ENTRY LANDSCAPE DESIGN STANDARDS
OCTOBER 2013
SITE PAVING AND SEATING
PAVING OPTIONS

Decomposed Granite Paving

- Install with binder
- Install away from entry doors to prevent spread of fines into buildings and classrooms
- Colors: California Gold and Graphite Grey only
- See District standard detail for installation and more information

California Gold

Graphite Grey

Standard Concrete Paving

- Medium broom finish to be used at all accessible routes of travel
- Salt and light sandblast in approved areas only
- Toned Concrete Colors: Davis Colors Dune and Omaha Tan only in areas approved by District
- See District standard detail for installation and more information

Standard Grey Scored Concrete

Toned Scored Concrete
SEATING OPTIONS

Concrete Seat Pads

- Approved Models: TF5100, TF5116, TF5118, TF5119
- Submit color selection to District for approval
- Install per mfr details and installation instructions

Concrete Seat Walls with Skate Stops

- See District standard detail for installation and more information
- Skate stops available from www.skatestoppers.com Install every 30” o.c.

Natural Boulders

- Minimum size: 30”x30”x30”
- Maximum size: 3’x3’x3’
- Sonoma Fieldstone or Moss Rock Boulders
- See District standard detail for installation and more information
SPECIFICATIONS
PART 1 - GENERAL

1.01 SCOPE

A. Provide concrete walks, vehicular paving, driveways, curbs, gutters, handicap ramps, precast walls, and precast monoliths, complete and in place, as shown and specified. The work includes but is not limited to:
   1. Final subgrade preparation and paving base
   2. Concrete curbs, walks, paving, walls, driveways, roadway.
   3. Concrete footings for site mechanical, carpentry, and electrical items as shown.

1.02 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Divisions 1 Specifications Sections, apply to this section.

B. Related Work:
   1. Section 01 56 39: Clearing, Grubbing and Demolition
   2. Section 32 84 00: Irrigation System

1.03 QUALITY ASSURANCE

A. Materials and methods of construction shall comply with the following standards:
   2. American Concrete Institute, (ACI).
   3. California Building Code (CBC)
   5. American National Standards Institute, (ANSI).

B. Installer Qualifications: An experienced installer who has completed concrete work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Source Limitations: Obtain each type of cement of the same brand from the same manufacturer’s plant, each aggregate from one source and each admixture from the same manufacturer.

D. Maintain field records of time, date of placing, curing and removal of forms of concrete in each portion of work.

E. Samples:
   1. Sample panel for concrete walk, precast wall: Before ordering material for concrete, provide sample panel, minimum 2’ X 2’ of each color and finish, using specified materials. Show color, texture, pattern, edging, and joint treatments.
      a. Where applicable, the approved sample panel may be a portion of the work and remain in place. Location as directed by the District’s Representative. Contractor will be required to provide additional panels as necessary, until approved.
1.04 **SUBMITTALS**

A. Submit concrete mix designs to District’s Representative. Obtain approval before placing concrete.

B. Product data:
   1. Submit complete materials list of items proposed for the work. Identify materials source.
   2. Submit admixture, curing compound, retarder, and accessory item product data, if used.
   3. Submit material certificates for aggregates, reinforcing, and joint fillers.

C. Submit concrete delivery tickets. Show the following:
   1. Batch number.
   2. Mix by class or sack content with maximum size aggregate.
   3. Admixtures.
   4. Slump.
   5. Time of loading.

D. Submit concrete test reports.

1.05 **DELIVERY, STORAGE AND HANDLING**

A. Work notification: Notify District’s Representative at least 24 hours prior to installation of concrete.

B. Establish and maintain required lines and grade elevations. All concrete shall slope to drain with no ponding of water.

C. Do not install concrete work over wet, saturated, muddy, or frozen subgrade.

D. Do not install concrete when air temperature is below 40 degrees F. Use of calcium chloride, salt, or any other admixture to prevent concrete from freezing is prohibited.

E. When temperatures is between 85 and 90 degrees F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when temperatures is above 90 degrees F, reduce mixing and delivery to 60 minutes.

F. Protect adjacent work.

G. Provide temporary barricades and warning lights as required for protection of project work and public safety.

**PART 2 - PRODUCTS**

2.01 **FORMWORK**

A. Furnish formwork and form accessories according to ACI 301-10.

B. Wood or metal formwork shall be of sufficient strength to resist concrete placement pressure and to maintain horizontal and vertical alignment during concrete placement. Provide forms straight, free of defects and distortion, and height equal to full depth of concrete work.
   1. Provide 2” nominal thickness, surfaced plank wood forms for straight sections. Use flexible metal, 1” lumber or plywood forms to form radius bends.
2.02 STEEL REINFORCEMENT
A. Reinforcing steel bar: ASTM A615, A616, or A617, Grade 60, new domestic deformed steel bars.
C. Steel Dowels: ASTM A615

2.03 CONCRETE MATERIALS
A. Portland Cement: ASTM C150, Type 1, natural color, unless otherwise noted.
B. Aggregate: Provide ASTM C33 normal weight aggregates, 3/4" maximum size, clean, uncoated crushed stone or gravel coarse aggregate free of materials which cause staining or rust spots; fine aggregate shall be clean natural sand.
C. Water: Clean, fresh, and potable.

2.04 ADMIXTURES
A. Calcium Chloride: Do not use calcium chloride in concrete, unless specifically specified by Engineer.
C. All admixtures, if used, shall conform to C.B.C. Vol. 2, Section 1905A.2. Use of additional admixtures is accepted based upon approval by Engineer.

2.05 CONCRETE MIXES
A. Provide Class A ready-mixed concrete. Batch mixing at site not acceptable.
   1. For roadway paving: Use Portland Cement Concrete containing not less than 658 pounds of Portland Cement per cubic yard to allow for 7 day cure time, with a compressive strength of not less than 4000 p.s.i.
   2. For all other site concrete: Use Portland Cement Concrete containing not less than 564 pounds of Portland Cement per cubic yard, with a compressive strength of not less than 3000 p.s.i.
B. Indicate water added to mix at job site on each delivery ticket. Show quantity of water added. Site water tempered mixes exceeding specified slump range will be rejected as not complying with specification requirements.
C. Retempering of concrete will not be permitted.

2.06 INTEGRAL COLOR
A. Concrete Color Additives: Davis Colors, as indicated in contract drawings, details and these specifications.

2.07 GLARE REDUCING AGENTS
A. Lampblack in dry form, in accordance with the requirements of ASTM D209-81 “Standard Specifications for Lampblack”, in proportion from ½ to ¾ of a pound per cubic yard of concrete.
B. An approved liquid or semi-paste black colorant intended for use integrally in concrete mixes. The proportion required generally from 10 to 40 ounces liquid measure per cubic yard of concrete, may be affected by the colorant used. Curing, in this case, shall be by the pigmented curing compound method.

2.08 ACCESSORIES

A. Granular base: Class II Aggregate Base, clean and uncoated.


C. Curing compound: ASTM C309, non-yellowing, non-staining liquid membrane-forming type containing a fugitive dye. Chlorinated rubber compounds not acceptable for exterior use.

D. Joint Sealants: Two-component polysulfide or polyurethane elastomeric type complying with Federal Specifications TT-S-00227, self-leveling, designed for foot traffic in pedestrian areas. All vehicular areas shall have traffic rated joint sealant. Available from Sikaflex, Sikaflex 2 NS TG, Color: TBD.

E. Form release agent: Non-staining chemical form release agent free of oils, waxes, and other materials harmful to concrete.

F. Reveals/Chamfer strips: Shall be plastic or polyvinyl coated for easy release. Available from Barker Steel, www.barker.com, or approved equal.

G. Provide all stirrups, ties, anchors, shown or required to be cast into precast members.


I. Waterproofing at walls shall be Tremco 250-GC, or approved equal.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine subgrades and installation conditions. Immediately inform the District’s Representative of any discrepancy between the Drawings and Specifications and actual conditions and secure approval to proceed. Do not start concrete work until unsatisfactory conditions are corrected.

3.02 PREPARATION

A. Proof roll the subgrade and do all necessary rolling and compacting to obtain firm, even subgrade surface. Fill and consolidate depressed areas. Remove uncompactable materials, replace with clean fill and compact to 90% of the maximum dry density in accordance with ASTM D1557-70.

B. Provide minimum 4" depth of compacted base material at walks. Compact base to 95% of the maximum dry density in accordance with ASTM D1557-70

C. Remove loose material and debris from base surface before placing concrete.

D. Install, align, and level forms. Stake and brace forms in place. Maintain following grade and alignment tolerances:
   1. Top of form: Maximum 1/8" in 10'-0".
   2. Vertical face: Maximum ½" in 10'-0".
E. Coat form surfaces in contact with concrete with form release agent. Clean forms after each use and coat with form release agent as necessary to assure separation from concrete without damage.

F. Install, set, and build-in work furnished under other specification sections. Provide adequate notification for installation of necessary items.

G. Install pipe sleeves for irrigation system furnished under Section 32 84 00. Stake location of irrigation sleeves.

3.03 PLACING REINFORCEMENT

A. Place all reinforcement as shown on the drawings. Place accurately and securely fasten and support reinforcement to prevent displacement before or during pouring. Hang footing bars from forms. Support wire mesh with suitable metal cradles.

B. Clean, bend and place reinforcement in accordance with current requirements of the ACI Manual of Concrete Practice.

C. Reinforcement Splices:
   Welded wire fabric - one mesh minimum.
   Reinforcing bars - 24 bar diameter minimum, except as otherwise noted.

3.04 TESTING

A. Provide slump test on first load of concrete delivered each day and whenever requested due to changes in consistency or appearance of concrete.

3.05 INSTALLATION

A. Concrete placement:
   2. Protect concrete from physical damage or reduced strength due to weather extremes during mixing, placing, and curing. In cold weather comply with ACI 306, “Cold Weather Concreting”. In hot weather comply with ACI 305, “Hot Weather Concreting”.
   3. Moistened base to provide a uniform dampened condition at the time concrete is placed. Verify structures are at required finish elevation and alignment before placing concrete.
   4. Place and spread concrete to the full depth of the forms. Use only square-end shovels or concrete rakes for hand-spread and consolidating operations to prevent segregation of aggregate and dislocation of reinforcement.
   5. Place concrete in a continuous operation between expansion joints. Provide construction joints where sections cannot be placed continuously.
   6. Place concrete as indicated on the plans in one course, monolith construction, for the full width and depth of concrete work.
   7. Strike-off and bull-float concrete after consolidating. Level ridges and fill voids. Check surface with a 10'-0” straightedge. Fill depressions and refloat repaired areas. Darby the concrete surface to provide a smooth level surface ready for finishing.

B. Joints:
   1. Provide expansion joints using premolded joint filler at concrete work abutting curbs, walls, structures, walks, and other fixed objects.
a. Expansion joints shall be formed provided at the location and intervals as shown on the plans and details.

b. Approved joint material shall be placed with top edge 1/4 inch below the paved surface, and shall be securely held in place to prevent movement. Joint and other edges shall be formed in the fresh concrete using and edging tool to provide a smooth uniform impression. All edges shall be struck before and after brooming.

c. After the curing period, expansion joints shall be carefully cleaned and filled with approved joint sealant to just below adjacent paved surface in such a manner as to avoid spilling on paved surfaces or overflow from joint.

d. Install joint fillers full-width and depth of joint. Recess top edge below finish grade for joint sealants.

e. Provide joint fillers in single lengths for the full slab width, whenever possible. Fasten joint filler sections together when multiple lengths are required.

f. Protect the top edge of the joint filler during concrete placement.

2. Score Joints:

   a. Score joints shall be formed in the fresh concrete using a jointer to cut the groove so that a smooth uniform impression is obtained. All joints shall be struck before and after brooming. See plans and details for size and locations.

C. Dowels:

   1. All new concrete walkways shall be doweled into new and existing concrete walkways and curbing. See plans and details for size and location.

D. Finishes:

   1. Broom Finish: Shall be obtained by drawing a stiff bristled broom across a floated finish. Direction of brooming to be perpendicular to direction of work or otherwise shown on drawings.

   2. Sand Blast Finish:

      a. Perform in as continuous an operation as possible, utilizing the same work crew to maintain continuity of finish.

      b. Depth of Cut: Use an abrasive grit of the proper type and gradation to expose the aggregate and surrounding matrix surfaces to match approved sample panel.

         1) Light Cut: Approx. 1/16 inch depth.

         2) Medium Cut: Approx. 1/8 inch to 3/16 inch depth.

         3) Heavy Cut: Approx. 1/2" to 3/4" depth.

      c. Blast corners and edge patterns carefully, using backup boards, in order to maintain a uniform corner or edge line.

      d. Use same nozzle, nozzle pressure and blasting technique as used for sample panel.

      e. Maintain control of abrasive grit and concrete dust in each area of blasting. Clean up and remove all expended abrasive grit, concrete dust, and debris at the end of each day of blasting operations.

E. Curing:

   1. Cure concrete with a clear, non-staining liquid membrane-forming compound. Spray apply in accordance with manufacturer’s recommended coverage rate. Apply curing compound immediately after completing surface finish.
3.06 TOLERANCES
   A. Comply with ACI 117, “Specifications for Tolerances for Concrete Construction and Materials”

3.07 PROTECTION
   A. Protect concrete work from damage due to construction and vehicular traffic until Final acceptance. Exclude construction and vehicular traffic from concrete pavements for at least 14 days.
   B. Protection: Protect precast concrete items from chipping, spalling, cracking, or other damage until the Work is accepted by the District.

3.08 CLEANING
   A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, debris, and equipment. Repair damage resulting from concrete operations.
   B. Sweep concrete sidewalks and pavement; wash free of stains, discoloration, dirt, and other foreign material immediately prior to final acceptance.

END OF SECTION 03 30 00
SECTION 31 10 00
CLEARING, GRUBBING AND MISCELLANEOUS DEMOLITION

PART 4 - GENERAL

4.01 RELATED DOCUMENTS
A. The General Conditions of the Contract, including General and Special Provisions and General Requirements apply to the work in this section.

4.02 DESCRIPTION
A. Work Included: Furnish all labor, materials, equipment, facilities, transportation and services to complete all clearing and demolition and related work as shown on the drawings and/or specified herein.
   1. Clearing and Grubbing
   2. Removal and Disposal of Miscellaneous Construction Items and Debris

PART 5 - MATERIALS

5.01 EQUIPMENT
A. Equipment shall be suitable for the work to be done and shall be in first-class condition. Equipment operators and workmen to be skilled in operations and to be supervised by a competent superintendent.

PART 6 - EXECUTION

6.01 GENERAL
A. Clear and grub future planting and paved areas as shown on Plans or as specified herein. Grubbing shall include clearing the entire root systems of all plants, weeds, and grasses.
B. Remove and dispose of wire mesh fencing; including posts and footings, and miscellaneous deleterious materials, such as, asphalt, aggregate base, concrete, where shown on plans. Contractor shall finish off edges at limit of fence to remain as directed by the City inspector.
C. Dust Control: At all times during the operations, prevent the formation of an airborne dust nuisance by watering and/or treating the site of the work in such a manner that will confine dust particles to the immediate area of the work.
D. Debris:
   1. Remove debris as it accumulates, except as otherwise specified. Do not store or permit debris to accumulate on the site. If contractor fails to remove excess debris promptly, the City reserves the right to cause same to be removed at Contractor's expense.
   2. Materials requiring removal and demolition shall become the property of the contractor and shall be removed completely from site, unless noted otherwise on plans, and shall be disposed of at an approved site outside the city limits.
   3. If unforeseen items are encountered during clearing and demolition work, the Contractor shall notify the City Inspector prior to removal or demolition.
END OF SECTION 31 10 00
PART 7 - GENERAL

7.01 PROVISIONS
A. The requirements of the General Conditions, Supplementary Conditions, and Division 1, General Requirements apply to the work of this Section.

7.02 INCLUDED WORK
A. Redwood Headers
B. Decomposed Granite

7.03 REFERENCES AND STANDARDS
B. Percent Compaction: As referred to in these Specifications, percent compaction or relative compaction is required in-place dry density of material expressed as a percentage of the maximum dry density of the same material determined in accordance with Caltrans 216. Optimum moisture content is the moisture content corresponding to the maximum dry density determined by Caltrans 216.

7.04 QUALITY ASSURANCE
A. Decomposed granite paving shall comply with these specifications and all applicable sections of the above named references and standards.
B. Installation: Performed only by skilled workmen with satisfactory record of performance on completed projects of comparable size and quality.
C. Sample Panel: Before starting decomposed granite paving, provide a sample panel including redwood headers. Build panel at the site of full thickness and approximately 4 feet x 4 feet. Correct and rebuild sample panel until City’s acceptance of the work. Retain panel during construction as a standard for completed paving work.
   1. The approved sample panel may be a portion of the work and remain in place. Location as directed by the City.
D. Do not change source of decomposed granite during the course of the work.

7.05 SUBMITTALS
A. Submit manufacturer’s product data and specifications.
B. Submit the following material samples for the City’s written approval prior to delivery of materials to site, or preparation of sample panel. Provide suppliers sieve analysis with each sample.
   1. Base Course: one-half cubic foot.
2. Surface Course: one-half cubic foot.

C. Submit material certificates for base materials.

7.06 DELIVERY, STORAGE, AND HANDLING

A. Store loose granular materials in a well drained area on a solid surface to prevent mixing with foreign materials.

7.07 PROJECT CONDITIONS

A. Review installation procedures and coordinate paving work with other work affected by decomposed granite paving work. Do not begin the work until installation of trees and boulders is complete.

B. Protect partially completed paving against weather damage when work is not in progress.

C. Provide temporary barricades and warning lights as required for protection of project work and public safety.

D. Protect adjacent work from damage, soiling, or staining during paving operations.

PART 8 - PRODUCTS

8.01 DECOMPOSED GRANITE

A. Base Course: ¾” base rock per State Specifications; color: Tan or buff; California Gold by Felton Quarry, Granite Construction Co., (408) 335-3445.

B. Surface Course: #4 minus Path Fines by Felton Quarry, Granite Construction Co., (408) 335-3445, decomposed granite; color: Tan or buff.

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8.02 BINDER

A. Stabilizer, or equal, available from Lyngso Supplies, Redwood City, CA, (415) 364-1730.

8.03 ACCESSORIES

A. Redwood Headers: C.R.A. Construction Heart California Redwood; rough.

B. Stakes may be Construction Heart Redwood or pressure treated Douglas Fir.

C. Nails: Galvanized.
D. Soil Sterilizer: Granular weed growth inhibiting type herbicide, labeled for use under pavement surfaces. Material shall not damage trees and plant adjacent to pavement surfaces.

PART 9 - EXECUTION

9.01 INSPECTION
A. Examine the substrate under which paving is to be installed. Notify the City, in writing, of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

9.02 LINES AND LEVELS
A. Finished grade of decomposed granite shall be ¼” to ½” below top of existing curb and top of existing walk. Any settlement below this level shall be corrected.
B. Surfaces shall be true to within 1/8” inch when tested in any direction with a 10 foot straightedge. There shall be no pools of water standing on the pavement after a rain.
C. Transition between changes in vertical gradient of walks and paving shall be smooth and gradual with no abrupt or sharp changes.

9.03 WEED CONTROL
A. Apply soil sterilizer over subgrade prior to installing paving in accordance with the manufacturer’s printed instructions.

9.04 BINDER
A. Apply stabilizer to subgrade in accordance with manufacturer’s instructions.

9.05 INSTALLATION
A. Redwood Headers
   1. Install headers true to line and grade as indicated in the Drawings.
   2. Sharp radii may be constructed of laminated material to the thickness of header board indicated on the Drawings.
   3. Stakes shall be a minimum 18 inches long (increase length as necessary per soil conditions for solid anchorage) at 4 feet on center.
   4. Double stake corners and splices.
   5. Securely nail stakes to headers with galvanized nails, 16 penny.

B. Placement and Compaction
   1. General: Uniformly spread approved material and compact to grades and lines shown. Compaction shall be made by power rollers to 90%. Each lift shall be compacted separately immediately after placement. Apply water as required.
   2. Base Course: Place over prepared subgrade, and compact to depth shown. Finish to a tolerance of ±¼”.
   3. Surface Course: Place surface material over base course and compact to depth shown.
4. When surface areas have been rolled and it becomes necessary to add thin layer of material to bring surface to grade, previously rolled or compacted area shall be scarified to provide bond with added material.

5. Finish surface of walks shall be uniform in appearance as to texture and color, and shall have a firm stable consistency, resistant to erosion.

9.06 PROTECTION

A. Restrict traffic from paving surfaces during construction and until final project acceptance by City.

9.07 CLEANING

A. Perform cleaning during installation of work and upon completion of the work. Remove from site all excess materials, debris, and equipment. Repair damage resulting from crushed stone paving operations.

END OF SECTION 32 15 40
IRRIGATION SYSTEM

PART 10 - GENERAL

10.01 RELATED DOCUMENTS
   A. The General and Supplementary Conditions and General Requirements apply to the work herein specified.

10.02 DESCRIPTION
   A. Contractor shall furnish all labor, tools, equipment, product, materials and transportation and perform all operations necessary to properly execute and complete all work in accordance with the Drawings and these Specifications. The intent is to accomplish the work of installing an irrigation system, which will operate in an optimum manner. This intention is to be met foregoing any deficiency in setting a complete detailed description of the work to be done.
   
   B. Related Work Specified Elsewhere:
      1. Section 3290 00: Landscape Planting
      2. Division 15: Mechanical
      3. Division 16: Electrical

10.03 QUALITY ASSURANCE
   A. Reference Standards:
      1. ASTM: American Society for Testing and Materials
      2. NSF: National Sanitation Foundation
   
   B. Drawings:
      1. For purposes of clarity and legibility, drawings are essentially diagrammatic to the extent that many offsets, bend, unions, special fittings, and exact locations of items are not indicated, unless specifically dimensioned.
      2. Exact routing of piping, etc., shall be governed by structural conditions, obstructions. Contractor shall make use of data in Contract Documents.
      3. The contractor shall not willfully install the irrigation system as shown on the drawings when it is obvious in the field that unknown obstructions, grade difference or discrepancies in area dimensions exist that might not have been considered in engineering. Such obstructions or differences shall be brought to the attention of the irrigation consultant. In the event this notification is not performed, the contractor shall assume full responsibility for any revision necessary.

10.04 VISIT TO THE SITE
   A. The contractor shall visit the construction site and shall take all measurements and obtain any other information as may be necessary for a complete and conclusive bid.
10.05 SUBMITTALS

A. Substitutions: Prior to installation, any proposed substitution from the plans or these specifications is to be forwarded, in writing, to the irrigation consultant for approval.

B. Record Drawings: Provide record drawings as follows:
   1. The contractor shall maintain in good order in the field office one complete set of prints of all sprinkler drawings, which form a part of this contract. In the event any work is not installed as indicated on the drawings, such work shall be indicated and dimensioned accurately on record drawings as changes occur. Dimension from two permanent points of reference, building corner, sidewalk, road intersections, etc., the location of the following items.
      a. Connection to existing water lines
      b. Connection of existing electrical power
      c. Routing of pressure lines (dimension max. 100 feet lone along routing)
      d. Electrical control valves
      e. Routing of control wires
      f. Quick-coupling valves
      g. Underground stub-outs
      h. Other related equipment as directed by the irrigation consultant
   2. Upon completion of the work, obtain reproducible mylar from the landscape architect and neatly correct the plans (to be done by a competent draftsperson) to show the as-built conditions. After the as-buils are reviewed and approved by the irrigation consultant, obtain reduced copies of "as-built" mylar (8-1/2" x 11" sheets or to the smallest readable size), and laminate with weather proofing coating.

C. Operation and Maintenance Manuals:
   1. Prior to the final inspection of the irrigation system, furnish two (2) individually bound Service Manuals to the district. The manuals shall contain the following:
      a. Index sheet indicating the contractor's name, address, and phone number.
      b. A copy of the completed guarantee-following the form in these specifications.
      c. Certificate of insurance verifying coverage for completed operations.
      d. List of equipment with names, addresses and telephone numbers of all local manufacturers’ representatives.
      e. Copies of equipment warranties and certificates.
      f. Complete operating and maintenance instructions of all equipment including exploded drawings and spare parts list.
   2. Provide instruction in operation of system to district's personnel.

D. Hardware Items:
   1. Two (2) sets of matching Q.C.V. keys and hose swivels.
   2. Two (2) keys to each controller box.
   3. Two (2) sets of any special tool required for the maintenance of each type of component used in the sprinkler system.

10.06 PROJECT COORDINATION

A. Sequencing and Scheduling: Coordinate irrigation installation work with the installation of other site improvements, including utility installation work and landscape installation.

B. Environmental Conditions: Site work such as trenching and backfilling shall not be performed during wet, muddy or frozen conditions.
C. **Rules and Regulations:** All work and materials shall be in full accordance with the latest rules and regulations of the National Electric Code; the Uniform Plumbing Code and other applicable state or local laws or regulations. Nothing in these drawings or specifications is to be construed to permit work not conforming to these codes.

1. The contractor shall furnish any additional material and labor required to comply with these rules and regulations, though the work is not mentioned in these particular specifications or shown on the drawings.
2. When the specifications call for materials or construction of a better quality or larger size than required by the above mentioned rules and regulations, the provision of the specifications shall take precedence over the requirements of the said rules and regulations.

D. **Safety:**

1. The contractor shall erect and maintain barricades, guards, warning signs, and lights as required for the protection of the public and workmen.
2. All work shall be performed in a safe manner. All regulations, all OSHA requirements and other authoritative agencies shall be followed.
3. Prior to commencement of work, locate all underground utilities so that proper precautions may be taken not to damage such improvements.

E. **Maintaining Traffic:** It is the responsibility of the contractor to ensure adequate protection and controls for pedestrian and vehicular traffic in the vicinity of the project areas. The contractor shall provide all signs, barricades, flagmen, etc., necessary to meet all traffic requirements for this project at his own expense.

F. **Permits and Fees:** The contractor shall obtain all permits and pay all required fees to any governmental agency having jurisdiction over the work and arrange for inspections specified by local ordinances during the course of construction as necessary.

**PART 11 - PRODUCTS**

**11.01 PRODUCT DELIVERY, STORAGE AND HANDLING**

A. Handling of pipe and fittings: The contractor is cautioned to exercise care in handling, loading, unloading, and storing of pipe and fittings. Cracks can occur from sudden impact. Protect all plastic products from excessive exposure to sunlight. Any section of pipe that has been dented or damaged shall be removed from the site and, if installed, shall be replaced with new undamaged piping.

**11.02 MATERIALS**

A. PVC Pressure main line piping and fittings:
   1. Pressure main line piping: 2 ½” and larger: Class 315 PVC pipe. 2” and smaller: 1120-Schedule 40 PVC plastic pipe. Fittings shall be Schedule 40 PVC solvent weld.
   2. Pipe shall be made from NSF approved, Type 1, Grade 1 PVC compound conforming ASTM D1784. All pipe shall meet requirements set forth in ASTM D2441 with an appropriate standard dimension ratio.
   3. All PVC pipe shall bear the following markings:
      a. Manufacturer’s name
      b. Nominal pipe size
      c. Schedule or class
      d. Pressure rating in PSI
      e. NSF
      f. Date of extrusion
4. All fittings shall bear the manufacturer’s name or trademark, material designation, size, applicable I.P.D. schedule and NSF seal of approval.

B. PVC non-pressure lateral line piping and fittings:
1. Non-pressure buried lateral line piping shall be PVC 1120 Class 200 with Schedule 40 PVC solvent-weld fittings.
2. Pipe shall be made from NSF approved, Type 1, Grade 1 PVC compound conforming to ASTM D1784. All pipe shall meet requirements set forth in ASTM D2441 with an appropriate standard dimension ratio.
3. Except as heretofore specified, all requirements for non-pressure lateral line pipe and fittings shall be the same as for solvent-weld pressure main line pipe and fittings as specified.

C. Sleevings and Conduit: Material shall be polyvinyl chloride (PVC) Schedule 40, type 1120/1220 with solvent weld.

D. Galvanized steel pipe shall be Schedule 40; ASTM (A120) and steel fittings shall be Schedule 40 hot dipped, double banded malleable steel.

E. PVC Schedule 80 nipples shall be used with molded threads. Machined threaded nipples will not be allowed.

F. Connections between supply line and R.C.V.’s shall be as specified or detailed on the drawings.

G. Riser assemblies shall be as specified or detailed on the drawings.

H. Controller(s), valves, backflow preventer(s) and sprinkler heads shall be specified and/or detailed on the drawings.

I. Control wires shall be UL approved 2-wire cable manufactured by paige as follow: Cable between controller and decoders shall be paige p7350d 14 awg solid copper jacketed 2-conductor direct burial cable. 2-wire cable between decoders and solenoids shall be paige p7351d dts 14 awg solid copper jacketed 2-conductor direct burial cable.

J. Miscellaneous installation materials:
1. Solvent weld joints shall be of make and type approved by manufacturer(s) of pipe and fittings. Solvent cement shall be a proper consistency throughout use. Mixing thinner with solvent will not be allowed.
2. Pipe joint compound shall be non-hardening, non-toxic materials designed specifically for use on threaded connections in water carrying pipe.
3. Wire connections shall be 3M DBY-6 seal packs or approved equal.

K. Control or Valve Boxes:
1. Provide 14 x 19 inch plastic rectangular control valve box with bolt down plastic lid for each electrical control valve. Hot stamp or permanently engrave irrigation controller station number onto valve box lid.
2. For gate valves and quick coupling valves: Use 9-inch plastic round box. Add extensions for gate valves as required. Hot stamp or permanently engrave “GV” for gate valve and “QCV” for quick coupler valves onto valve box lid.

PART 12 - EXECUTION

12.01 GENERAL

A. Irrigation system shall be installed in accordance with all applicable local and state codes and ordinances by a licensed landscape contractor.

B. Follow manufacturer's direction except as shown or specified.
12.02 **INSPECTION OF SITE CONDITIONS**

A. All scaled dimensions are approximate. The contractor shall check and verify all size dimensions prior to proceeding with work under this Section.

B. Exercise extreme care in excavating and working near existing utilities. Contractor shall be responsible for damages to utilities, which are caused by his operations or neglect. Check existing utilities drawings for existing utility locations.

C. Coordinate installation of irrigation materials, including pipe, so there shall be no interference with utilities or other construction or difficulty in planting trees, shrubs, and groundcover.

D. Avoid trenching within drip line of trees where possible. When not possible, all damaged roots over 1-1/2” in diameter shall be cut leaving clean face, seal cuts with tree seal, then immediately install pipe, wire, etc., refill trench and soak.

E. The contractor shall carefully check all grades to satisfy himself that he may safely proceed before starting work on the irrigation installation.

F. Coordinate the work of this Section with that of other Sections for the location of pipe sleeves through walls, paving, etc.

G. The landscape contractor shall verify water pressure and available gallonage prior to construction. If deficiencies are noted that will hinder the system's performance, notify the irrigation consultant for directions to correct deficiencies.

H. The design is diagrammatic. All piping, valves, etc., shown within paved areas is design clarification only. Install piping, valves, etc., in planting areas.

12.03 **PREPARATION - LAYOUT OF WORK**

A. Prior to installation, stake out all pressure supply lines, routing and location of sprinkler heads and notify irrigation consultant for reviewing layout when area or grade differences or obstructions are not as indicated on the plans.

12.04 **INSTALLATION**

A. Trenching:
   1. Dig trench straight and support pipe continuously on bottom of trench. Lay pipe to an even grade. Trenching excavation shall follow layout shown on drawings.
   2. Provide for a minimum of 18 inches cover for all pressure supply lines.
   3. Provide for a minimum cover of 12 inches for all non-pressure lines to spray heads.
   4. Provide for a minimum cover of 18 inches for all control wiring.
   5. Provide a minimum cover of 24 inches over pipe and wiring under asphalt pavement.

B. Backfilling:
   1. Do not backfill trenches until all required tests are performed. Carefully backfill trenches with specified excavated materials for backfilling, consisting of earth, loam, sandy clay, sand, or other acceptable materials, free from large clods of earth or stones. Backfill shall be mechanically compacted in landscaped areas to a dry density equal to adjacent undisturbed soil in planting areas. Backfill shall conform to adjacent grades without dips, sunken areas, humps or other surface irregularities.
   2. Surround pipe with sand in rocky terrain with a 4” bed and 4” cover.
   3. Backfill in proposed asphalt paved areas shall have sand covering pipe with a 6” minimum depth.
C. Pipe and Fitting Installation and Connections:
   1. Provide each assembly with its own outlet.
   2. Install all assemblies specified herein in accordance with details shown on drawings.
   3. Thoroughly clean PVC pipe and fittings of dirt, dust and moisture before installation. Installation and solvent welding methods shall be as recommended by the pipe and fitting manufacturer.
   4. On PVC to metal connections, the contractor shall work the metal connections first. Use Teflon tape, or equal, on all threaded PVC to PVC, and on all threaded PVC to metal joints.
   5. Install piping under existing walks by boring whenever possible. Where any cutting or breaking of sidewalks and/or concrete is necessary, it shall be done and replaced at no increase in contract sum. Obtain permission to cut or break sidewalks and/or concrete from the architect before proceeding. No hydraulic driving will be permitted under concrete paving.

D. Line clearance:
   1. All lines shall have a minimum clearance of 6 inches from each other and from lines of other trades. Parallel lines shall not be installed directly over one another.

E. Automatic Controller(s):
   1. Locate controller(s) in general location(s) shown with exact placement to be determined at job site by the irrigation consultant or District’s Representative.
   2. Connect control lines to controller(s) in sequential arrangement according to assigned identification number on plans.
   3. Controller(s) shall be properly grounded per Article 250 of the National Electric Code and conform to local regulations.

F. Remote Control Valves:
   1. Install where shown on drawings. When grouped together, allow at least 12 inches between valves. Install each remote control valve in a separate valve box. Locate boxes in groundcover areas whenever possible, and a minimum of 12 inches from paving or curbs.

G. Control Wiring:
   1. Make connections between existing automatic controls and electrical control valves with direct burial copper wire as specified. Install in accordance with valve manufacturer's specifications and wire charts.
   2. Wiring shall occupy the same trench and shall be installed along the same route as pressure supply or lateral lines wherever possible. House all wiring in PVC conduit as described in "Sleeving and Conduit" section.
   3. Provide 2-foot expansion coil at each wire connection and at least every 100 feet of wire length on runs more than 100 feet in length. Form expansion coils by wrapping at least five turns of wire around a 1-inch diameter pipe, then withdrawing the pipe.
   4. Splicing on runs shall be placed in junction boxes. Indicate all splices on the As-Built Plan.

H. Sleeving and Conduit:
   1. Control wiring passing under proposed concrete and paving shall pass through Schedule 40 PVC conduit-size as required.
   2. Sleeving and conduit shall extend six (6”) beyond farthest edge of pavement or curb.
   3. Provide removable non-decaying plug at ends of sleeves and conduits to prevent entrance of earth.

I. Flushing of System:
   1. After all new pipelines and risers are in place and connected, all necessary diversion work has been completed, and prior to installation of sprinkler heads, open control valves and use a full head of water to flush out the system.
   2. Install sprinkler head only after flushing of system has been accomplished.
J. Sprinkler Heads:
1. Install sprinkler heads as shown on Drawings.
2. Spacing of heads shall not exceed maximum shown on Drawings. In no case shall spacing exceed maximum recommended by manufacturer.

12.05 FIELD QUALITY CONTROL

A. Adjustment of the System:
1. Flush and adjust all sprinklers for optimum performance and to prevent overspray onto walks, roadways and buildings.
2. If it is determined that adjustments in the irrigation equipment will provide proper and more adequate coverage, the contractor shall make such adjustments prior to planting. Adjustments may also include changes in nozzles sizes and degrees of arc as required.

B. Testing of Irrigation System:
1. Notify the irrigation consultant at least three (3) days in advance of testing.
2. Test to be done at no extra cost to the District.
3. Center load piping with sufficient amount of backfill to prevent arching or slipping under pressure. No fitting shall be covered.
4. Testing of pressure main lines shall occur prior to installation of electrical control valves.
5. Pressure Test for Solvent Weld Pipes:
   a. Apply test for solvent welded plastic pipe after joints have cured at least 24 hours or more it manufacturer of solvent cement requires.
   b. Test supply lines per ASTM-F690 as follows: (1) add water slowly to pipe to avoid water hammer damage, (2) bleed system to insure all air is out of pipes, (3) pressurize system to 125 psi for two (2) hours. Visually inspect for leaks while system is holding pressure constant. Note – use hydraulic pump or other safe method – do not use air compressor.
   c. Test sprinkler lines at line pressure and visually inspect for leaks.
6. When the irrigation system is completed, perform a coverage test to determine if the water coverage for planting areas is complete and adequate. Furnish all materials and perform all work required to correct any inadequacies of coverage due to deviation from drawings. This test shall be accomplished before any plant material is planted.
7. Upon completion of each phase of work, test and adjust entire system to meet site requirements.

12.06 CLEAN-UP

A. Clean-up shall be made as each portion of work progresses. Refuse and excess dirt shall be removed from the site, all walks and paving shall be broomed or washed down, and any damage sustained on the work of others shall be repaired to original conditions.

12.07 FINAL REVIEW PRIOR TO ACCEPTANCE

A. Operate each system in its entirety at time of final review. Any items deemed not acceptable shall be reworked to the satisfaction of the irrigation consultant.

B. Final review shall take place after submission of all specified lists, record drawings, and manuals.

12.08 INSPECTIONS

A. The contractor shall be subject to inspections at any and all times by authorized representatives of the District.
12.09 MAINTENANCE

A. The contractor is to make all repairs and maintain the entire sprinkler system from the time of installation through the landscape maintenance period.

12.10 WARRANTY

A. The contractor shall repair or replace any irrigation found to be defective in material or workmanship within the entire sprinkler system from the time of installation through the warranty period, as outlined in the Guarantee form provided in these specifications.
WE HEREBY GUARANTEE THAT THE SPRINKLER IRRIGATION SYSTEM WE HAVE FURNISHED AND INSTALLED IS FREE FROM DEFECTS IN MATERIALS AND WORKMANSHIP, AND THE WORK HAS BEEN COMPLETED IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS. WE AGREE TO REPAIR OR REPLACE ANY DEFECTS IN MATERIAL OR WORKMANSHIP, ANY SETTLING OF BACKFILLED TRENCHES, WHICH MAY DEVELOP DURING THE PERIOD OF ONE YEAR FROM DATE OF ACCEPTANCE AND ALSO TO REPAIR OR REPLACE ANY DAMAGE CAUSED BY ANY DEFECTS IN THE IRRIGATION SYSTEM OR RESULTING FROM THE REPAIRING OR REPLACING OF SUCH DEFECTS AT NO ADDITIONAL COST TO THE DISTRICT. ORDINARY WEAR AND TEAR, UNUSUAL ABUSE OR NEGLECT ARE EXCEPTED. WE SHALL MAKE SUCH REPAIRS OR REPLACEMENTS, INCLUDING COMPLETE RESTORATION OF ALL DAMAGED PLANTING, PAVING, OR OTHER IMPROVEMENTS OF ANY KIND, WITHIN A REASONABLE TIME, AS DETERMINED BY THE DISTRICT, AFTER RECEIPT OF WRITTEN NOTICE. IN THE EVENT OF OUR FAILURE TO MAKE SUCH REPAIRS OR REPLACEMENTS WITHIN A REASONABLE TIME AFTER RECEIPT OF WRITTEN NOTICE FROM THE DISTRICT, WE AUTHORIZE THE DISTRICT TO PROCEED TO HAVE SAID REPAIRS OR REPLACEMENTS MADE AT OUR EXPENSE AND WE WILL PAY THE COSTS AND CHARGES THEREFORE UPON DEMAND.

PROJECT: ____________________________________________________________

LOCATION: __________________________________________________________

CONTRACTOR: _______________________________________________________

LICENSE NO: _________________________________________________________

ADDRESS: __________________________________________________________

TELEPHONE: _________________________________________________________

GUARANTEE TO: _______________________________________________________

___________________________________________________________

DATE OF ACCEPTANCE: ______________________________________________

AUTHORIZED REPRESENTATIVE: _______________________________________

END OF SECTION 32 84 00
PART 13 - GENERAL

13.01 DESCRIPTION

A. Work Included: Furnish all labor, materials, equipment, rentals, facilities, transportation, excavations, and services for installation of plant material (trees, shrubs, seed, ground covers, and plant labels) and related work as shown on the drawings and/or specified herein including plant materials, maintenance, warranties and all other materials incidental to planting work and as necessary for a complete and full installation of Landscape Planting.

B. Related Work:
   1. Section 32 84 00 Irrigation System: Irrigation system shall be installed and operative before beginning planting operation.
   2. Storm Drainage Utilities: Contractor shall fully acquaint himself with the existing conditions particularly in reference to underground piping. Any damage caused by the Contractor to work of other trades shall be repaired by him at no cost to the District.
   3. Section 32 91 13 – Bay-Friendly Landscape Soil Preparation
   4. Section 01 78 19 – Bay Friendly Landscape Maintenance
   5. Appendix A: Bay Friendly Landscape Maintenance Specifications.

13.02 RELATED DOCUMENTS

A. The General and Supplementary Conditions and General Requirements apply to the work herein specified.

B. References:
   1. Manufacturer's recommendations.
   4. Staking and guying procedures: "Staking Landscape Trees", University of California Extension, Publication #2576, or current publication.

13.03 REGULATORY Requirements

A. Conform to all federal, state, district, local codes and requirements for installation, preparation and maintenance as referenced herein and as applicable.

B. Certificates of inspection required by law for transportation shall accompany invoice for each shipment of plants. File copies of certificates with District’s Representative after acceptance of material. Inspection by Federal or State Governments at place of growth does not preclude rejection of plants at project site.
13.04 PERFORMANCE REQUIREMENTS

A. Supervision: Assign a full-time employee to the job as Foreman for the duration of the Contract with a minimum of three (3) years experience in landscape installation. Foreman shall be listed as an active member of Bay Friendly Qualified Contractors and be present during the entire installation. Notify District’s Representative of all changes in supervision.

13.05 QUALITY ASSURANCE

A. Personnel:
1. All planting and turf work shall be performed by competent and efficient personnel familiar with planting and turf procedures under the supervision of a Qualified Foreman.
2. Installing contractor shall have successfully completed within the last 3 years at least 3 planting applications similar in type and size to that of this project.

B. Plant Material Standards:
1. Plant Certification: All plants must meet specifications of Federal, State, and County laws requiring inspection for plant disease and insect infestations. Inspection certifications required by law shall accompany each shipment, invoice and order for stock.
3. Use only nursery-grown stock that is free from insect pests and diseases. Any required clearances shall be obtained prior to shipment of plant material.
4. Plants shall be subject to inspection and approval of the Landscape Architect at place of growth or upon delivery for conformity to specifications. Such approval shall not impair the right of inspection and rejection during progress of the work. Wherever the terms "approve", "approval" or "approved" are used herein they mean approval of the Landscape Architect in writing.
5. Contract Grown Plants: Contract grown plant material does not relieve the landscape contractor of providing materials which do not match or exceed standard nursery stock. Plants which do not meet standards shall be rejected and the Contractor shall provide nursery grown stock as required at no additional cost to the District or contract.

13.06 SUBSTITUTIONS

A. Substitutions:
1. Substitutions of plant materials will not be permitted unless authorized in writing by District's Representative. 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. Such proof shall be substantiated and submitted in writing to District's Representative.
2. The Contractor shall submit a list of un-available plants and a list of all nurseries and plant brokers contacted a maximum of 15 days after Notice to Proceed.
3. The Landscape Architect reserves the right to require the Contractor to replace at the Contractor's cost any plants which the Contractor has installed without the Landscape Architect's approval.

13.07 Proof of plant availability

A. 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. Contractor shall secure all material and provide proof of such within 30 days of Notice to Proceed in order to guarantee plant availability at time of planting.
B. Payment for procurement of plant material, including possible incidentals such as storage and maintenance at nursery after purchase or contract growing plants, is the full responsibility of the Contractor.

13.08 SUBMITTALS

All submittal data shall be forwarded in a single package to the District's Representative within 30 days of Notice to Bid.

A. Contractor Foreman Bay Friendly Qualification.

B. Furnish 6 copies of manufacturers' literature for the following items:
   1. Plant Supplier’s List
      Submit documentation to the District's Representative within 60 days of proposed installation that all plants listed on the plans have been ordered. Substitution of size or species due to unavailability must be requested in writing within 30 days of proposed installation.
   2. Turf Sod
   3. Tree Support Poles/Tree Guying
   4. Tree ties
   5. Erosion Control Netting
   6. Root Control Barrier

13.09 SELECTION AND TAGGING OF PLANT MATERIAL

A. Contractor shall select and tag all plant material within 30 days of Notice to Proceed. Plant material which is not available, or not possible to contract grow shall be noted to the Landscape Architect within 15 days of Notice to Proceed so substitutions may be selected. Contractor shall source material from out of state or thru a plant broker if not locally available. Contractor shall submit lists of all nurseries and plant brokers contacted for availability.

B. Plants shall be subject to inspection and approval by the Landscape Architect at place of growth or upon delivery for conformity to specifications. Such approval shall not impair the right of inspection and rejection during progress of the work. Wherever the terms "approve", "approval" or "approved" are used herein they mean approval of the Landscape Architect in writing. Plants which are contract grown shall meet or exceed all nursery standards for health and size. Plants which do not meet standards shall be rejected and the Contractor shall provide nursery grown stock as required at no additional cost to the contract.

13.10 PROJECT SITE CONDITIONS

A. Site Visit: At beginning of work, visit and walk the site with the District's Representative to clarify scope of work and understand existing project site conditions. Identify location of utilities and other improvements. Notify District's Representative of conflicts prior to start of work for resolution.

B. Access: Inspect Project site and become familiar with the accessing requirements and restrictions. At time of submitting bid, provide written notice of any conditions that would prevent installation of the specified plant material.

13.11 JOB CONDITIONS

A. Delivery:
   1. Deliver plants with identification labels.
      a. Labels should state correct name and size.
b. Use durable, water-proof labels with water resistant ink that will remain legible for at least 60 days.

2. Protect plant materials during transport to prevent damage to rootball or desiccation of leaves.
3. Remove unacceptable plant materials immediately from job site.

B. Storage:
1. Maintain plant material in healthy growing condition at all times. Protect plants from drying winds, vandals and animals. Keep plants that cannot be installed immediately in the shade, if shade plants and in the sun, if sun plants. Water and feed as necessary. District's Representative reserves the right to reject plants that decline in quality after delivery to site.

C. Timing: Under no circumstances shall any work be performed if the temperature exceeds 90 degrees or is below 40 degrees.

D. No planting shall be done with the soil saturated with water.

13.12 PROTECTION OF EXISTING PLANTS TO REMAIN
A. Do not store materials or equipment, permit burning, or operate or park equipment under the branches of any existing plant to remain except as actually required for construction in those areas.

B. Provide barricades, fences or other barriers as necessary at the drip line to protect existing plants to remain from damage during construction.

C. Notify District's Representative in any case where Contractor feels grading or other construction called for by Contract Documents may damage existing plants to remain.

D. If existing plants to remain are damaged during construction, Contractor shall replace such plants of the same species and size as those damaged at no cost to District. Determination of extent of damage and value of damaged plant shall rest solely with District's Representative.

PART 14 - PRODUCTS

14.01 GROUNDCOVERS, TREES, AND SHRUBS
A. All plant materials shall be nursery grown in accordance with the best known horticulture practices and under climatic conditions similar to those in the locality of the project. Container stock shall have grown in the containers in which delivered for at least six (6) months, but not over two years. No container plants that have cracked or broken balls of earth when taken from container shall be planted except upon special approval by District’s Representative.

B. Plants shall be vigorous and shall have a normal habit of growth. Plants shall be free of damage by insects, pests, diseases or wind; burns from insecticides or fertilizer; and stunted growth due to lack of water, lack of food, diseases, or other causes. Plants shall be in conformity with the sizes shown on the drawings.

C. Trees:
1. All trees shall have straight trunks of uniform taper, larger at the bottom. Trunks shall be free of damaged bark, with all minor abrasions and cuts showing healing tissue. Sucker basal growth and sucker lateral growth shall be removed and treated to eliminate resprouting. Normal lower side branching shall remain. Trees unable to stand upright without support shall be rejected.
2. All old abrasions and cuts are acceptable only if completely callused over.

D. Quantities: The quantities shown on the plant list and in labels are for the Engineer’s use and are not to be construed as the complete and accurate limits of the contract. Contractor shall furnish and install all plants
shown schematically on the drawings. Any unlabelled plants shall be considered as the smaller size shown for that type on the drawings.

E. Root Systems:
1. All shrubs and trees shall have a normal root system
2. Contractor shall be responsible for inspection of all root systems on plant materials. Inspection shall include, but not be limited to, checking for rootbound stock, encircling roots at the perimeter of the container, girdling roots at the top surface of the rootball, and other defective root conditions. Such inspections shall include the complete removal of soil from one percent of plant material containers, or at least one plant from each nursery and each plant type. Contractor shall cut defective or potentially defective girdling, rootbound, and encircling roots and spread the root system into the surrounding backfill. Plants with excessively defective root systems shall be rejected by the Contractor.
3. In case of any unsatisfactory root system, a total group of plants may be rejected.

F. Untrue Species: All plant materials, with two years following the final acceptance of the project, determined by the District’s Representative to be untrue to the species, clone, and/or variety specified, shall be replaced by the Contractor, to the equal condition of adjacent plants at the time of replacement.

14.02 Turf SOD
A. Sod shall be one year old and dense with grass, having been mowed at 1 in. height before lifting from field. All grown on fumigated soil. Sod shall be in vigorous condition, dark green in color, free of disease and harmful insects. Sod shall be Medallion Dwarf with Bonsai by Pacific Sod 800-942-5296, or approved equal.

14.03 TREE SUPPORT POLES
A. Peeled, lodge pole pine logs, treated with Chemonite or ACQ or approved equal, clean, smooth, new, and sized as follows:
  1. Three inch (3") diameter by ten (10') long for trees greater than 8 feet high and 1 inch caliper.

14.04 Tree TIES
A. Flexible strap, 24 inch minimum length without sharp edges adjacent to trunk, V.I.T. cinch-ti, or approved equal.

14.05 EROSION CONTROL NETTING
A. New, with a uniform, open plain-weave, flame-retardant mesh. The mesh shall be [natural brown-tan] and made from unbleached single jute yarn. The yarn shall be of loosely twisted construction and shall not vary in thickness by more than one-half its normal diameter. Furnish jute mesh in rolled strips to meet the following requirements:
  1. Width: 48 inches, with tolerance of one-inch wider or narrower.
  2. Not less than 78 warp ends per width.
  3. Not less than 41 weft ends per yard.
  4. Weight shall average 1.22 pounds per liner yard, with tolerance of 5 percent heavier or lighter.

B. Install jute mesh loosely up and down the slope in accordance with manufacturer’s specifications and as follows. Fit the soil surface contour and hold in place with 12 inch long, 11-gauge (minimum) steel wire staples driven vertically into the soil at 18-24 inch spacing. Jute mesh strips shall overlap along all edges at least 6 inches. Ends of side stripes shall be buried into the soil at least 6 inches. Drive staples along to securely anchor mesh to ground.
14.06 ROOT CONTROL BARRIERS

A. Deep Root Model UB 24-2, Deep Root (415) 344-1464. Root barrier shall be used on all trees 5’ or closer to pavement, utilities, curbs, etc. Or approved equal.

14.07 Vine ties:

A. For vines that require supports in order to climb, install anchor bolts with 11-gauge galvanized steel wires on structure in configuration approved by District's Representative. Train vine branches to supports with using biodegradable jute twine. Fasten twine loosely to allow for vine growth.

14.08 Water Source

A. Irrigation Water source shall be provided by the District. Contractor shall provide transport of additional supply if required.

PART 15 - EXECUTION

15.01 General

A. Planting shall not occur while the soil is wet.

B. Protection of Plants: Contractor shall maintain all plant materials in a healthy growing condition prior to and during planting operations. Contractor shall be responsible for vandalism, theft and damage to plant material until the commencement of the maintenance period.

15.02 SURFACE CONDITIONS

A. Inspections by the Landscape Contractor:
   1. Before proceeding with the work: Carefully inspect all areas and verify all dimensions and quantities.
   2. In the event of discrepancy, immediately notify the District's Representative. Do not proceed with this installation in areas of discrepancies until all such discrepancies have been fully resolved.
   3. Planting operations shall be performed only during periods when beneficial results can be obtained. When excessive moisture or other unsatisfactory conditions prevail, the work shall be stopped until conditions are satisfactory.
   4. Inspect trees, shrubs and ground cover plants for injury, insect infestations, and proper pruning.
   5. General contractor shall coordinate rough grading of site to ensure the Landscape Contractor shall receive all planting areas graded to ±0.10 ft. of finish grades shown on the Drawings. Allow for depth of soil amendments and mulch in determining the difference between finished subgrade in groundcover and shrub beds. Verify that subgrades are not compacted. Do not proceed until detrimental conditions are corrected. Contractor shall take precautions during the excavation of all planting areas to not undermine or damage all adjacent pavements, footings and their associated subgrades.

15.03 FIELD QUALITY CONTROL/inspections

A. Progress observations: In addition to the installation observations specified below, the District's Representative may make periodic progress observations.

B. Notification: The Contractor shall notify the District’s Representative a minimum of 72 hours before requiring a visit by the District’s Representative or his duly appointed representative to the site.
C. Installation observations:
1. Observation of plant material upon delivery to site.
2. Observation of layout and placement of plant material at time of planting.
3. Observation of any planting drainage problems, as identified by Contractor.

The above shall be considered check points and the Contractor shall only proceed with the work after the District's Representative has visited the site and determined that the work is proceeding satisfactorily.

D. Maintenance Observations: For the purpose of establishing the start of Maintenance Period and observing completion of the Work of this Section through Final Acceptance. **Request at least 7 working days in advance:**

1. Observation for Maintenance Period commencement.
   a. A check visit shall be made to begin the maintenance period. At this time the Contractor shall have completed all phases of the Plans and Specifications. Any discrepancies shall be noted at that time and the Contractor shall make appropriate corrections before the acceptance of the work.

2. Observation for Final Acceptance.
   a. A conference including the District shall be held at the completion of the work, provided that all deficiencies brought out in the check visit which began the maintenance period have been corrected by this time. The Contractor shall continue to maintain the project at his own expense until all deficiencies have been corrected, at which time the Contractor shall request the District’s Representative to visit the site and approve the project as complete. The District’s Representative will accept the landscape project in writing. The date of the acceptance letter shall be the first day of the guarantee period.
   b. Should it be determined at the Final Inspection or Final Acceptance visit that any punchlist item is incomplete, any further review of the site will be terminated until all items are guaranteed, in writing, to be complete by the Contractor. The cost of additional site visits by the District’s Representative to verify completion of work shall be paid for by the Contractor.

15.04 **SOIL PREPARATION**

A. Refer to Specification Section 02920 – Landscape Soil Preparation

15.05 **HANDLING OF PLANTS**

A. Prevent damage to plant material. Lift and handle plants only from bottom of rootball.

B. Do not plant material that has not been reviewed by District's Representative upon delivery to the project site, or that has been rejected for any reason. Do not plant under unfavorable weather conditions.

C. The Contractor shall protect all utilities, vegetation, and structures during work.

D. Trees shall be located a minimum of 3’ from walls, overheads, walks, headers, and other trees within the project. If conflicts arise between size of areas and plans, Contractor shall contact District’s Representative for resolution. Failure to make such conflicts known to the District's Representative will result in Contractor's liability to relocate the materials.

15.06 **Percolation Testing:**
1. Contractor shall verify water drainage of all planting pits with a percolation test prior to planting.
2. Fill full sized planting pit with water and observe in 24 hours.
3. Notify District's Representative if planting pit has not fully drained before proceeding with the planting operation for all areas not draining, and all soil conditions considered detrimental to growth of plant material. State condition, and proposal and cost estimate for correcting the condition.

4. Obtain District's Representative's instructions prior to proceeding with work affected.

5. Repeat drainage testing and correction of conditions until tests are passed.

6. Failure to perform drainage tests, or to notify District's Representative in writing of conditions specified above, renders Contractor responsible for all plant failure that occurs as a result of inadequate drainage or detrimental soil conditions, as determined by District's Representative.

15.07 SHRUBS AND TREES

A. Excavation:

1. Excavate container grown tree, shrub, groundcovers and vine pits as follows. If rocks, underground construction work, tree roots or other unknown obstructions are encountered in the excavation of plant holes; District's Representative may select alternate locations. Report all such conditions in writing to the District's Representative. Where locations cannot be changed, submit a written proposal and cost estimate for removing the obstructions to a depth of not less than 6 inches below the required hole's depth. Obtain District's Representative's instructions prior to proceeding with the work affected.

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<tr>
<th>Excavation for</th>
<th>Width</th>
<th>Depth</th>
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<tr>
<td>Boxed Trees</td>
<td>Box + 24&quot;</td>
<td>Box + 12&quot;</td>
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<tr>
<td>Canned Trees/Shrubs (15 gal) or larger</td>
<td>Can + 24&quot;</td>
<td>Can + 12&quot;</td>
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<tr>
<td>Canned Shrubs/Vines (2.5 to 5 gal)</td>
<td>Can + 18&quot;</td>
<td>Can + 8&quot;</td>
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<tr>
<td>Canned Shrubs/Groundcover/Vines (1 gal)</td>
<td>Can + 12&quot;</td>
<td>Can + 6&quot;</td>
</tr>
</tbody>
</table>

2. All plant pits shall be dug with vertical walls. The sides and bottoms of all planting pits shall be thoroughly scarified to ensure root penetration.

B. Planting:

1. Center plant in pit or trench over tamped mound.
2. Face for best effect.
3. Set plant plumb and hold rigidly in position.
4. All plants shall be set in the ground so that the root ball will be flush with the finish grade. All plants that settle below the finish grade within 30 days of acceptance of the work shall be replanted in the proper position. In case a total section of planting area settles, the Contractor shall lift the plants, import additional soil mix, regrade, and replant, at no additional cost to the District.
5. Add plant tabs per Specification Section 32 91 13 Bay-Friendly Landscape Soil Preparation.
7. Sheet Mulch per Specification Section 32 91 13 Bay-Friendly Landscape Soil Preparation.
8. Apply post-planting organic fertilizer, per soils report.
9. Planting operation for plants in raised concrete planters is same as above except that finish grade of soil mix shall be 1 1/2" below top of planter walls. Planters may be backfilled with excess topsoil up to the depth specified for plant pits above which backfill shall be soil mix.

C. Plants in Containers:

1. Plants shall be removed carefully from their containers after the containers have been cut on two sides minimum; fifteen-gallon containers shall be opened in three places. In the case of boxed plant specimens, the wood shall be removed at the sides and at the bottom of the box.
2. After removing plant material from its container, stimulate root growth by making four or five vertical cuts 1" deep around the circumference of the root ball.
3. Do not lift or handle plants by the top, stems, or trunk at any time. All plants shall be lifted in such a manner that the root ball is supported from the underside.

4. The Contractor shall check all plants for adequate root systems. If the root system is defective, he shall remove deficient plants from the site and replace them with new ones.

15.08 GROUNDCOVER AREAS

A. Planting:
1. Space plants equally and uniformly at spacing indicated on the Drawings, which are the maximum and in a triangular pattern.
2. Plant pits shall be sufficiently large so that the root can be freely suspended in the pit. After backfilling the pit, firm the soil so that there will be no air space around the roots.
3. Add plant tabs per Specification Section 32 91 13 Bay-Friendly Landscape Soil Preparation.
5. Sheet Mulch per Specification Section 32 91 13 Bay-Friendly Landscape Soil Preparation.
6. Apply post-planting organic fertilizer, per soils report.

15.09 turf SOD

A. Inspection:
1. Upon the completion of the placing of the soil and prior to placing sod, the Contractor shall call for an inspection of the turf irrigation system. The sod shall be placed after the District's Representative has satisfied himself that the irrigation system is operating satisfactorily and finish grade is in accord with the Drawings.

B. Laying Sod:
1. Remove all rubble, sticks, rocks and stones 1" or larger from top 2" amended soil.
2. Arrange for delivery of sod in the morning to insure same-day installation.
3. Lightly roll surface and re-shape to level humps and hollows. Secure District's Representative's approval prior to sodding. Do not sod on dry soil.
4. Lay first strip of sod along a straight line (use a string in irregular areas). Butt joints tightly, do not overlap edges. On second strip, stagger joints. Use a sharp knife to cut sod to fit curves, edges and sprinkler heads. When a conveniently large area has been sodded, water lightly to prevent drying. Continue to sod and to water until installation is complete. Lay sod without stretching. Stagger end seams and butt edges as close as possible to each other. Roll with sod roller perpendicular to direction it was laid.
5. After laying all sod, roll lightly to eliminate irregularities and to form good contact between sod and soil. Avoid a heavy roller and excessive initial watering.
6. Thoroughly water the completed sod surface to at least 8 inches deep. Repeat sprinkling at regular intervals to keep sod moist at all times until rooted. After sod is established, decrease frequency and increase amount of water per application.
7. Protect turf areas by erecting fences, barriers and signs necessary to prevent trespass. Keep barriers neat and well maintained.
8. Apply post-planting fertilizer.

C. At the time of final inspection the turfs shall be dense, green, and weed free. It is the Contractor's responsibility to eliminate any bare spots, dead areas and weeds.
15.10 TREE STAKING

A. All trees shall be staked as drawn with stakes driven securely into existing soil aligned with the trunk and perpendicular to the direction of the prevailing winds. Remove excess stake protruding above top tree tie to prevent rubbing against branches. Allow 1 to 3 inches sway in trunk or branches.

B. A minimum of two figure-eight tree ties required per stake as shown on plans. Do not pull tight.

C. Tying: Find the proper support height by holding the trunk in one hand and pulling the top to one side and releasing it. The lowest height, at which the trunk will return to the upright position when the top is released, is the height at which to attach tree ties.

15.11 VINE ATTACHMENT

A. Remove nursery stake from vine. Gently unravel twisted or knotted branches. Locate screw eyes, if required, or as directed by District's Representative and string wire tightly between screw eyes. Fasten vines loosely but securely to support with biodegradable jute twine. Untwine leaves and distribute across walls or wrap around posts as appropriate.

15.12 EROSION CONTROL NETTING

A. Install jute mesh loosely up and down the slope in accordance with manufacturer's specifications and as follows. Fit the soil surface contour and hold in place with 12 inch long, 11-gauge (minimum) steel wire staples driven vertically into the soil at 18 - to 24 inch spacing. Jute mesh strips shall overlap along all edges at least 6 inches. Ends of side strips shall be buried into the soil at least 6 inches. Drive staples along edges to securely anchor mesh to ground.

15.13 ROOT GUARD

A. Install as detailed and as specified below. If not shown, install in accordance with manufacturer's recommendations. Excavate an additional 12 inches below the proposed bottom edge of tree root barrier, then compact this space with the original excavation materials. Install the panels so that the vertical root deflecting ribs on the panels face inward, toward the root ball. The double top edge of the barrier should be positioned flush with finished grade. Install root barrier as indicated and at locations on drawings.

B. Install root control barrier for all trees located within 5 feet-0 inches of paved areas, in accordance with manufacturer's recommendations.

C. Root Barrier shall be installed in a linear fashion and shall never circle a tree.

15.14 PRUNING

A. Tree and Shrub: Pruning shall be performed as required to maintain a natural appearance, promote healthy and vigorous growth, and eliminate diseased or damaged growth.

B. Trees shall be pruned to thin crown and avoid wind damage, eliminate narrow V-shaped branch forks that lack strength, eliminate sucker growth, and maintain a radial branching pattern to avoid crossing branches.

C. Under no circumstances will stripping of lower branches ("raising-up") of young trees be permitted. Lower branches shall be retained in a "tipped back" or pinched condition with as much foliage as possible to promote caliper trunk growth (tapered trunk).
D. Major pruning of trees to compensate for root loss or for aesthetic reasons shall be done only with approval of the District’s Representative.

E. Shrubs shall not be clipped into balled or boxed forms, unless such is required by the design and directed by the District’s Representative.

F. All pruning shall be made flush to lateral branches, buds, or trunk. "Stubbing" will not be permitted.

G. Damage: All cuts over 1" resulting from pruning or wind breakage shall be inspected periodically for insect infestation or disease.

15.15 WATERING

A. Water all trees, shrubs and ground cover immediately after planting. Apply water to all plants as often and in sufficient amount as conditions may require to keep the plants in a healthy vigorous growing condition until completion of the Contract. Do supplemental hand watering of trees and shrubs during the first 3 weeks of plant establishment as necessary.

15.16 CLEAN UP

A. Keep all areas of work clean and neat at all times. Upon completion of planting, all cans, boxes, and other debris that is a part of the planting operation shall be removed from the site.

B. All pavements shall be washed off, and site shall be left in an absolutely clean condition. All planting areas shall be cultivated and weed free before final inspection. Clean-up operations shall take place throughout the course of work so that walks and drives are clean at all time.

15.17 MAINTENANCE

A. Contractor shall furnish all labor, material, equipment, and services required to maintain the landscape in a healthy and attractive condition for a period of 60 days.

B. Maintenance shall include fertilization, watering, insect and disease control (IPM), and weed control using IPM, weekly trash removal, mulching, restaking trees, tightening of guys, resetting plants to proper grades or upright position, and restoration of watering basins. Refer to Bay Friendly Landscape Specifications, Appendix A.

C. Synthetic chemical pre-emergent are prohibited. Chemical controls are applied only when monitoring indicates that preventative and non-chemical methods are not effective forms of weed control. When pesticides are required, the least toxic and the least persistent pesticide shall be applied.

D. Maintenance period shall not start until all elements of construction, planting, and irrigation for the entire project are complete. Project will not be segmented into maintenance phases, unless specifically authorized in writing by the District's authorized representative.

E. The Contractor shall request an inspection to begin the plant maintenance period after all planting and related work has been completed in accordance with the Contract documents. A prime requirement is that all groundcover and lawn areas be planted. If such criteria are met to the satisfaction of the Architect, a field notification will be issued to the Contractor to establish the effective beginning date of the period.

F. The Contractor's maintenance period will be extended if the provisions required within the plans and specifications are not filled.

G. Watering:
1. All plants shall be kept watered as often as it is necessary to keep them in optimum, vigorous growth. Watering shall be done preferably during the early morning hours. Check soil moisture levels with a soil probe before watering and adjust watering schedule to match weather conditions.

2. Water shall be controlled so that there will be no excessive run-off, ponding, or overwatering. Check and adjust irrigation system on a weekly basis.

3. Root Growth: Periodically the Contractor shall check the progress of the root growth within the back fill area. As the root growth increases beyond the root ball, the frequency of watering shall be reduced so that the roots are encouraged to grow to a lower soil depth. Watering then shall be less frequent, but applications shall be very slow and the Contractor shall assure himself that water does penetrate to the depth of the former plant pit.

4. Replace broken equipment immediately with equal or superior materials.

H. Spraying:
1. Utilize IPM practices for plant care, as outlined in the Bay Friendly Landscape maintenance specifications. Spraying shall only be performed as a last resort.

2. All shrubs and trees shall be inspected at least twice a month during the growing period to determine the need for spraying to control insect damage, fungus development or any other disease that might be attacking the plants. Preventative spraying shall be done only with the approval of the District’s Representative.

3. Operators of spray equipment shall take all reasonable precautions to protect themselves, other people and buildings from spray. The Contractor shall have all permits and licenses required for such an operation. Where applicable, dormant spray shall be applied to shrubs and trees during the winter period.

4. All equipment shall be properly washed before and after use.

5. No spraying shall take place during windy or gusty days.

I. Staking and Guying: Stakes and guys shall be inspected a minimum of two times a month to assure that the wires and ties are tight and no damage has occurred to the tree trunk or branches.

J. Weed Control:
1. Weeds shall be kept under control, preferably either by hand or by IPM methods outlined in the Bay Friendly Landscape maintenance specifications. The application of herbicides shall be as last resort...

2. All equipment used for herbicides, if utilized, shall be properly cleaned before it is used on this project. Herbicides shall be applied at temperatures recommended by the manufacturers. Herbicides shall not be used during windy or gusty days. All possible precautions shall be taken to protect vegetation which is susceptible to damage from the particular herbicides to be used.

3. The bases of all plants shall be kept completely free of weeds. Periodically, the base of the trees and shrubs shall be cultivated in order to allow better penetration of water, but such cultivation shall be carefully done in order not to destroy surface roots.

K. Non-Synthetic Fertilization: Top dress all areas at 45 day intervals from time of planting with organic fertilizer or compost tea as recommended by soils report.

L. Litter: The Contractor shall remove promptly after pruning, trimming, and weeding or other work required under the contract, all debris generated by his performance of the work. Immediately after working in the areas of public walks, driveways or paved areas, they shall be vacuumed clean with suitable equipment. All areas covered by this contract shall be kept free of the following items: bottles, cans, paper cardboard or metallic items. Common debris and litter shall be disposed of in an appropriate manner.

M. Pruning: Prune as necessary to remove injured twigs and branches, dead wood, and suckers.

N. All green waste shall be taken to a certified green waste facility for utilization in organic compost or mulch.
15.18 GUARANTEE AND REPLACEMENT

A. Guarantee period shall be extended for a period of one year from the date of written acceptance.

B. All plants shall be guaranteed to be alive and healthy as determined by the District’s Representative at the end of the guarantee period.

C. The Contractor shall replace, as soon as possible, in accordance with the Drawings and Specifications throughout the guarantee period, any plants that die, or in opinion of the District’s Representative, are in an unhealthy or unsightly condition, and or have lost their natural shape due to dead branches, excessive pruning, inadequate or improper maintenance, or any other causes due to the Contractor's negligence.

D. Specimen trees that die during the 12 month guarantee period and are deemed the responsibility of the Contractor shall be replaced by a boxed tree of the same variety and size at no cost to the District.

E. Contractor shall not be held liable for loss of plant materials during the guarantee period due to vandalism or accidental causes.

END OF SECTION 32 93 00
PART 16 - GENERAL

16.01 DESCRIPTION

A. Work Included: Furnish all labor, materials, soil and amendment testing, equipment, rentals, facilities, transportation, incidentals, excavations, and services for landscape soil preparation and related work as shown on the drawings and/or specified herein including all placement of topsoil, soil amendment, compost, fertilizers, plant tabs, sheet mulching, pre-emergent, fine grading, maintenance, and all other materials incidental to landscape soil preparation and as necessary for a complete and full Landscape Soil Preparation.

B. Related work:
   1. Storm Drainage: Contractor shall fully acquaint himself with the existing conditions particularly in reference to underground piping. Any damage caused by contractor to work of other trades shall be repaired by him at no cost to the District.
   2. Section 32 84 00 -- Irrigation: Irrigation system shall be installed and operative before beginning planting operation
   3. Section 32 90 00 – Landscape Planting
   4. Utilities: Contractor shall fully acquaint himself with the existing conditions particularly in reference to underground piping. Any damage caused by contractor to work of other trades shall be repaired by him at no cost to the District.

16.02 RELATED DOCUMENTS

A. The General and Supplementary Conditions and General Requirements apply to the work herein specified.

B. References:

16.03 PERFORMANCE REQUIREMENTS

A. Supervision: Assign a full-time employee to the job as Foreman for the duration of the Contract with a minimum of three (3) years experience in landscape installation. Foreman shall be listed as an active member of Bay Friendly Qualified Contractors and be present during the entire installation. Notify District’s Representative of all changes in supervision.

16.04 QUALITY ASSURANCE

A. Personnel: Planting Soil Preparation shall be performed by competent and efficient personnel familiar with planting sub-soil preparation procedures and planting under the supervision of a Qualified Foreman.

16.05 SUBMITTALS

A. Contractor Foreman Bay Friendly Qualification.

B. Soil Analysis Report and Recommendations:
1. All testing costs for soil and soil amendments shall be paid by Contractor. Testing costs for the initial samples and costs for any additional samples due to non-compliance by the Contractor shall be paid by the Contractor.

2. Contractor shall provide two (2) one-quart samples to Soil and Plant Laboratory of Santa Clara (408) 727-0330, or any other approved soil testing laboratory, for their testing for conformance to this specification.
   a. Sample one shall be from existing topsoil
   b. Sample two shall be from the proposed import topsoil

3. At a minimum the soil analysis shall include:
   a. Soil Texture
   b. Infiltration rate determined by laboratory test or soil texture infiltration rate table
   c. pH
   d. Total soluble salts
   e. Sodium
   f. Essential nutrients
   g. Percent organic matter

4. Lab Recommendations- Per soils analysis, request testing lab to provide recommendations for amending the soil with:
   a. Compost to bring the soil organic matter to a minimum of 3.5% by dry weight.
   b. Natural, non-synthetic fertilizers to recommended levels for planting.

C. Amendment Testing: Contractor shall provide a one-quart sample of each proposed amendment to Soil and Plant Laboratory of Santa Clara (408) 727-0330, or any other approved soil testing laboratory, for their testing for conformance to this specification.
   1. No material shall be delivered to the site until the Landscape Architect approves the material. Testing costs shall be paid by the Contractor.

D. Certificates of Compliance, receipts, and/or delivery tickets per Specification Section 01350/01 35 63 Bay-Friendly Landscaping Requirements.

16.06 PROJECT SITE CONDITIONS

A. Site Visit: At beginning of work, visit and walk the site with the District's Representative to clarify scope of work and understand existing project site conditions. Identify location of utilities and other improvements. Notify District's Representative of conflicts prior to start of work for resolution.

B. Access: Inspect Project site and become familiar with the accessing requirements and restrictions. At time of submitting bid, provide written notice of any conditions that would prevent installation of the specified plant material.

16.07 JOB CONDITIONS

A. Delivery:
   1. Deliver manufactured materials in original containers with brand and maker's name marked thereon. Materials in broken containers or showing evidence of damage will be rejected and must be immediately removed from the site. Odorous materials shall not be brought to the site until they are to be used. Deliver quantities necessary to complete the work shown on the Drawings
   2. Deliver bulk materials to the job site and store to deter mixing with other bulk materials, saturation by rainwater, contamination and/or contact with other deleterious substances or materials.
   3. Remove unacceptable materials immediately from job site.
4. Contractor shall endeavor to coordinate delivery with installation schedule so that soil amendment and planting is installed on the same day.

**PART 17 - PRODUCT**

**17.01 MATERIALS**

A. Import Topsoil:

Shall be a homogeneous mineral soil classified as sandy loam, or fine sand. Particle size data shall be based upon standard USDA methodology. Of the material falling in the sand category, a minimum of 80% shall fall in the fine sand range (0.05 – 5mm). Gravel content (greater than 2.0mm) shall be less than 15%. Import topsoil shall not contain more silt and clay than the on-site native soil. The sum of silt plus clay shall be less than 25%; the soil shall be nonsaline as determined on the saturation extract. Salinity shall not exceed 3.0 mmhos/cm, boron shall not exceed 1.0 ppm and the sodium absorption ration (SAR) shall not exceed 6.0. Soil reaction as determined on a saturated paste shall fall between 5.5 and 7.5. The soil shall be free of organic herbicides, or other growth restricting chemicals. Contamination may be tested by greenhouse trials using rye grass and radish as test crops using the existing import soil as substrate. These trials require four to five weeks for completion.

B. Organic Compost:

1. Shall be determined from soils analysis results.
2. For bidding purposes, assume Soil Amender Compost, available from Organic Solutions, ph. 707-751-0466 or approved equal. Application rate per 1000 square feet:

   6 cubic yards  Organic Compost

3. Compost shall be a well decomposed, stable and weed free. It shall be derived from one or more locally sourced organic materials such as: food waste or urban plant debris, agricultural crop residue or herbivore animal manures with a preference for urban plant debris and food waste. It shall not contain mixed solid waste. The product shall contain no substances toxic to plants, will possess no objectionable odors and shall not resemble the feedstock (the original material from which it was derived). Compost shall be tested through the US Composting Councils USCC Seal of Testing Assurance Program (STA). A lab analysis shall be performed by a STA certified laboratory using the test methods used in the Seal of Testing Assurance program found in the Test Methods for Examination of Compost and Composting Manual (TMECC). Verifying current participation in the STA program can be confirmed by logging onto the USCC website at [www.compostingcouncil.com](http://www.compostingcouncil.com). The compost lab analysis shall be submitted as part of the “Compost Technical Data Sheet” before delivery of compost.

   a. The compost laboratory report **must** confirm the following compost parameters:

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Units of measure</th>
<th>General Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen (Total N)</td>
<td>% dry weight</td>
<td>&gt;0.9</td>
</tr>
<tr>
<td>Ammonium (N or NH4-N)</td>
<td>ppm or mg/kg dry weight</td>
<td>&lt;450</td>
</tr>
<tr>
<td>Nitrate (NO3-N)</td>
<td>ppm or mg/kg dry weight</td>
<td>&gt;10</td>
</tr>
<tr>
<td>Phosphorus (P)</td>
<td>% dry weight</td>
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</tr>
<tr>
<td><strong>Calcium (Ca)</strong></td>
<td>% dry weight</td>
<td>&lt;3.5</td>
</tr>
<tr>
<td>------------------</td>
<td>--------------</td>
<td>------</td>
</tr>
<tr>
<td><strong>Boron (Total B)</strong></td>
<td>ppm or mg/kg dry weight</td>
<td>&lt;80</td>
</tr>
<tr>
<td><strong>Sodium (Na)</strong></td>
<td>% dry weight</td>
<td>&lt;0.5</td>
</tr>
<tr>
<td><strong>Total Nitrogen Phosphorus and Potassium (NPK)</strong></td>
<td>Sum % dry weight</td>
<td>&gt;2.0</td>
</tr>
<tr>
<td><strong>Carbon Nitrogen Ratio</strong></td>
<td>Carbon: Nitrogen</td>
<td>≤25:1</td>
</tr>
<tr>
<td><strong>Organic Matter Content</strong></td>
<td>% by dry weight basis</td>
<td>&gt;35</td>
</tr>
<tr>
<td><strong>pH</strong></td>
<td>pH units</td>
<td>6.5-8.5</td>
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<tr>
<td><strong>Moisture Content</strong></td>
<td>% wet weight basis</td>
<td>&gt;35</td>
</tr>
<tr>
<td><strong>Particle Size or Sieve Size</strong></td>
<td>% under ½” or 25mm by dry weight</td>
<td>&gt;95%</td>
</tr>
<tr>
<td><strong>Stability Indicator: Carbon Dioxide (CO2) Evolution Rate</strong></td>
<td>Mg CO2-C/g OM per day</td>
<td>&lt;8</td>
</tr>
<tr>
<td><strong>Maturity Indicator: Cucumber Bioassay</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Seed Emergence</strong></td>
<td>%, relative to control</td>
<td>&gt;80%</td>
</tr>
<tr>
<td><strong>Seed Vigor</strong></td>
<td>%, relative to control</td>
<td>&gt;80%</td>
</tr>
<tr>
<td><strong>Select Pathogens</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fecal Coliform Bacteria</strong></td>
<td>MPN/gram dry weight</td>
<td>&lt;1000</td>
</tr>
<tr>
<td><strong>Salmonella</strong></td>
<td>MPN/4gram dry weight</td>
<td>&lt;3</td>
</tr>
<tr>
<td><strong>Metals</strong></td>
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</tr>
<tr>
<td><strong>Arsenic</strong></td>
<td>mg/kg (ppm)</td>
<td>&lt;16</td>
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<tr>
<td><strong>Cadmium</strong></td>
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<td>&lt;8</td>
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<tr>
<td><strong>Chromium</strong></td>
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<tr>
<td><strong>Copper</strong></td>
<td>mg/kg (ppm)</td>
<td>&lt;400</td>
</tr>
<tr>
<td><strong>Lead</strong></td>
<td>mg/kg (ppm)</td>
<td>&lt;100</td>
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<tr>
<td><strong>Mercury</strong></td>
<td>mg/kg (ppm)</td>
<td>&lt;4</td>
</tr>
<tr>
<td><strong>Nickel</strong></td>
<td>mg/kg (ppm)</td>
<td>&lt;80</td>
</tr>
<tr>
<td><strong>Selenium</strong></td>
<td>mg/kg (ppm)</td>
<td>&lt;5</td>
</tr>
<tr>
<td><strong>Zinc</strong></td>
<td>mg/kg (ppm)</td>
<td>&lt;500</td>
</tr>
</tbody>
</table>
b. In addition, it is recommended that the compost laboratory report conforms to the following compost parameters.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Units of measure</th>
<th>General Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boron (Soluble B)</td>
<td>ppm or mg/kg dry weight</td>
<td>&lt;2.5</td>
</tr>
<tr>
<td>Soluble Sodium</td>
<td>% of ECE</td>
<td>&lt;40</td>
</tr>
<tr>
<td>Soluble Chloride</td>
<td>% of ECE</td>
<td>&lt;50</td>
</tr>
<tr>
<td>Organics:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clyopyralid</td>
<td></td>
<td>Pass plant test</td>
</tr>
<tr>
<td>Organochlorine Pesticides</td>
<td></td>
<td>Non Detect</td>
</tr>
<tr>
<td>Organophosphorus Pesticides</td>
<td></td>
<td>Non Detect</td>
</tr>
<tr>
<td>Chlorinated Herbicides</td>
<td></td>
<td>Non Detect</td>
</tr>
<tr>
<td>Chlorinated Hydrocarbons</td>
<td></td>
<td>Non Detect</td>
</tr>
</tbody>
</table>

(Table modified from the US Composting Council Landscape Architectural Specifications 6/1/05 and Alameda County Waste Management Authority Compost Quality Standards and Testing Protocol April 6, 2006)

C. Storm Water/Retention/Bioswale/Rain Garden Soil Mix:

Soil mix shall have a minimum percolation rate of 5" per hour and be amended per Soil and Plant lab test results. Depth of soil shall be as specified on the Civil Engineer plans. Mix shall be Terravida by TMT or approved equal.

D. Fertilizer:
1. Shall be determined from soils analysis results.
2. For bidding purposes, assume per 1000 square feet:
3. Synthetic fertilizers or fertilizers prohibited by the OMRI in its “Generic Materials List” are not allowed in the project.

E. Plant Tablets:
1. 7 gram tablet, 20-10-5 Gro-Power Planting tablets, or approved equal
2. All container plants shall receive organic plant tablets, as follows:

<table>
<thead>
<tr>
<th>Plant Size</th>
<th>Tablets</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-gallon plant</td>
<td>two 7-gram tablets</td>
</tr>
<tr>
<td>Five-gallon plant</td>
<td>six 7-gram tablets</td>
</tr>
<tr>
<td>Fifteen-gallon</td>
<td>twelve 7-gram tablets</td>
</tr>
<tr>
<td>24” Box tree</td>
<td>fourteen 7-gram tablets</td>
</tr>
<tr>
<td>36” Box tree</td>
<td>eighteen 7-gram tablets</td>
</tr>
<tr>
<td>48” Box tree</td>
<td>twenty-two 7-gram tablets</td>
</tr>
</tbody>
</table>

3. Synthetic fertilizers or fertilizers prohibited by the OMRI in its “Generic Materials List” are not allowed in the project.

F. Sheet Mulch Cardboard: 100% recycled B flute cardboard or approved equal.

G. Mulch:
1. On site salvaged and chipped material
2. Recycled Pro-Chip Decorative Mulch, Dark Brown. Available from Earth Tones Mulch, ph 1-800-536-6702, or approved equal.

H. Pre-Emergent: Synthetic Pre – Emergent is prohibited from use.

PART 18 - EXECUTION

18.01 SURFACE CONDITIONS

A. Prior to construction, Contractor shall furnish a construction schedule which demonstrates that soil preparation and planting will not occur during the rainy season. Contractor shall not proceed with soil prep and planting while soil is wet.

B. Inspections by the Landscape Contractor:
1. Before proceeding with the work: Carefully inspect all areas and verify all dimensions and quantities.
2. In the event of discrepancy, immediately notify the District’s Representative. Do not proceed with this installation in areas of discrepancies until all such discrepancies have been fully resolved.
3. Landscape Soil Preparation and subsequent planting operations shall be performed only during periods when beneficial results can be obtained. When excessive moisture or other unsatisfactory conditions prevail, the work shall be stopped until conditions are satisfactory.
4. General contractor:
   a. Shall coordinate rough grading of site to ensure the Landscape Contractor shall receive all planting areas graded to ±0.10 ft. of finish grades shown on the Drawings. Allow for depth of soil amendments and mulch in determining the difference between finished subgrade in groundcover and shrub beds. Verify that subgrades are not compacted. Do not proceed until detrimental conditions are corrected. Contractor shall take precautions during the excavation of all planting areas to not undermine or damage all adjacent pavements, footings and their associated subgrades.
b. shall complete the rough grading as necessary to round the top and toe of all slopes, providing naturalized contouring to integrate newly graded areas with the natural topography. Finish grading under this section shall be completed in accordance with the section shown on the landscape grading plan and details.

18.02 FIELD QUALITY CONTROL/INSPECTION

A. Reviews: Contractor shall specifically request at least two days in advance the following reviews prior to progressing with the work:
1. Verification of amendment incorporation depths
2. Finish grade

B. Certification: Written certificates stating quantity, type, and composition, weight and origin for all amendments; chemicals shall be delivered to the Landscape Architect before the material is used on the site.

18.03 TOPSOIL STORAGE AND PLACEMENT

A. Existing topsoil shall be removed, stored, and re-spread upon completion of fine grading. Maximum topsoil pile height shall be 6’ and measures must be taken to protect the stored topsoil from erosion.

B. Cross rip topsoil to a depth of twelve (12) inches. Then incorporate the amendments to a homogeneously blended soil depth of six inches. Compact all soil in place to 85% compaction.

18.04 ORGANIC AMENDMENT AND FERTILIZER INCORPORATION

A. Materials determined from the soils test should be uniformly distributed throughout all irrigated planting areas and incorporated to a homogeneously blended soil depth of six inches.

18.05 SHEET MULCHING

A. After the 5 gallon and larger plant materials have been planted the “sheet mulch” shall be installed.

B. Apply a minimum of two layers of 100% recycled B flute cardboard as a bio-degradable weed barrier to the entire planting area, completely covering all existing soil and vegetation
1. Wet cardboard while applying to prevent it from blowing away.
2. Sheets of cardboard shall overlap a minimum of 8”.
3. Cardboard shall abut directly against edge of pavement, curbs and boulders.
4. Cardboard shall be applied to the edge of installed plant root balls without covering any part of the top of the root ball/root crown area.
5. Excess cardboard shall be folded under itself when abutting against hardscape objects or root crown areas, as opposed to being cut, to avoid excessive cardboard scraps. This folding under process is greatly aided when the cardboard is wet.
6. All cardboard scraps shall remain separated from other construction debris and shall be deposited at a local recycling facility.

C. Apply compost and mulch.
1. Apply 1” of organic compost on top of the cardboard layer in all planting areas. Reduce organic compost application to ½” when 6” or less from the edge of curb.
2. Apply 2” of plant debris mulch on top of the compost in all planting areas to protect compost during the planting of 1 gallon and 4” pots and the laying out of drip lines.
3. Keep root crowns of all plants clear of compost, mulch.

D. Installation of plants smaller than 5 gallons.
   1. Punch hole through cardboard and place plants in soil under sheet mulch. Smaller plants can be planted directly into sheet mulch layer.

18.06 TREE AND PLANT PITS

A. Tree pits shall have their sides and bottoms loosened or otherwise broken to prevent glazed or compacted surfaces. Contractor shall auger for each tree a minimum of three 18” diameter holes as appropriate for trees size and as shown on the planting notes and detail.

B. Plant pits shall have their sides and bottoms loosened or otherwise broken to prevent glazed or compacted surfaces, and shall be as shown on the planting detail.

18.07 PLANT TABLETS

A. Space the tablets evenly around the root ball halfway up backfill touching side of root ball.

B. The Landscape Architect may require excavation of plants selected at random for conformance review.

18.08 BACKFILL

A. Backfill for plant pits shall be the prepared soil per parts 3.04 of this section, taken from adjacent prepared areas. Spread excavated material onto adjacent areas as replacement.

B. Should additional backfill be necessary, a mixture of one-third organic amendment/fertilizer mix (per Soil and Plant Laboratory) and two-thirds topsoil may be used.

18.09 FINISH GRADING

A. Contractor shall finish grade all irrigated and non-irrigated planting areas unless otherwise noted, and shall remove all rocks and clods over one and one-half cubic inches. All areas shall be smooth and uniformly graded. All erosion damage during the construction period shall be repaired by the Contractor.

B. Unless otherwise noted, all soil finish grades shall be one inch below finish grade of walks, pavements and curbs.

END OF SECTION 32 91 13