of Rupture: 1,900 psi per ASTM C 99.
  2. Compressive Strength: 17,622 psi per ASTM C 170.
  3. 3. Flexural Strength: 3,141 in.lb. per ASTM C 880.
  4. 4. Absorption: 0.647% per ASTM C 97.
  5. 5. Density: 160 lbs/cu.ft. per ASTM C 97.
  6. Static Coefficient of Friction: 0.62 in.lb. per ASTM C 1028.
  7. Abrasion Resistance: 70.92 in.lb. per ASTM C 241.
  8. Products: Subject to compliance with requirements, provide the following:
    - a. Local river stone used in traditional stone pavement.
    - b. Face Size: Of varying sizes as indicated in the plans.
    - c. Edges: Rounded

#### **EDGE RESTRAINTS**

- C. Provide flush curb edge restraints for vehicular applications of stone paving. See edge restraint for unit pavers in Det 3/L-501.
- D. For pedestrian applications:
1. Stone paving infill behind amphitheater steps will be restrained by concrete steps
  2. Stone paving lining sand pit will not be restrained.

#### **AGGREGATE SETTING-BED MATERIALS**

- E. Class 2 Base Aggregate.
- F. Sand for Leveling Course: Washed river sand from a local source. Provide gradations as follows:

Sieve Size	Percent Passing
3/8 in.(9.5 mm)	100
No. 4 (4.75 mm)	95 to 100
No. 8 (2.36 mm)	85 to 100
No. 16 (1.18 mm)	50 to 85
No. 30 (0.600 mm)	25 to 60
No. 50 (0.300 mm)	10 to 30
No. 100 (0.150 mm)	2 to 10
No. 200 (0.075 mm)	0 to 1 D.

- G. Joint Sand:
1. Apply if stone pavement is not traditionally constructed.
  2. Description: Dry mix, containing polymeric binding agent, activated with water.
  3. Manufacturer: Techniseal; [www.techniseal.com](http://www.techniseal.com)
  4. Product:
    - a. JS-1: Techniseal "RG+" Polymeric Jointing Sand.
  5. Joint Sand Colors: Provide color samples for selection from the manufacturer's full range.

### **PART 3 - EXECUTION**

#### **PRE EXAMINATION**

- A. Verify that subgrade is properly compacted and ready for the work of this Section.

#### **AGGREGATE SETTING-BED APPLICATIONS**

- B. Compact soil subgrade uniformly to at least 95 percent of ASTM D 1557 laboratory density.
- C. Provide edge restraints as indicated. Install edge restraints before placing stone pavers. Set pavers with a joint width not to exceed ½ inch, being careful not to disturb leveling base. Use string lines to keep straight lines.

#### **INSTALLATION, GENERAL**

- D. A. Mix rocks of differing sizes and colors, as they are placed, to produce uniform blend of colors and textures.
- E. Stone Cutting
  - 1. Stone cutting is not anticipated to be needed for pedestrian area installation. Apply for vehicular use application.
  - 2. Cut stone pavers with stone guillotine or snap cut machine to provide pattern indicated and to fit adjoining work neatly. Use full stones without cutting where possible.
- F. Place leveling course and screed to a thickness of 1 to 1-1/2 inches, taking care that moisture content remains constant and density is loose and uniform until pavers are set and compacted.
- G. Traditional pavement pattern is closely placed in an irregular pattern.
- H. Vibrate pavers into leveling course with a low-amplitude plate vibrator capable of a 3500- to 5000-lbf compaction force at 80 to 90 Hz.
- I. Joint Sand:
  - 1. Verify that pavers are completely dry.
  - 2. Spread Polymeric sand and fill joints completely.
  - 3. Sweep surface clean of sand prior to compaction to avoid staining.
  - 4. Compact pavers and add more sand if necessary until joints are completely filled to a minimum depth of 1.25 inches.
  - 5. Remove excess dust with leaf blower.
  - 6. Polymeric Sand Wetting:
    - a. Perform wetting in three or more applications of water.
    - b. Do not flood pavement or generate runoff.
    - c. First application of water shall be in a fine mist; Do not displace sand. Wait 5 to 10 minutes.

- d. Subsequent applications of water: Dampen surface in 5 to 10 minute intervals to gradually soak joints to a complete depth. Spot check joints by emptying sand to the bottom of a joint.
- e. Allow joints to dry at least 24 hours before allowing traffic on pavers.
- f. If there is a risk of rain within 24 hours, protect pavement with waterproof cover.

**END OF SECTION**

## **SECTION 32 15 40 – DECOMPOSED GRANITE PAVING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes: All labor, materials, equipment, tools, accessories, transportation, and services as required for Decomposed Granite Paving.
- B. Related Requirements
  - 1. Section 31 22 00, Grading
  - 2. Section 32 11 23, Base Aggregate

#### **1.2 REFERENCES**

- 1. Standards: Comply with pertinent provisions of following standards, in case of conflict between referenced standards, the more stringent requirements shall govern.
  - a. ASTM, latest edition.
  - b. AASHTO Specifications for Materials, latest edition.
- 2. Standard Specifications: Conform to all applicable requirements of the Standard Specifications listed below, whether specifically referred to or not, except as modified hereinafter.
  - a. CalTrans Standard Specifications.

#### **1.3 PRICE AND PAYMENT PROCEDURES**

- A. Refer to Section 01 29 00, Payment Procedures.

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Scheduling
  - 1. Inspection: The Tribe will determine the location, timing, and number of compaction tests to assure that specified requirements are met.

#### **1.5 SUBMITTALS**

- A. Product Data
  - 1. Soil Sterilant: Submit written recommendation from a State of California appropriately licensed individual along with complete product data from proposed manufacturer, for review by Engineer.
  - 2. Decomposed Granite
    - a. Sieve analysis of aggregate materials.
    - b. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
    - c. Certificates of compliance with the specified standards for natural materials and manufactured items.
  - 3. Material list of items proposed to be furnished under this section.

- B. Samples
1. Decomposed Granite Paving without stabilizer: Contractor shall submit a 5 lb. sample of decomposed granite to the Engineer for approval prior to delivery of material to the site.
  2. Decomposed Granite Paving with stabilizer: Contractor shall submit a 5 lb. sample of decomposed granite and 1 lb. stabilizer to the Engineer for approval prior to delivery of material to the site.
  3. The Contractor shall demonstrate to the satisfaction of the Engineer that he or his subcontractor possesses sufficient skills and minimum five years of experience to perform the work in all aspects required.
  4. A five-square-foot sample of decomposed granite paving shall be installed at the site for the Engineer's review and approval. The Contractor shall meet or exceed that quality of work in all subsequent work. Contractor shall be responsible for the removal of the sample at the completion of work.

## **1.6 QUALITY ASSURANCE**

- A. Tests and Inspections
1. The Tribe will provide a qualified testing laboratory to observe and test placement of aggregate in accordance with the specifications.
  2. Tests will include inspection of subgrade prior to placing aggregate, inspection and testing of materials after mixing, and compaction tests to determine compliance with specification requirements.
  3. Grading Tolerance: Construct grades described in this section within a tolerance of plus or minus five hundredths (0.05) foot maximum variation in any ten foot length from the grades shown on drawings.
- B. Surface Drainage: No area of the finished paving will hold water.
- C. Qualifications of Workers: Provide at least one person who shall be thoroughly trained and experienced in the skills required, completely familiar with the design and application of work described for this section and present at all times during progress of the work of this section and direct all work performed under this section.

## **1.7 SITE CONDITIONS**

- A. Protection from Water Accumulation: Perform all operations in a manner which continuously allows proper disposal of surface run-off and prevents accumulation of water potentially causing soft areas impeding Work. Before leaving after each work day perform such operations as may be necessary to minimize possible damage or work slowdown caused by rain.

## **PART 2 - PRODUCTS**

### **2.1 DECOMPOSED GRANITE PAVING**

- A. Description: Shall be California gold track fines.

- B. Performance  
1. Without Stabilizer

Sieve Size	% Passing
#4	95-100
#30	30-50
#200	5-15

2. With Stabilizer

Sieve Size	% Passing
#4	85-100
#8	55-80
#30	30-45
#200	10-20

3. Maximum dry density: 130 p.c.f.  
4. Optimum moisture: 8.8%  
a. Color: Shall be uniform tan or buff color.  
5. The performance characteristics of the decomposed granite should not be impacted by minor variations of the gradation ( $\pm 10\%$ ).

## 2.2 STABILIZER

- A. Manufacturers  
1. Stabilizer Solutions of Phoenix, Arizona (1-800-336-2468) or approved equal as supplied by Supply Side Products (888) 222-4341 or approved equal.
- B. Description  
1. Stabilizer™ binder additive. The organic binding agent shall be a premium non-toxic, colorless, odorless, non-staining concentrated powder that binds decomposed granite together to provide a natural appearing firm surface.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protection of In-Place Conditions  
1. Surrounding areas, surfaces and appurtenances already in place shall be protected during installation of decomposed granite paving.
- B. Surface Preparation  
1. Prior to any installation, the area shall be treated with weed control treatment and pre-emergent treatment per Section 32 91 00, Planting Preparation.  
2. Immediately prior to placing the decomposed granite, the subgrade shall be moistened.

C. Mixing

1. The binding agent shall be premixed at a standard rate of twelve to sixteen pounds (12-16 lbs.) per ton of decomposed granite. It is critical that Stabilizer be thoroughly and uniformly mixed throughout the decomposed granite.
2. Perform blending by the stationary plant method or a truck mounted mixer.
3. Portable mixers may not be used.
4. Mixing granular surfacing and stabilizer in situ is not acceptable.
5. Do not mix during, just prior to, or immediately following rainfall.
6. Blend for a minimum of 15-minutes.

**3.2 INSTALLATION**

A. DECOMPOSED GRANITE PAVING

1. Decomposed granite shall be as shown and detailed on the Plans and be approved by the Engineer, both to color and gradation.
2. Upon thorough moisture penetration, compact aggregate screenings to ninety five percent (95%) relative compaction by compaction equipment such as double drum roller (2-4 ton) or single drum roller (1,000 lbs.) vibratory plate tamp. Do not begin compaction for six (6) hours after placement and up to forty eight (48) hours.
3. Decomposed granite shall be installed in two inches (2") lifts compacted to a four inches (4") depth. Each lift shall be wetted, rolled, and compacted to ninety five percent (95%) relative density. The finish surface shall be firm and stable.
4. In general each layer shall be placed in spreads as wide as practicable and to the full width of the course before a succeeding layer is placed.
5. Installation of decomposed granite shall not occur on rainy days.
6. Fill in any low spots or cracks with additional decomposed granite.
7. Grade to smooth uniform slopes between elevation points or lines, and between such elevations and existing grades.
8. Tolerances: The finish grades of the decomposed granite paving shall conform to the lines and grades on the drawings and allow for drainage.
9. Finish rake granular surfacing smooth with a steel tine rake.
10. Final thickness of the completed path section shall not vary more than ½-inch from the dimensions indicated.

B. Watering

1. Water heavily to achieve full depth moisture penetration of the granular surfacing to activate entire depth of stabilizer. Apply minimum of twenty (20) GPM per one thousand square feet (1,000 sf) for a one hour duration.
2. Spray water in such a manner as to not disturb the path surface.
3. Test for depth of water penetration by random inspection of pavement cores. Following inspection fill holes with removed material and smooth to match adjacent surfacing.
4. Let watered surface stand for six to twenty four (6-24) hours until surface water is no longer present and the granular surfacing is moist but not wet.
5. Fill in any low spots or cracks with additional decomposed granite.
6. Compaction

7. While granular surfacing is still thoroughly moist, roll with a heavy lawn roller (minimum two hundred and twenty five pounds (225 lbs.) and maximum width of thirty inches (30") to achieve finish grade and initial compaction.
8. Hand tamp edges and areas inaccessible to the roller.
9. Perform final compaction with a minimum 1-ton roller to achieve a dense, smooth, uniform surface texture.
10. Do not use whackers or vibratory rollers as the granular surfacing will not harden for weeks.

### **3.3 SITE QUALITY CONTROL**

- A. Non-Conforming Work
  1. Remove and replace decomposed granite paving that is damaged, defective, or does not meet requirements of this section.
- B. Site Tests and Inspections
  1. Finished surface shall be smooth, uniform and solid, with no evidence of chipping or cracking. Dried, compacted surfacing shall be firm all the way through with no spongy areas.
  2. Loose material shall not be present on the surface prior to extensive use.
  3. Loose and unconsolidated material is evidence of improper bonding due to poor mixing or insufficient watering. Test the loose material for adequate stabilizer by wetting, then tamping and allowing it to dry. If the material is still unconsolidated, the stabilizer did not get mixed adequately throughout the surfacing. If the material now is solid, initial watering was insufficient, cracking or sponginess is evidence of excessive stabilizer in the mix.
  4. Remove all unconsolidated surfacing material and replace in accordance with the pertinent requirements of this section.

### **3.4 CLEANING**

- A. Planting Areas: All excess decomposed granite shall be removed from planting areas.

### **3.5 PROTECTION**

1. General: Following construction of each layer and following completion of the decomposed granite paving take all required measures necessary to prevent or repair segregation, raveling or rutting, and to maintain the layer in the specified condition until it is covered with a following layer or until all work is completed.
- B. Final Acceptance: Immediately prior to final acceptance smooth any irregularities by rewetting rough areas thoroughly and rolling with one thousand to one thousand five hundred pound (1000-1500 lbs.) roller.

**END OF SECTION**

## **SECTION 32 80 00 - IRRIGATION**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Projec scope is to provide site water via quick coupler and hose bibbs for establishment watering, and vegetable garden bed water. Section Includes:
1. Point of Connection
  2. Backflow Prevention Device
  3. Backflow Preventer Cage
  4. Flow Sensor
  5. Piping.
  6. Encasement for piping.
  7. Manual valves.
  8. Pressure-regulators
  9. Transition fittings.
  10. Dielectric fittings.
  11. Miscellaneous piping specialties.
  12. Quick couplers.
  13. Boxes for automatic control valves.
- B. RELATED SECTIONS
1. Section 31 23 00 Excavation and Backfill
  2. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### **1.2 DEFINITIONS**

- A. Lateral Piping: Downstream from control valves to drip equipment. Piping is not under pressure.
- B. Main Piping: Downstream from point of connection to water distribution piping to, and including, control valves. Piping is under water-distribution-system pressure.
- C. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

#### **1.3 PERFORMANCE REQUIREMENTS**

- A. Irrigation zone control shall be automatic operation with controller and automatic control valves.
- B. Location of Equipment and Dripline: Design location is approximate. Make minor adjustments necessary to avoid plantings and obstructions such as signs and light standards. Maintain 100 percent irrigation coverage of areas indicated.

- C. Minimum Working Pressures: The following are minimum pressure requirements for piping, valves, and specialties unless otherwise indicated:
  - 1. All Pressure Lines: 200 psig.

#### **1.4 PRICE AND PAYMENT PROCEDURES**

- A. Refer to Section 01 20 00, Price and Payment Procedures.

#### **1.5 SUBMITTALS**

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories.
- B. Wiring Diagrams: For power, signal, and control wiring as applicable.
- C. Qualification Data: For qualified Installer.
- D. Zoning Chart: Show each irrigation zone and its control valve. Provide scaled Record copy drawings at time of design completion; maintain one (1) copy on site for Construction Manager's review.
- E. Controller Timing Schedule: Indicate timing settings for each automatic controller zone.
- F. Field quality-control reports.
- G. As-Built Record Set of Drawings. Note any changes from the original design plans.
- H. Testing Data from all required pressure testing.
- I. Independent Irrigation Audit: in accordance with California Code of Regulation Title 23 Waters, Division 2 Department of Water Resources Chapter 2.7 Model Water Efficient Landscape Ordinance, 492.12 Irrigation Audit, Irrigation Survey and Irrigation Water Use Analysis.
- J. Operation and Maintenance Data: For controllers and automatic control valves to include in operation and maintenance manuals. Provide three (3) copies, in bound notebook form, for review/approval.

#### **1.6 QUALITY ASSURANCE**

- A. Installer Qualifications: An employer of workers that include a California C27 License, at least three years experience with installation of inline drip systems, and the name, title, addresses and phone numbers of at least two clients.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

**1.7 TESTING:**

A. Hydrostatic pressure testing

1. After flushing, and the installation of valves the following tests shall be conducted in the sequence listed below. The Contractor shall furnish all equipment; materials and labor necessary to perform the tests and all tests shall be conducted in the presence of the Owner's Representative.
2. Water pressure tests shall be performed on all pressure main lines before any couplings, fittings, valves and the like are concealed.
3. Immediately prior to testing, all irrigation lines shall be purged of all entrapped air or debris by adjusting control valves and installing temporary caps forcing water and debris to be discharged from a single outlet.
4. Test all pressure main line at 150 PSI. For a minimum of four (4) hours with an allowable loss of 5 PSI. Pressure and gauges shall be read in PSI, and calibrated such that accurate determination of potential pressure loss can be ascertained.
5. Re test as required until the system meets the requirements. Any leaks, which occur during test period, will be repaired immediately following the test. All pipe shall be re tested until final written acceptance.
6. The Contractor is responsible for proving documentation stating the weather conditions, date, the start time and initial water pressure readings, the finish time and final water pressure readings and the type of equipment used to perform the test. The documentation must be signed by a witness acceptable to the Owner, verifying all of the above-mentioned conditions.
7. Submit a written report of the pressure testing results with the other above required information to the Owner's Representative for approval.

B. Backflow Preventer Testing

1. The backflow preventer shall be tested according to procedures and results per the requirements of the Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California or American Water Works Association whichever is more stringent.
2. Testing shall be performed by a Backflow Prevention Assembly Tester with a current certification from the American Backflow Preventer Association.

**1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
- B. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.
- C. Storage of materials on site only in lockable storage container or lockable fenced yard. Owner not responsible for materials left on site. Coordinate location with the Construction Manager, if applicable.

## **1.9 PROJECT CONDITIONS**

- A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless prior permission has been granted by the Construction Manager. Schedule and coordinate notice during the preconstruction period of the project. Provide reminder notices two weeks and again one week in advance.
- B. POINT OF CONNECTION
  - 1. The point of connection of the irrigation system to its electrical power sources shall be provided by the irrigation installer. All connections shall be made by a licensed electrical Contractor per governing codes at the location shown on the drawings.
  - 2. The point of connection of the irrigation system to its potable and or non-potable water sources, including the main shutoff valve and backflow preventer shall be provided by the irrigation installer. All connections shall be made by a licensed Contractor per governing codes, at the location shown on the drawings.

## **PART 2 - PRODUCTS**

### **2.1 BACKFLOW PREVENTION DEVICE**

- A. The backflow prevention device shall be certified to NSF/ANSI 372 shall be ASSE Listed 1013, rated to 180 degree F, and supplied with full port ball valves.
- B. The main body and access covers shall be low lead bronze (ASTM B 584)
- C. The seat ring and all internal polymers shall be NSF Listed Noryl and the seat disc elastomers shall be silicone.
- D. Backflow Preventer shall be as indicated on the drawings.

### **2.2 BACKFLOW PREVENTER CAGE**

- A. A heavy-duty steel mesh cage with rust proof finish. The caging shall be sized to allow space for the entire piping assembly associated with the Backflow Preventer unit, and all associated equipment.
- B. The cage shall include the manufacturers' standard tamper proof locking mechanism.
- C. Provide a concrete base as detailed on the drawings.
- D. Backflow Preventer Cage type, manufacturer and color shall be as indicated on the plans.

### **2.3 FLOW SENSOR**

- A. Flow sensor shall be compatible with the irrigation controller.
- B. Flow sensor shall be as indicated on the drawings.

## **2.4 PIPES, TUBES, AND FITTINGS**

- A. Comply with requirements in the piping schedule for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.
- B. Galvanized-Steel Pipe: ASTM A 53/A 53M, Standard Weight, Type E, Grade B.
  - 1. Galvanized-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106/A 106M, Standard Weight, seamless-steel pipe with threaded ends.
  - 2. Galvanized, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.
  - 3. Malleable-Iron Unions: ASME B16.39, Class 150, hexagonal-stock body with ball-and-socket, metal-to-metal, bronze seating surface, and female threaded ends.
  - 4. Cast-Iron Flanges: ASME B16.1, Class 125.
- C. PE Pipe with Controlled OD: ASTM F771, PE 3408 compound, SDR 11.
  - 1. PE Butt, Heat-Fusion Fittings: ASTM D 3261.
  - 2. PE Socket-Type Fittings: ASTM D 2683.
- D. PE Pressure Pipe: AWWA C906, with DR of 7.3, 9, or 9.3 and PE compound number required to give pressure rating not less than 200 psig.
  - 1. PE Butt, Heat-Fusion Fittings: ASTM D 3261.
  - 2. PE Socket-Type Fittings: ASTM D 2683.
- E. PVC Pipe: ASTM D 1785, PVC 1120 compound, Schedules 40.
  - 1. PVC Socket Fittings: ASTM D 2466, Schedule 40.
  - 2. PVC Threaded Fittings: ASTM D 2464, Schedule 80.
  - 3. PVC Socket Unions: Construction similar to MSS SP-107, except both headpiece and tailpiece shall be PVC with socket ends.
- F. PVC Pipe, Pressure Rated: ASTM D 2241, PVC 1120 compound, SDR 21 and SDR 26.
  - 1. PVC Socket Fittings: ASTM D 2467, Schedule 80.
  - 2. PVC Socket Unions: Construction similar to MSS SP-107, except both headpiece and tailpiece shall be PVC with socket or threaded ends.

## **2.5 PIPING JOINING MATERIALS**

- A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick unless otherwise indicated; full-face or ring type unless otherwise indicated.
- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- C. Solvent Cements for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
- D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

## 2.6 MANUAL VALVES

- A. PVC Ball Valves:
1. Manufacturers: As indicated in the Irrigation Schedule, or approved equal.

## 2.7 Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawing or approved equal.

- A. Pressure Regulators:
1. Should unforeseen circumstances require separate pressure regulators due to excess water main pressure, these requirements shall apply.
  2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Hunter Industries Incorporated.
    - b. Rain Bird Corporation.
    - c. Toro Company (The); Irrigation Division.
  3. Specifications:
    - a. Inlet Pressure: Up to 200 PSI (13, 8 bar)
      - 1) Pressure Regulation: 15 to 100 psi (1, 0 to 6.9 bar)
    - b. Accuracy: + 1 to 3 psi (+ 1- 0,2 bar)
  4. Temperature: Up to 150°F (66°C)

## 2.8 DIELECTRIC FITTINGS

- A. General Requirements: Where needed, assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.
- B. Dielectric Unions:
1. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by one of the following:
    - a. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
    - b. Zurn Plumbing Products Group; Wilkins Water Control Products.
  2. Description: Factory-fabricated union, NPS 2 and smaller.
    - a. Pressure Rating: 250 psig at 180 deg F.
    - b. End Connections: Solder-joint copper alloy and threaded ferrous; threaded ferrous.
- C. Dielectric Couplings:
1. Manufacturers: As needed, subject to compliance with requirements, provide products by one of the following, or approved equal:
    - a. Calpico, Inc.
    - b. Lochinvar Corporation.
  2. Description: Galvanized-steel coupling.
    - a. Pressure Rating: 300 psig at 225 deg F.
    - b. End Connections: Female threaded.
    - c. Lining: Inert and noncorrosive, thermoplastic lining.

## **2.9 MISCELLANEOUS PIPING SPECIALTIES**

- A. Water Hammer Arresters: ASSE 1010 or PDI WH 201, with bellows or piston-type pressurized cushioning chamber and in sizes complying with PDI WH 201, Sizes A to F.
- B. Pressure Gages: ASME B40.1. Include 4-1/2-inch- diameter dial, dial range of two times system operating pressure, and bottom outlet.

## **2.10 QUICK COUPLERS**

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or approved comparable product by one of the following:
  - 1. Buckner; a division of Storm Manufacturing Group Inc.
  - 2. Hunter Industries Incorporated.
  - 3. Rain Bird Corporation.
  - 4. Toro Company (The); Irrigation Division.
  - 5. Weathermatic.
- B. Description: Factory-fabricated, bronze or brass, two-piece assembly. Include coupler water-seal valve; removable upper body with spring-loaded or weighted, locking rubber-covered cap; hose swivel with ASME B1.20.7, 3/4-11.5NH threads for garden hose on outlet; and operating key.

## **2.11 BOXES FOR AUTOMATIC CONTROL VALVES**

- A. Plastic Boxes:
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Armorcast Products Company.
    - b. Carson Industries LLC.
  - 2. Description: Box and cover, with open bottom and openings for piping; designed for installing flush with grade.
    - a. Size: As indicated in Det 8/L5.2
    - b. Shape: As indicated in Det 8/L5.2.
    - c. Sidewall Material: PE, ABS, or FRP.
    - d. Cover Material: PE, ABS, or FRP.

## **PART 3 - EXECUTION**

### **3.1 EARTHWORK**

- A. Perform all trenching, directional boring, sleeving and excavations as required for the installation of the work included under this section, including shoring of earth banks to prevent cave ins.
- B. The Contractor may directional bore lines where it is practical or where required on the plans.

1. Extend the bore 1' past the edge of pavement unless noted differently on the plans.
  2. Cap ends of each bore and locate ends at finished grade using metal stakes.
  3. All boring and sleeving shall have detectable locator tape placed at the ends of the pipe.
- C. Make trenches for mains, laterals and control wiring straight and true to grade and free of protruding stones, roots or other material that would prevent proper bedding of pipe or wire.
- D. Excavate trenches wide enough to allow a minimum of 4 - inch between parallel pipelines and 8 inch from lines of other trades. Maintain 3 - inch vertical clearance between irrigation lines. Minimum transverse angle is 45 degrees. All pipes shall be able to be serviced or replaced without disturbing the other pipes.
- E. Trenches for pipelines shall be made of sufficient depth to provide the minimum cover from finished grade as follows:
1. Pressure main line: 18 inches below finish grade and 36 inches below paved areas in Schedule 40 PVC sleeves.
  2. Lateral lines: 12 inches below finish grade and 36 inches below paved areas in Schedule 40 PVC sleeves.
  3. Control wiring: to the side of pressure main line and 24 inches below paved areas in Schedule 40 PVC sleeves.
- F. On new on-site systems (post-meter), the required horizontal separation between potable water lines, reclaimed water constant pressure main lines and sewer lines shall be a minimum of four (4) feet apart as directed by the project engineer and/ or regulatory agency. Measurements shall be between facing surfaces, not pipe centerlines.
- G. When trenching through areas of imported or modified soil, deposit imported or modified soils on one side of trench and subsoil on opposite side.
- H. Backfill the trench per the requirements in paragraphs "Backfilling and Compacting" below.
- I. Install warning tape directly above pressure piping, 12 inches below finished grades, except 6 inches below subgrade under pavement and slabs.

### **3.2 PREPARATION**

- A. Set stakes to identify locations of proposed irrigation system. Obtain Construction Manager's approval before excavation.

### **3.3 PIPING INSTALLATION**

- A. Location and Arrangement: Drawings indicate location and arrangement of piping systems. Install piping as indicated unless deviations are approved on Coordination Drawings.

- B. Install piping free of sags and bends.
- C. Install groups of pipes parallel to each other, spaced to permit valve servicing.
- D. Install fittings for changes in direction and branch connections.
- E. Install underground thermoplastic piping according to ASTM D 2774 and ASTM F 690.
- F. Install expansion loops in control-valve boxes for plastic piping.
- G. Lay piping on solid subbase, uniformly sloped without humps or depressions.
- H. Install PVC piping in dry weather when temperature is above 40 deg F. Allow joints to cure at least 24 hours at temperatures above 40 deg F before testing.
- I. Install piping in sleeves under parking lots, roadways, and sidewalks.
- J. Install sleeves made of SDR 21, 200 psi, or greater, PVC pipe and socket fittings, and solvent-cemented joints.

### **3.4 JOINT CONSTRUCTION**

- A. Ream ends of pipes and tubes and remove burrs.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- D. Flanged Joints: Select rubber gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- E. Ductile-Iron Piping Gasketed Joints: Comply with AWWA C600 and AWWA M41.
- F. Copper-Tubing Brazed Joints: Construct joints according to CDA's "Copper Tube Handbook," using copper-phosphorus brazing filler metal.
- G. Copper-Tubing Soldered Joints: Apply ASTM B 813 water-flushable flux to tube end unless otherwise indicated. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy (0.20 percent maximum lead content) complying with ASTM B 32.

- H. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
  - 1. Plain-End PE Pipe and Fittings: Use butt fusion.
  - 2. Plain-End PE Pipe and Socket Fittings: Use socket fusion.
  
- I. PVC Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
  - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
  - 2. PVC Pressure Piping: Join schedule number, ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
  - 3. PVC Nonpressure Piping: Join according to ASTM D 2855.

### **3.5 VALVE INSTALLATION**

- A. Underground Iron Gate Valves, Resilient Seat: Comply with AWWA C600 and AWWA M44. Install in valve casing with top flush with grade.
  - 1. Install valves and PVC pipe with restrained, gasketed joints or thrust blocks similar to Det 1/15.2.
  
- B. Aboveground Valves: Install as components of connected piping system.
  
- C. Pressure-Reducing Valves: Install in boxes for automatic control valves or aboveground between shutoff valves.

### **3.6 DRIP IRRIGATION SPECIALTY INSTALLATION**

- A. Install drip tubes with inline emitters on ground.
  
- B. Install flush point valves in piping, typical, as indicated in Details 1 and 2/L5.3.

### **3.7 AUTOMATIC IRRIGATION-CONTROL SYSTEM INSTALLATION**

- A. Equipment Mounting: Install exterior freestanding controllers on precast concrete bases.
  - 1. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
  
- B. Install control cable in same trench as irrigation piping and at least 2 inches or beside piping. Provide conductors of size not smaller than recommended by controller manufacturer. Install cable in separate sleeve under paved areas.

### **3.8 CONNECTIONS**

- A. Comply with requirements for piping specified in Division 22 Section "Facility Water Distribution Piping" for water supply from exterior water service piping, water meters,

protective enclosures, and backflow preventers. Drawings indicate general arrangement of piping, fittings, and specialties.

- B. Install piping adjacent to equipment, valves, and devices to allow service and maintenance.
- C. Connect wiring between controllers and automatic control valves.

### **3.9 IDENTIFICATION**

- A. Identify system components. Comply with requirements for identification specified in Division 22 Section "Identification for Plumbing Piping and Equipment."
- B. Warning Tapes: Arrange for installation of continuous, underground, detectable warning tapes over underground piping during backfilling of trenches.

### **3.10 FIELD QUALITY CONTROL**

- A. Tests and Inspections:
  - 1. Upon completion and installation of all trenching, directional boring, and sleeving, all installed irrigation control wiring, lines and fittings shall be visually observed by the Owner's Representative unless otherwise authorized. Do not cover any wires, lines or fittings until they have been tested and observed by the Owner's Representative.
  - 2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
  - 3. Operational Test: After electrical circuitry has been energized, operate controllers and automatic control valves to confirm proper system operation.
  - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Any irrigation product will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

### **3.11 BACKFILLING AND COMPACTING**

- A. Irrigation trenches shall be carefully backfilled with material approved for backfilling and free of rocks and debris one (1) inch in diameter and larger. When back filling trenches in areas of imported or modified planting soil, replace any excavated subsoil at the bottom and the imported soil or modified planting soil at the top of the trench.
- B. Backfill shall be compacted with approved equipment to the following densities
  - 1. Backfill under pavement and within 2 feet of the edge of pavement: Compact to 95% or greater of maximum dry density standard proctor.
  - 2. Backfill of subsoil under imported planting mixes or modified existing planting soil: Between 85 and 90% of maximum dry density standard proctor.

3. Backfill of imported planting mixes or modified existing planting soil: Compact to the requirements of the adjacent planting mix or planting soil as specified in section "Planting Soil".
- C. Finish grade of all trenches shall conform to adjacent grades without dips or other irregularities. Dispose of excess soil or debris off site at Contractor's expense.
- D. Any settling of backfill material during the maintenance or warranty period shall be repaired at the Contractor's expense, including any replacement or repair of soil, lawn, and plant material or paving surface.

### **3.12 RESURFACING PAVING OVER TRENCHES**

- A. Restore all surfaces and repair existing underground installations damaged or cut as a result of the excavation to their original condition, satisfactory to the Owner's Representative.
- B. Trenches through paved areas shall be resurfaced with same materials quality and thickness as existing material. Paving restoration shall be performed by the project paving Sub-contractor or an approved Contractor skilled in paving work.
- C. The cost of all paving restoration work shall be the responsibility of the irrigation Contractor unless the trenching thru the paving was, by previous agreement, part of the general project related construction.

### **3.13 STARTUP SERVICE**

- A. Verify that controllers are installed and connected according to the Contract Documents.
- B. Verify that electrical wiring installation complies with manufacturer's submittal.

### **3.14 ADJUSTING**

- A. Adjust settings of controllers as required at time of install.
- B. Adjust automatic control valves to provide flow rate at rated operating pressure required.
- C. Adjust dripline to ensure proper coverage. California law requires irrigation to remain within planting beds, no leakage to paved areas is allowed. .

### **3.15 CLEANING**

- A. Flush dirt and debris from piping before installing irrigation system.

### **3.16 DEMONSTRATION**

- A. Train Store manager maintenance personnel to adjust, operate, and maintain automatic control valves and controllers.

**3.17 PIPING SCHEDULE**

- A. Install components having pressure rating equal to or greater than system operating pressure.
- B. Underground irrigation main piping,
  - 1. Schedule 40, PVC pipe and socket fittings, and solvent-cemented joints.
- C. Lateral piping, [shall be the following:
  - 1. Schedule 40, PVC pipe and socket fittings; and solvent-cemented joints.

**3.18 VALVE SCHEDULE**

- A. As indicated in the Irrigation Schedule L1.3

**3.19 WALKTHROUGH AT TIME OF COMPLETION**

- A. Provide any keys, valve keys, etc. to operate any and all components of system.

**3.20 WELO AUDIT**

- A. At the Contractor's expense, the Contractor shall be responsible for obtaining an independent audit of the irrigation system compliant with WELO for final sign offs.

**3.21 WARRANTY AND RECORD DRAWINGS**

- A. Provide Owner's Representative with three (3) scaled copies of Record Drawings. Same scale/dimension as original.
- B. Provide Water Manager with one (1) reduced scale laminated copy for retainage and use.
- C. Provide Owner's Representative with one (1) Digital Record Drawing of scaled drawing.
- D. The Contractor shall provide a written guarantee to the Owner covering all materials, installation, workmanship, and against defects for a period of one (1) year. Contractor shall be responsible for maintaining system and protecting it from all damage (at no cost to Owner) for the duration of one year after date of substantial completion as part of the landscape maintenance period.
- E. Provide minimum of one (1) startup with Store Manager in attendance. Show system operation and locations of mainline, drain valve, backflow, and pump.
- F. Provide a minimum of two (2) winterization programs for system. Ensure Store Manager is in attendance.
- G. Schedule meeting with chosen manufacturer's Representative for "smart" controller training and documentation.

**END OF SECTION**

## **SECTION 32 91 00 – PLANTING PREPARATION**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. The scope of work includes all labor, materials, tools, supplies, equipment, facilities, transportation and services necessary for, and incidental to performing all operations in connection with furnishing, delivery, and installation of Planting Soil and /or the modification of existing site soil for use as Planting Soil, complete as shown on the drawings and as specified herein.
- B. The scope of work in this section includes, but is not limited to, the following:
  - 1. Locate, purchase, deliver and install soil amendments.
  - 2. Harvest and stockpile existing site soils suitable for Native Soil.
  - 3. Modify existing stockpiled site soil.
  - 4. Modify existing site soil in place for use as Native Soil.
  - 5. Install existing or modified existing soil for use as Native Soil.
  - 6. Fine grade Native Soil.
  - 7. Install Compost into Native Soil.
  - 8. Clean up and disposal of all excess and surplus material.
- C. Related Sections
  - 1. Drawings and general provisions of contract, including general and supplementary conditions and Division I specifications, apply to work of this section.
    - a. Review Site Preparation notes on Landscape Sheet L-002 (notes 47-56) which describe site preservation, fire renewal, soil and plant salvage, and reuse of materials onsite.
  - 2. Related Specification Section
    - a. Section 32 93 00 - Plants

#### **1.2 References:**

- A. The following specifications and standards of the organizations and documents listed in this paragraph form a part of the Specification to the extent required by the references thereto. In the event that the requirements of the following referenced standards and specification conflict with this specification section the requirements of this specification shall prevail. In the event that the requirements of any of the following referenced standards and specifications conflict with each other the more stringent requirement shall prevail.
  - 1. ASTM: American Society of Testing Materials cited section numbers.
  - 2. U.S. Department of Agriculture, Natural Resources Conservation Service, 2003. National Soil Survey Handbook, title 430-VI. Available Online.
  - 3. US Composting Council [www.compostingcouncil.org](http://www.compostingcouncil.org) and [http://compostingcouncil.org/admin/wp-content/plugins/wp-pdfupload/pdf/191/LandscapeArch\\_Specs.pdf](http://compostingcouncil.org/admin/wp-content/plugins/wp-pdfupload/pdf/191/LandscapeArch_Specs.pdf).

4. Methods of Soil Analysis, as published by the Soil Science Society of America (<http://www.soils.org/>).
5. Up by Roots: healthy soils and trees in the built environment. 2008. J. Urban. International Society of Arboriculture, Champaign, IL.

### **1.3 CONTRACT DOCUMENTS**

- A. Shall consist of specifications, general conditions, and the drawings. The intent of these documents is to include all labor, materials, and services necessary for the proper execution of the work. The documents are to be considered as one. Whatever is called for by any parts shall be as binding as if called for in all parts.

### **1.4 PRICE AND PAYMENT PROCEDURES**

- A. Refer to Section 01 29 00, Payment Procedures.

### **1.5 VERIFICATION**

- A. All scaled dimensions on the drawings are approximate. Before proceeding with any work, the Contractor shall carefully check and verify all dimensions and quantities, and shall immediately inform the Owner's Representative of any discrepancies between the information on the drawings and the actual conditions, refraining from doing any work in said areas until given approval to do so by the Owner's Representative.

### **1.6 PERMITS AND REGULATIONS**

- A. The Contractor shall obtain and pay for all permits related to this section of the work unless previously excluded under provision of the contract or general conditions. The Contractor shall comply with all laws and ordinances bearing on the operation or conduct of the work as drawn and specified. If the Contractor observes that a conflict exists between permit requirements and the work outlined in the contract documents, the Contractor shall promptly notify the Owner's Representative in writing including a description of any necessary changes and changes to the contract price resulting from changes in the work.
- B. Wherever references are made to standards or codes in accordance with which work is to be performed or tested, the edition or revision of the standards and codes current on the effective date of this contract shall apply, unless otherwise expressly set forth.
- C. In case of conflict among any referenced standards or codes or among any referenced standards and codes and the specifications, the more restrictive standard shall apply or Owner's Representative shall determine which shall govern.
- D. Comply with the requirements of the California Code of regulation Title 23 waters, Division 2 Department of Water Resources Chapter 2.7 Model water efficient landscape ordinance, 492.5 Soil management report.
  1. Where requirements of specification section Planting Soil are more stringent than the California code, the more stringent requirements shall prevail.

**1.7 PROTECTION OF WORK, PROPERTY AND PERSON**

- A. The Contractor shall adequately protect the work, adjacent property, and the public, and shall be responsible for any damages or injury due to the Contractor's actions.

**1.8 CHANGES IN WORK**

- A. The Owner's Representative may order changes in the work, and the contract sum adjusted accordingly. All such orders and adjustments plus claims by the Contractor for extra compensation must be made and approved in writing before executing the work involved.
- B. All changes in the work, notifications and contractor's request for information (RFI) shall conform to the contract general condition requirements.

**1.9 CORRECTION OF WORK**

- A. The Contractor shall re-execute any work that fails to conform to the requirements of the contract and shall remedy defects due to faulty materials or workmanship upon written notice from the Owner's Representative, at the soonest possible time that can be coordinated with other work and seasonal weather demands but not more than 180 (one hundred and eighty) days after notification.

**1.10 DEFINITIONS**

- A. Acceptable drainage: Drainage rate is sufficient for the plants to be grown. Not too fast and not too slow. Typical rates for installed Planting Soil are between 1 - 5 inches per hour. Turf soils are often higher, but drainage rates above 2 - 3 inches per hour will dry out very fast. In natural undisturbed soil a much lower drainage rate, as low as 1/8th inch per hour can still support good plant growth. Wetland plants can grow on top of perched water layers or even within seasonal perched water layers, but could become unstable in high wind events.
- B. Biological Amendment: Amendments such as Mycorrhizal additives, compost tea or other products intended to change the soil biology.
- C. Compacted soil: soil where the density of the soil is greater than the threshold for root limiting, and further defined in this specification.
- D. Compost: well decomposed stable organic material as defined by the US Composting Council and further defined in this specification.
- E. Drainage: The rate at which soil water moves through the soil transitioning the soil from saturated condition to field capacity. Most often expressed as saturated hydraulic conductivity (Ksat; units are inches per hour).
- F. End of Warranty Acceptance: The date when the Owner's Representative accepts that the plants and work in this section meet all the requirements of the warranty. It is intended

that the materials and workmanship warranty for Planting, Planting Soil, and Irrigation (if applicable) work run concurrent with each other, and further defined in this specification.

- G. Existing Soil: Mineral soil existing at the locations of proposed planting after the majority of the construction within and around the planting site is completed and just prior to the start of work to prepare the planting area for soil modification and/or planting, and further defined in this specification.
- H. Fertilizer: amendment used for the purpose of adjusting soil nutrient composition and balance.
- I. Fine grading: The final grading of the soil to achieve exact contours and positive drainage, often accomplished by hand rakes or drag rakes other suitable devices, and further defined in this specification, and further defined in this specification.
- J. Finished grade: surface or elevation of Planting Soil after final grading and 12 months of settlement of the soil, and further defined in this specification.
- K. Graded soil: Soil where the A horizon has been stripped and relocated or re-spread; cuts and fills deeper than 12 inches, and further defined in this specification.
- L. Installed soil: Planting soil and existing site soil that is spread and or graded to form a planting soil, and further defined in this specification.
- M. Minor disturbance: Minor grading as part of agricultural work that only adjusts the A horizon soil, minor surface compaction in the top 6 inches of the soil, applications of fertilizers, installation of utility pipes smaller than 18 inches in diameter thru the soil zone.
- N. Native Soil: Soil native to the site of the planting.
- O. Owner's Representative: The person or entity, appointed by the Owner to represent their interest in the review and approval of the work and to serve as the contracting authority with the Contractor. The Owner's Representative may appoint other persons to review and approve any aspects of the work.
- P. Ped: a clump or clod of soil held together by a combination of clay, organic matter, and fungal hyphae, retaining the original structure of the harvested soil.
- Q. Planting Soil: Native Soil and Compost blended in accordance with this specification.
- R. Poor drainage: Soil drainage that is slower than that to which the plants can adapt. This is a wide range of metrics, but generally if the soil is turning grey in color it is reasonable to either plant moisture adaptive plants at smaller sizes that are young in age with shallow root balls or look at options to improve the drainage
- S. Scarify: Loosening and roughening the surface of soil and sub soil prior to adding additional soil on top, and further defined in this specification.

- T. Soil Fracturing: Deep loosening the soil to the depths specified by using a back hoe, and further defined in this specification.
- U. Soil Horizons: as defined in the USDA National Soil Survey Handbook [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2\\_054242](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242).
- V. Soil Ripping: Loosening the soil by dragging a ripping shank or chisel thru the soil to the depths and spacing specified, and further defined in this specification.
- W. Soil Tilling: Loosening the surface of the soil to the depths specified with a rotary tine tilling machine, roto tiller, (or spade tiller), and further defined in this specification.
- X. Soil trenching: Cutting narrow trenches thru the soil at the depths and spacing specified to loosen the soil profile, and further defined in this specification.
- Y. Subgrade: surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing Planting Soil.
- Z. Substantial Completion Acceptance: The date at the end of the Planting, Planting Soil, and Irrigation installation (if applicable) where the Owner's Representative accepts that all work in these sections is complete and the Warranty period has begun. This date may be different than the date of substantial completion for the other sections of the project, and further defined in this specification.
- AA. Topsoil: naturally produced and harvested soil from the A horizon or upper layers or the soil as further defined in this specification.
- BB. Undisturbed soil: Soils with the original A horizon intact that have not been graded or compacted. Soils that have been farmed, subjected to fire or logged but not graded, and natural forested land will be considered as undisturbed.

#### **1.11 SUBMITTALS**

- A. See the contract General Conditions for policy and procedures related to submittals.
- B. Submit all product submittals eight weeks prior to the start of the soil work.
- C. Product data and certificates: For each type of manufactured product, submit data and certificates that the product meets the specification requirements, signed by the product manufacturer, and complying with the following:
  - 1. Submit manufacturers or supplier's product data and literature certified analysis for standard products and bulk materials, complying with testing requirements and referenced standards and specific requested testing.
    - a. For each Compost product submit the following analysis by a recognized laboratory:
      - 1) pH
      - 2) Salt concentration (electrical conductivity)
      - 3) Moisture content %, wet weight basis

- 4) Particle size % passing a selected mesh size, dry weight basis
  - 5) Stability carbon dioxide evolution rate mg CO<sub>2</sub>-C per g OM per day
  - 6) Solvita maturity test
  - 7) Physical contaminants (inerts) %, dry weight basis
  - 8) US EPA Class A standard, 40CFR § 503.13, Tables 1 and 3 levels  
Chemical Contaminants mg/kg (ppm)
- D. Samples: Submit samples of each product and material, where required by Part 2 of the specification, to the Owner's Representative for approval. Label samples to indicate product, characteristics, and locations in the work. Samples will be reviewed for appearance only.
1. Submit samples a minimum of 8 weeks prior to the anticipated date of the start of soil installation.
  2. Samples of all Compost and Native Soil shall be submitted at the same time as the particle size and physical analysis of that material.
- E. Soil testing for Native Soil.
1. Native Soil: Submit soil test analysis report for each sample of Native Soil from an approved soil-testing laboratory and where indicated in Part 2 of the specification as follows:
    - a. All soil testing will be at the expense of the Contractor.
  2. Submit all testing required by California Code of regulation Title 23 waters, Division 2 Department of Water resources Chapter 2.7 Model Water Efficient Landscape Ordinance, 492.5 Soil Management Report.
  3. Provide a particle size analysis (% dry weight) and USDA soil texture analysis. Soil testing of Planting Soil Mixes shall also include USDA gradation (percentage) of gravel, coarse sand, medium sand, and fine sand in addition to silt and clay.
  4. Provide the following other soil properties:
    - a. pH and buffer pH.
    - b. Percent organic content by oven dried weight.
    - c. Nutrient levels by parts per million including: phosphorus, potassium, magnesium, manganese, iron, zinc and calcium. Nutrient test shall include the testing laboratory recommendations for supplemental additions to the soil for optimum growth of the plantings specified.
    - d. Soluble salt by electrical conductivity of a 1:2 soil water sample measured in Milliohm per cm.
    - e. Cation Exchange Capacity (CEC).

#### **1.12 OBSERVATION OF THE WORK**

- A. The Owner's Representative may observe the work at any time. They may remove samples of materials for conformity to specifications. Rejected materials shall be immediately removed from the site and replaced at the Contractor's expense. The cost of testing materials not meeting specifications shall be paid by the Contractor.
1. The Owner's Representative may utilize the Contractor's penetrometer and moisture meter at any time to check soil compaction and moisture.

- B. The Owner's Representative shall be informed of the progress of the work so the work may be observed at the following key times in the construction process. The Owner's Representative shall be afforded sufficient time to schedule visit to the site. Failure of the Owner's Representative to make field observations shall not relieve the Contractor from meeting all the requirements of this specification.
  - 1. EXISTING SOIL CONDITIONS REVIEW: Prior to the start of any soil modification that will utilize or modify the existing Native Soil.

#### **1.13 PRE-CONSTRUCTION CONFERENCE**

- A. Schedule a pre-construction meeting with the Owner's Representative at least seven (7) days before beginning work to review any questions the Contractor may have regarding the work, administrative procedures during construction and project work schedule.

#### **1.14 QUALITY ASSURANCE**

- A. Installer Qualifications: The installer shall be a firm having at least 5 years of experience of a scope similar to that required for the work, including the preparation, mixing and installation of soil mixes to support planting. The installer of the work in Section: Planting, shall be the same firm installing the work in this section.
  - 1. The bidders list for work under this section shall be approved by the Owner's Representative.
  - 2. Installer Field Supervision: When any Planting Soil work is in progress, installer shall maintain, on site, an experienced full-time supervisor who can communicate clearly with the Owner's Representative.
  - 3. Installer's field supervisor shall have a minimum of five years experience as a field supervisor installing soil, shall be trained and proficient in the use of field surveying equipment to establish grades and can communicate clearly with the Owner's Representative.
  - 4. The installer's crew shall be experienced in the installation of Planting Soil, plantings, and irrigation (where applicable) and interpretation of planting plans, soil installation plans, and irrigation plans (where applicable).
  - 5. Submit references of past projects and employee training certifications that support that the Contractors meet all of the above installer qualifications and applicable licensures.
- B. Soil testing laboratory qualifications: an independent laboratory, with the experience and capability to conduct the testing indicated and that specializes in USDA agricultural soil testing, Planting Soil Mixes, and the types of tests to be performed. Geotechnical engineering testing labs shall not be used.

#### **1.15 SITE CONDITIONS**

- A. It is the responsibility of the Contractor to be aware of all surface and subsurface conditions, and to notify the Owner's Representative, in writing, of any circumstances that would negatively impact the health of plantings. Do not proceed with work until unsatisfactory conditions have been corrected.

1. Should subsurface drainage or soil conditions be encountered which would be detrimental to growth or survival of plant material, the Contractor shall notify the Owner's Representative in writing, stating the conditions and submit a proposal covering cost of corrections. If the Contractor fails to notify the Owner's Representative of such conditions, they shall remain responsible for plant material under the warrantee clause of the specifications.
2. This specification requires that all Planting Soil work be completed and accepted prior to the installation of any plants.

**1.16 SOIL COMPACTION – GENERAL REQUIREMENTS**

- A. Uncompact soil by digging or tilling to a depth of 12". Use equipment that will not compact surround planting area soils.

**1.17 DELIVERY, STORAGE, AND HANDLING**

- A. Weather: Do not mix, deliver, place or grade soils when frozen or with moisture above field capacity.
- B. Protect soil and soil stockpiles, including the stockpiles at the soil blender's yard, from wind, rain and washing that can erode soil or separate fines and coarse material, and contamination by chemicals, dust and debris that may be detrimental to plants or soil drainage. Cover stockpiles with plastic sheeting or fabric at the end of each workday.
- C. All manufactured packaged products and material shall be delivered to the site in unopened containers and stored in a dry enclosed space suitable for the material and meeting all environmental regulations. Biological additives shall be protected from extreme cold and heat. All products shall be freshly manufactured and dated for the year in which the products are to be used.
- D. Deliver all chemical amendments in original, unopened containers with original labels intact and legible, which state the guaranteed chemical analysis. Store all chemicals in a weather protected enclosure.
- E. Bulk material: Coordinate delivery and storage with Owner's Representative and confine materials to neat piles in areas acceptable to Owner's Representative.

**1.18 EXCAVATING AND GRADING AROUND UTILITIES**

- A. Contractor shall carefully examine the civil, record, and survey drawings to become familiar with the existing underground conditions before digging.
- B. Determine location of underground utilities and perform work in a manner that will avoid damage. Hand excavate as required. Maintain grade stakes set by others until parties concerned mutually agree upon removal.
- C. Notification of the USA NORTH 811, [www.811Express.com](http://www.811Express.com), is required for all planting areas. The Contractor is responsible for knowing the location and avoiding utilities that are not covered by the

1.

## **PART 2 - PRODUCTS**

### **2.1 COMPOST**

- A. Compost: Blended and ground leaf, wood and other plant based material, composted for a minimum of 9 months and at temperatures sufficient to break down all woody fibers, seeds and leaf structures, free of live weed seeds, toxic material at levels that are harmful to plants or humans, including trash and debris. Source material shall be yard waste trimmings blended with other plant or manure based material designed to produce Compost high in fungal material.
1. Compost shall be commercially prepared Compost and meet US Compost Council STA/TMECC criteria or as modified in this section for "Compost as a Landscape Backfill Mix Component".  
[http://compostingcouncil.org/admin/wp-content/plugins/wp-pdfupload/pdf/191/LandscapeArch\\_Specs.pdf](http://compostingcouncil.org/admin/wp-content/plugins/wp-pdfupload/pdf/191/LandscapeArch_Specs.pdf)
- B. Compost shall comply with the following parameters:
1. pH: 5.5 - 8.0.
  2. Soil salt (electrical conductivity): maximum 5 dS/m (mmhos/cm).
  3. Moisture content %, wet weight basis: 30 – 60.
  4. Particle size, dry weight basis: 98% pass through 3/4 inch screen or smear.
  5. Stability carbon dioxide evolution rate: mg CO<sub>2</sub>-C/ g OM/ day < 2.
  6. Solvita maturity test: > 6.
  7. Physical contaminants (inerts), %, dry weight basis: <1%.
  8. Chemical contaminants, mg/kg (ppm): meet or exceed US EPA Class A standard, 40CFR § 503.13, Tables 1 and 3 levels.
  9. Biological contaminants select pathogens fecal coliform bacteria, or salmonella, meet or exceed US EPA Class A standard, 40 CFR § 503.32(a) level requirements.
- C. Provide a two gallon sample with manufacturer's literature and material certification that the product meets the requirements.

### **2.2 NATIVE SOIL (Acceptable for planting with minimum modifications)**

- A. General definition of existing soil: Surface soil in the areas designated on the soils plan as existing soil, that is not altered, compacted to root limiting density, graded or contaminated before or during the construction process and considered acceptable for planting and long term health of the plants specified either as it exists or with only minor modification.
1. Contractor shall obtain an agricultural soil analysis of the native soil to determine soil suitability. While it is assumed the soil is adequate for installation of native plants, this test should be provided prior to proceeding with soil modification and planting.

- B. Protect existing soil from compaction, contamination, and degradation during the construction process.
- C. Unless otherwise instructed, remove all existing plants, root thatch, and non-soil debris from the surface of the soil using equipment that does not increase compaction of soil to root limiting levels.
- D. Modifications:
  - 1. Till surface soil to six inches or greater
  - 2. Remove existing turf thatch, ground cover plants and weeds.
  - 3. Mix Native Soil with Compost at a ratio of 50-50 unless otherwise indicated by Native Soils agricultural test.

### **PART 3 - EXECUTION**

#### **3.1 SITE EXAMINATION**

- A. Prior to installation of Planting Soil, examine site to confirm that existing conditions are satisfactory for the work of this section to proceed.
  - 1. Confirm that the subgrade is at the proper elevation and compacted as required. Where underdrains are part of the project plans and specifications, subgrade elevations shall slope toward the under drain lines as shown on the drawings.
  - 2. Confirm that surface all areas to be filled with Planting Soil are free of construction debris, refuse, compressible or biodegradable materials, stones greater than 2 inches diameter, soil crusting films of silt or clay that reduces or stops drainage from the Planting Soil into the subsoil; and/or standing water. Remove unsuitable material from the site.
  - 3. Confirm that no adverse drainage conditions are present.
  - 4. Confirm that no conditions are present which are detrimental to plant growth.
  - 5. Confirm that utility work has been completed per the drawings.
  - 6. Confirm that irrigation work, if included in the project, and which is shown to be installed below prepared soil levels, has been completed.
- B. If unsatisfactory conditions are encountered, notify the Owner's Representative immediately to determine corrective action before proceeding.

#### **3.2 COORDINATION WITH PROJECT WORK**

- A. The Contractor shall coordinate with all other work that may impact the completion of the work.
- B. Prior to the start of work, prepare a detailed schedule of the work for coordination with other trades.
- C. Coordinate the relocation of any irrigation lines, heads or the conduits of other utility lines that are in conflict with tree locations. Root balls shall not be altered to fit around lines. Notify the Owner's Representative of any conflicts encountered.

**3.3 GRADE AND ELEVATION CONTROL**

- A. Provide grade and elevation control during installation of Planting Soil. Utilize grade stakes, surveying equipment, and other means and methods to assure that grades and contours conform to the grades indicated on the plans.

**3.4 SITE PREPARATION**

- A. Excavate to the proposed subgrade. Maintain all required angles of repose of the adjacent materials as shown on the drawings or as required by this specification. Do not over excavate compacted subgrades of adjacent pavement or structures. Maintain a supporting 1:1 side slope of compacted subgrade material along the edges of all paving and structures where the bottom of the paving or structure is above the bottom elevation of the excavated planting area.
- B. Remove all construction debris and material including any construction materials from the subgrade.
- C. Confirm that the subgrade is at the proper elevation and compacted as required. Subgrade elevations shall slope approximately parallel to the finished grade and/or toward the subsurface drain lines as shown on the drawings.
- D. In areas where Planting Soil is to be spread, confirm subgrade has been scarified.
- E. Protect adjacent walls, walks and utilities from damage or staining by the soil. Use 1/2 inch plywood and or plastic sheeting as directed to cover existing concrete, metal and masonry work and other items as directed during the progress of the work.
  - 1. At the end of each working day, clean up any soil or dirt spilled on any paved surface.
  - 2. Any damage to the paving or site features or work shall be repaired at the Contractor's expense.

**3.5 SOIL MOISTURE**

- A. Volumetric soil moisture level, in both the Planting Soil and the root balls of all plants, prior to, during and after planting shall be above permanent wilt point and below field capacity for each type of soil texture within the following ranges.

<b>Soil texture</b>	<b>Permanent wilting point</b>	<b>Field capacity</b>
Sand, Loamy sand, Sandy loam	5-8%	12-18%
Loam, Sandy clay, Sandy clay loam	14-25%	27-36%
Clay loam, Silt loam	11-22%	31-36%
Silty clay, Silty clay loam	22-27%	38-41%

- B. The Contractor shall confirm the soil moisture levels with a moisture meter (Digital Soil Moisture Meter, DSMM500 by General Specialty Tools and Instruments, or approved equivalent). If moisture is found to be too low, the planting holes shall be filled with water and allowed to drain before starting any planting operations. If the moisture is too high, suspend planting operations until the soil moisture drains to below field capacity.

### 3.6 PLANTING SOIL INSTALLATION

- A. Prior to installing any Planting Soil, the Owner's Representative shall approve the condition of the subgrade and the previously installed subgrade preparation and the installation of subsurface drainage.
- B. In large planting bed areas, all equipment utilized to install or grade Planting Soil shall be wide track or balloon tire machines rated with a ground pressure of 4 psi or less. All grading and soil delivery equipment shall have buckets equipped with 6 inch long teeth to scarify any soil that becomes compacted.
  - 1. In areas of soil installation above existing subsoil, scarify the subgrade material prior to installing Planting Soil.
    - a. Scarify the subsoil of the subgrade to a depth of 3 – 6 inches with the teeth of the back hoe or loader bucket, tiller or other suitable device.
    - b. Immediately install the Planting Soil. Protect the loosened area from traffic. DO NOT allow the loosened subgrade to become compacted.
    - c. In the event that the loosened area becomes overly compacted, loosen the area again prior to installing the Planting Soil.
  - 2. Where plans specify planting of individual plant containers, hand held equipment may be used. Contractor to ensure surrounding soils are not compacted by activity around planting holes.
- C. Install the Planting Soil in 6-12 inch lifts to the required depths. Apply compacting forces to each lift as required to attain the required compaction. Scarify the top of each lift prior to adding more Planting Soil by dragging the teeth of a loader bucket or backhoe across the soil surface to roughen the surface.
- D. Phase work such that equipment to deliver or grade soil does not have to operate over previously installed Planting Soil. Work in rows of lifts the width of the extension of the bucket on the loader. Install all lifts in one row before proceeding to the next. Work out from the furthest part of each bed from the soil delivery point to the edge of the each bed area.
- E. Where possible place large trees first and fill Planting Soil around the root ball.
- F. Installing soil with soil or mulch blowers or soil slingers shall not be permitted due to the over mixing and soil ped breakdown cause by this type of equipment.
- G. Where travel over installed soil is unavoidable, limit paths of traffic to reduce the impact of compaction in Planting Soil. Each time equipment passes over the installed soil it shall

reverse out of the area along the same path with the teeth of the bucket dropped to scarify the soil. Comply with the paragraph "Compaction Reduction" (section 3.9) in the event that soil becomes over compacted.

- H. The depths and grades shown on the drawings are the final grades after settlement and shrinkage of the compost material. The Contractor shall install the Planting Soil at a higher level to anticipate this reduction of Planting Soil volume. A minimum settlement of approximately 10 - 15% of the soil depth is expected. All grade increases are assumed to be as measured prior to addition of surface Compost till layer, mulch, or sod.

### **3.7 FINE GRADING**

- A. The Owner's Representative shall approve all rough grading prior to the installation of Compost, fine grading, planting, and mulching.
- B. Grade the finish surface of all planted areas to meet the grades shown on the drawings, allowing the finished grades to remain higher (10 – 15% of depth of soil modification) than the grades on the grading plan, as defined in paragraph Planting Soil Installation, to anticipate settlement over the first year.
- C. Utilize hand equipment, small garden tractors with rakes, or small garden tractors with buckets with teeth for fine grading to keep surface rough without further compaction. Do not use the flat bottom of a loader bucket to fine grade, as it will cause the finished grade to become overly smooth and or slightly compressed.
- D. Provide for positive drainage from all areas toward the existing inlets, drainage structures and or the edges of planting beds. Adjust grades as directed to reflect actual constructed field conditions of paving, wall and inlet elevations. Notify the Owner's Representative in the event that conditions make it impossible to achieve positive drainage.
- E. Provide smooth, rounded transitions between slopes of different gradients and direction. Modify the grade so that the finish grade before adding mulch and after settlement is one or two inches below all paving surfaces or as directed by the drawings.
- F. Fill all dips and remove any bumps in the overall plane of the slope. The tolerance for dips and bumps in shrub and ground cover planting areas shall be a 2 inch deviation from the plane in 10 feet. The tolerance for dips and bumps in lawn areas shall be a 1 inch deviation from the plane in 10 feet.

### **3.8 CLEAN-UP**

- A. During installation, keep the site free of trash, pavements reasonably clean and work area in an orderly condition at the end of each day. Remove trash and debris in containers from the site no less than once a week.
  - 1. Immediately clean up any spilled or tracked soil, fuel, oil, trash or debris deposited by the Contractor from all surfaces within the project or on public right of ways and neighboring property.

- B. Once installation is complete, wash all soil from pavements and other structures. Ensure that mulch is confined to planting beds and that all tags and flagging tape are removed from the site. The Owner's Representative seals are to remain on the trees and removed at the end of the warranty period.
  - 1. Make all repairs to grades, ruts, and damage to the work or other work at the site.
  - 2. Remove and dispose of all excess Planting Soil, subsoil, mulch, plants, packaging, and other material brought to the site by the Contractor.

### **3.9 PLANTING SOIL AND MODIFIED EXISTING SOIL PROTECTION**

- A. The Contractor shall protect installed and/or modified Planting Soil from damage including contamination and over compaction due to other soil installation, planting operations, and operations by other Contractors or trespassers. Maintain protection during installation until acceptance. Utilize fencing and matting as required or directed to protect the finished soil work. Treat, repair or replace damaged Planting Soil immediately.
- B. Loosen compacted Planting Soil and replace Planting Soil that has become contaminated as determined by the Owner's Representative. Planting Soil shall be loosened or replaced at no expense to the Owner.
  - 1. Till and restore grades to all soil that has been driven over or compacted during the installation of plants.
  - 2. Where modified existing soil has become contaminated and needs to be replaced, provide imported soil that is of similar composition, depth and density as the soil that was removed.

### **3.10 PROTECTION DURING CONSTRUCTION**

- A. The Contractor shall protect planting and related work and other site work from damage due to planting operations, operations by other Contractors or trespassers.
  - 1. Maintain protection during installation until the date of plant acceptance (see specifications section – Planting). Treat, repair or replace damaged work immediately.
  - 2. Provide temporary erosion control as needed to stop soil erosion until the site is stabilized with mulch, plantings or turf.
- B. Damage done by the Contractor, or any of their sub-contractors to existing or installed plants, or any other parts of the work or existing features to remain, including large existing trees, soil, paving, utilities, lighting, irrigation, other finished work and surfaces including those on adjacent property, shall be cleaned, repaired or replaced by the Contractor at no expense to the Owner. The Owner's Representative shall determine when such cleaning, replacement or repair is satisfactory. Damage to existing trees shall be assessed by a certified arborist.

### **3.11 SUBSTANTIAL COMPLETION ACCEPTANCE**

- A. Upon written notice from the Contractor, the Owners Representative shall review the work and make a determination if the work is substantially complete.

- B. The date of substantial completion of the planting soil shall be the date when the Owner's Representative accepts that all work in Planting, Planting Soil, and Irrigation installation sections is complete.

**3.12 FINAL ACCEPTANCE / SOIL SETTLEMENT**

- A. At the end of the plant warrantee and maintenance period, (see Specification section - Planting) the Owner's Representative shall observe the soil installation work and establish that all provisions of the contract are complete and the work is satisfactory.
  - 1. Restore any soil settlement and or erosion areas to the grades shown on the drawings. When restoring soil grades remove plants and mulch and add soil before restoring the planting. Do not add soil over the root balls of plants or on top of mulch.
- B. Failure to pass acceptance: If the work fails to pass final acceptance, any subsequent observations must be rescheduled as per above. The cost to the Owner for additional observations will be charged to the Contractor at the prevailing hourly rate of the Owner's Representative.

**END OF SECTION**

## **SECTION 32 93 00 - PLANTS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes: All labor, materials, equipment, tools, accessories, transportation, and services as required for the furnishing and planting of trees, shrubs, and ground covers, protection of the work, and cleaning up as shown on the drawings and herein specified.
- B. References
  - 1. Standardized Plant Names, second edition, and secondly, A Checklist of Woody Ornamental Plants of California, Manual 32, University of California.
  - 2. AAN's American Standard for Nursery Stock.
  - 3. Federal, State and County laws requiring inspection for plant disease and insect control.
- C. Related Sections
  - 1. Drawings and general provisions of contract, including general and supplementary conditions and Division I specifications, apply to work of this section.
    - a. Review Site Preparation notes on Landscape Sheet L-002 (notes 47-56) which describe plant salvage, and propagation of local genotype plants.

#### **1.2 PRICE AND PAYMENT PROCEDURES**

- A. Refer to Section 01 29 00, Payment Procedures.

#### **1.3 ADMINISTRATIVE REQUIREMENTS**

- A. Schedule
  - 1. Submit a proposed planting schedule to the Engineer for approval at least thirty (30) days prior to start of work under this section.
  - 2. After above approval, no modification shall be made to this schedule without written authorization by Engineer.

#### **1.4 SUBMITTALS**

- A. Certificates: All plant materials shall meet the specifications of Federal, State, and County laws requiring inspection for plant diseases and insect infestations. Inspection certifications required by law shall accompany each shipment, invoice, or order for stock, and when such plants arrive at the site of the work, the certificate of inspection shall be filed with the Engineer.
- B. Materials Lists
  - 1. Within forty five (45) days after award of the Contract, submit to Engineer a complete list of materials proposed to be furnished and installed demonstrating conformance with the requirements specified.

2. Submittal to include invoices identifying sizes and quantities and the names and addresses of all plant material suppliers and growers.

### **1.5 QUALITY ASSURANCE**

- A. Plants not meeting the specified sizes and quantities at time of inspection are subject to rejection and replacement.
- B. Reviews: The Contractor shall specifically request the following reviews prior to progressing with the work:
  1. Plant material approval.
  2. Plant layout.
  3. Finish grade.
  4. Substantial completion.
  5. Final completion.
- C. Nomenclature and Labels: Plant botanical names shall conform to Standardized Plant Names, second edition, and secondly, A Checklist of Woody Ornamental Plants of California, Manual 32, University of California. All plants of each clone, species, and cultivar shall be delivered to the site labeled with their full botanical names. Every plant species shall be labeled with no less than one label for every ten plants of a species.

### **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Materials: All materials required to complete the work under this contract shall be furnished by the Contractor.
- B. Delivery and Acceptance Requirements
  1. The Contractor shall notify the Section of Engineer at least two (2) days prior to the delivery date of each shipment of plant materials.
  2. Any plants delivered to the job site, which are found to be not true to name or unsuitable in growth or conditions, shall be removed from the site and replaced with acceptable plants.
  3. All plants shall be of the genus, species, cultivar, size, age, and condition as specified herein and as shown on the Plans.
  4. Under no condition will there be any substitution of plants or sizes for those listed on the accompanying plans, except with the written consent of the Engineer.
  5. Inspection of all plant material for acceptance shall be made at the project site at time of delivery. All plant material shall be approved by the Engineer prior to installation. Any and all rejected plant material shall be marked as such and removed from the project site immediately.
- C. Storage and Handling
  1. Plant materials shall be protected and maintained in good condition. Bare root and balled materials shall be watered regularly and placed in a cool area, protected from sun and wind.
- D. Substitutions

1. Substitutions of plant materials will not be permitted unless authorized in writing by Engineer.
2. If proof is submitted that any plant specified is not obtainable, a proposal will be considered for use of the nearest equivalent size or variety with corresponding adjustment of Contract price.
3. Such proof shall be substantiated and submitted in writing to the Engineer at least 30 days prior to start of work under this section.
4. These provisions shall not relieve Contractor of the responsibility of obtaining specified materials in advance if special growing conditions or other arrangements must be made in order to supply specified materials.

#### **1.7 SITE CONDITIONS**

- A. Planting Conditions
  1. Boxed or container material may be installed at any time.
  2. Air Temperature
    - a. Do not install plant materials during freezing weather or when the ground is frozen.
    - b. Protect plants from desiccation in hot, dry conditions by keeping moist, or use an anti-desiccant.

#### **1.8 WARRANTY**

- A. Final Guarantee: Contractor shall provide guarantee
- B. General: Contractor shall warrant that all plants installed under this Contract will be healthy and in flourishing condition of active growth on year from date of Final Acceptance.
- C. Plant Replacements
  1. Replace, without cost to Tribe, and as soon as weather conditions permit, all dead plants and all plants not in a vigorous, thriving condition, during and at the end of the Warranty Period. Plants shall be free of dead or dying branches and branch tips, and shall bear foliage of a normal density, size and color. Replacements shall closely match adjacent specimens of the same species and shall be subject to all requirements of this specification.
  2. Rejected plants may be retained in place or be required to be removed at the discretion of the Tribe.
  3. Contractor shall not be held responsible for failures due to neglect by the Tribe or vandalism during Warranty Period. Report such conditions to the Tribe in writing.
  4. Warranty shall not include damage or loss of plant materials caused by fires, floods, freezing rains, lightning storms, winds over seventy-five (75) MPH, or winter kill caused by extreme cold and severe winter conditions not typical of the project site.
  5. Plant replacement during the warranty period shall be limited to one replacement unless the prior plant installation did not meet the requirements of these specifications.

- D. A final inspection will be held in presence of Contractor and Tribe at the end of the one-year period. It shall be the Contractor's responsibility to notify the Tribe fourteen (14) days prior to the anticipated meeting.

## **PART 2 - PRODUCTS**

### **2.1 PLANT MATERIALS**

- A. Description
1. Tagging: All plants shall be true to name, and one of each bundle or lot shall be tagged with the name and size of the plant in accordance with the standards of practice recommended by the AAN.
  2. Plants shall be as specified in the Plant List on the Plans and shall be healthy, vigorous stock, free of insects and disease.
  3. Unless otherwise indicated, plants material shall be of local genotype native species, sourced from the Klamath-Trinity watersheds within 50 miles of the site. Any substitutions must also conform to this requirement.
  4. Use only plant materials that are first class representations of the genus, species, and cultivars specified and that conform to all State and local laws governing the sale, transportation, and inspection of plant materials.
  5. Only healthy and shapely plants of the size and type indicated and only plants with a normal plant and root structure will be acceptable.
  6. All plants shall be nursery grown stock and shall have been grown in the specified containers for not less than six (6) months but shall not have been overgrown in the containers so as to become root-bound. They shall have straight, single trunks, unless otherwise specified on the plans.
  7. No pruning shall be undertaken before planting.
  8. Plants specified to be multi-trunk shall have at least three main leaders from the base.
  9. Any and all plants that have any encircling roots (not root-bound) shall have root balls lightly slashed on a minimum of three (3) sides to stop encircling root growth.
  10. All plants shall be free from disfiguring knots and sunscald injuries, abrasions, abrasion of bark, or other objectionable disfigurements. Tree trunks shall be sturdy and well "hardened off".

### **2.2 SOIL AMENDMENTS**

- A. As specified in Section 329100, Planting Preparation.

### **2.3 MULCH**

- A. As specified in Section 329100, Planting Preparation.

### **2.4 ACCESSORIES**

- A. Guying Materials for trees less than four inch (4") diameter.
1. Polypropylene Weave
    - a. Manufacturer: DeepRoot Arbor Tie, or approved equal.

- B. Tree Stakes
  - 1. Two stakes per tree.
  - 2. Eight to ten foot (8'-10') lengths depending on tree height.
  - 3. Two inch by two inch (2" x 2") Lodge Pole Pine Stakes, pressure treated with Chemonite.

## **2.5 SOURCE QUALITY CONTROL**

- A. Damaged Plants
  - 1. Plants shall not be pruned before delivery.
  - 2. Trees which have damaged or crooked leaders, or multiple leaders, unless specified, will be rejected.
  - 3. Trees with abrasions of the bark, sunscalds, disfiguring knots, or fresh cuts of limbs over three fourths inch (3/4 inch) which have not completely callused, will be rejected.
  - 4. Trees with asymmetrical canopies, skirted canopies (excessively high branching) and topped or lollipop pruned in the nursery will be rejected.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Preinstallation Testing: The Contractor is required to conduct an irrigation coverage test prior to the installation of any planting material, including seeded turf or sod.
- B. The coverage test shall take place in the presence of the Engineer.
- C. The Contractor shall add any irrigation heads as necessary to obtain the proper irrigation coverage as directed by the Engineer at the Contractor's own expense.
- D. The Contractor shall notify the Engineer a minimum of forty eight (48) hours prior to the coverage test.

### **3.2 PREPARATION**

- A. Protection of In-Place Conditions
  - 1. Surrounding areas, surfaces and appurtenances already in place shall be protected during installation of plants.

### **3.3 TREE AND SHRUB INSTALLATION**

- A. Location Staking: Each tree and shrub location shall be as indicated on the Plans and shall not be in conflict with any existing utilities, utility boxes, etc. Any and all plants improperly located shall be replanted in their proper location at no additional cost to the Tribe.
  - 1. Notify Engineer immediately of any discrepancy.

- B. Excavate holes by auger, unless otherwise specified for particular situations. Before an augured hole is made, the top six inches (6") of amended soil shall be removed and stockpiled at one side of hole.
- C. An augured hole of the appropriate size shall be made to a depth of the container. The size of the auger shall depend on the size of the plant container. The hole shall be broken in with a crowbar until it is twice the width of the container, leaving the sides rough with no "auger slick". Break up the bottom six inches (6") of soil prior to placing plant.
- D. The plant shall then be set in an upright position in the center of the hole and the space around it backfilled with planting mix so that a minimum of four inches (4") of amended soil is around the sides of the root ball. Do not place organic matter beneath the plant's root ball. The plant shall be set so that the root crown is one half inch to three fourths inch (1/2" to 3/4") higher than average surrounding grade. Dispose of balance of borings around plant in a manner that water is shed away from the crown or trunk of plant.
- E. When the backfill around the plant is approximately two-thirds (2/3) completed, the plant shall be thoroughly watered, after which the backfill shall be completed to the grade of the surrounding area.
- F. Install planting packets within six inches to eight inches (6" - 8") of the soil surface and as per the following schedule:
  - 1. 1 gal. stock - 1 packet
  - 2. 2 or 5 gal. stock - 3 packets
  - 3. 15 gal. stock - 9 packets
  - 4. 24 inch box stock or larger - 12 packets
- G. No boxed, balled, or canned trees shall be planted if the ball is broken or cracked, either before or during the process of planting.
- H. Tree Wrap: Protect all trees from sun scald with tree bark-wrap prior to staking. Remove prior to Final Acceptance.
- I. Tree Staking: All trees shall be provided with two (2) Lodge Pole Pine Stakes, pressure treated with Chemonite (See Plans for Tree Planting Detail). Tree stakes shall not be driven into the rootball.
  - 1. Fifteen (15) gallons trees or smaller: two inches (2") diameter x ten feet (10') long stake, six feet (6') above ground.
  - 2. Twenty four (24) inches box trees or larger: three inches (3") diameter x twelve feet (12') long stake, eight feet (8') above ground, with three one inch by four inches (1" x 4") wood cross ties.
  - 3. The tree ties shall be pieces of corded rubber placed in one place just below the main fork or branches.
- J. Soil Berm: In all planting areas (excluding turf), each plant shall have a soil berm constructed around it to retain water. The soil berm shall be at least four inches (4") high and shall have a minimum diameter of two feet (2') for shrubs and three feet (3') for trees.

- K. Edging: Each tree in turf areas shall have the turf removed in a ring from the tree base diameter as follows:
  - 1. Twenty four inches (24") diameter to five (5) gallon trees.

**3.4 Thirty inches (30") diameter to fifteen (15) gallon and larger trees.**

- A. Pruning: Pruning shall be limited to a minimum necessary for removal of injured twigs and branches, with cuts over one-half (1/2) inch in diameter painted with a tree wound compound.
- B. Watering: Immediately after planting, each tree or shrub shall be thoroughly watered, and the areas between soil berms shall be raked smooth.

**3.5 GROUND COVERS**

- A. Spacing: The spacing of all ground cover plants shall be as indicated on the Plans and in the Plant List.
- B. Groundcovers of the same species shall be clustered in groups of three to five and staggered to create a naturalistic effect. They shall be placed around the shrubs (to within one (1) foot) and trees (to within eighteen (18) inches).

**3.6 PLUG PLANTING**

- A. Spacing: Plugs of the same species shall be clustered in groups of three to five and staggered to create a naturalistic effect.

**3.7 SEED**

- A. Note 54 of Landscape Sheet L-002 shall apply to the application of all seed.

**3.8 WEED CONTROL**

- A. During site preparation and topsoil salvage, apply interim weed management practices described in Note 56 of Landscape Sheet L-002. Plan for 3 to 6 months of thermosterilization.
  - 1.

**3.9 MULCH**

- A. Refer to Section 32 91 00, Planting Preparation.

**3.10 SITE QUALITY CONTROL**

- A. Site Tests and Inspections
  - 1. Inspection for Starting of Operation and Maintenance Period: Upon completion of the irrigation, turf, planting, and hydroseeding work, when a satisfactory stand of turf (between 2 to 3 inches (2" to 3") high) has been established, and after the first cutting, the Contractor shall notify the Project Engineer that the project is ready for

maintenance. The Project Engineer shall then schedule a pre-maintenance walk-through inspection for the project and shall notify the Contractor and various Tribal representatives as to the time and date.

2. Upon inspection, if the Project Engineer finds the irrigation, turf, planting, and hydroseeding work complete and in compliance with the plans and specifications, the Tribe shall authorize the start of the operation and maintenance period. Written notice will be given the Contractor to inform him as to the starting date of the maintenance period.

### **3.11 CLEANING**

#### **A. Waste Management**

1. After all planting operations have been completed, the Contractor shall remove all trash, empty plant containers, tools, and equipment used in this work, or any other debris accumulated by the work, from the site of the work, and all scars, ruts, or other marks in the area caused by this work shall be repaired at the Contractor's expense, and the ground left in a neat and orderly condition throughout the site of the work.

**END OF SECTION**