SECTION 31 10 01 – PLANT PROTECTION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Preserve and protect existing trees, shrubs, and other plant materials to remain, including protecting plants on adjoining properties during site preparation work and construction.

B. Provide tree and shrub pruning and removal in accordance with these Specifications if required by the Contract Documents.

C. Layout and review of utility and irrigation trenches that occur in the Tree Protection Root Zone.

D. Related requirements specified elsewhere include:
   1. Section 31 10 00, SITE CLEARING
   2. Section 31 20 00, EARTHWORK
   3. Section 32 84 00, IRRIGATION
   4. Section 32 90 00, PLANTING

1.2 QUALITY ASSURANCE

A. Reference Standards:
   1. Ordinances and Regulations: All local, municipal, and state laws, codes and regulations governing or relating to all portions of this work are hereby incorporated into and made a part of these Specifications. Anything contained in these Specifications shall not be construed to conflict with any of the above codes, regulations, or requirements of the same. However, when these Specifications and Drawings call for or describe materials, workmanship or construction of a better quality, higher standard than is required by the above-mentioned codes and regulations, the provisions of these Specifications and Drawings shall take precedence. Furnish without extra charge additional materials and labor required to comply with above rules and regulations.

   2. International Society of Arboriculture, Guide for Plant Appraisal, latest version.

B. Pre-installation Conference:
   1. Conduct conference at the project site. Contractor shall review and identify with the Owner’s Representative the limits of Work and extent of plant materials and other improvements to be protected. Notify Owner's Representative of discrepancies between existing conditions and Drawings before proceeding with Work.
   2. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:
      a. Tree-service firm's personnel, and equipment needed.
      b. Arborist's responsibilities.
      c. Quality-control program.

d. Coordination of Work and equipment movement with the locations of protection zones.
e. Trenching by hand or with air spade within protection zones.

C. At the Owner's discretion, an Arborist may represent the Owner to review the work of the Contractor in regard to plant protection. Arborist Qualifications: ISA Certified Arborist licensed to work in the State of California.

D. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.

1.3 PROJECT CONDITIONS

A. Coordination: Coordinate this work with the work of other Sections to avoid delay and interference with other work.

B. Nuisances: Keep dirt, dust, noise and other objectionable nuisances to a minimum. Use temporary enclosures, coverings and sprinkling, and combinations thereof, as necessary to limit dust to lowest practicable level, except do not use water to the extent that it causes flooding or contaminated run-off.

C. Traffic: Conduct work to ensure minimum interference with vehicular and pedestrian traffic, and to permit unencumbered access to site and adjacent properties.
1. Do not close or obstruct streets, sidewalks, alleys, or other public passageways without permission from authorities having jurisdiction.
2. If required by governing authorities, provide alternate routes around closed and obstructed traffic ways.

D. The following practices are prohibited within protection zones:
1. Storage of construction materials, debris, or excavated material.
2. Moving or parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

E. Do not direct vehicle or equipment exhaust toward protection zones.

F. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

1.4 DEFINITIONS

A. Diameter at breast height (DBH): diameter of a trunk as measured at a height 54 inches above the ground line.

B. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.

C. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and as identified on the drawings or otherwise by a certified arborist.

D. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

E. Structural Root Zone: A circular area with the tree trunk at the center and a radius equal to 3 times the diameter of the tree trunk measured at breast height (4.5 feet above ground line). This zone, where most of the structural roots exist, is based upon tree failure research conducted by E.T. Smiley at the Bartlett Tree Research Laboratory. Any structural (buttress) root, which has been severed or is rotten within this zone, can no longer provide adequate support to the tree and must be considered missing.

F. Dripline: The area of the ground directly beneath the vertical projection (shadow) of the tree's foliage canopy.

1.5 SUBMITTALS

A. Product Data: For each type of product.

B. Soil Analysis Report:
   1. Provide soil analysis report for any top soil to be removed and stockpiled for reuse as planting soil. Soils analysis report to be performed by Wallace Laboratories LLC (310-615-0116), a certified soil analysis laboratory, and include agricultural suitability analysis and recommendations for amending the soil. Subsoil will not be approved as planting soil.

C. Samples: For each type of the following:
   1. Organic Mulch: 1-quart of organic mulch; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch.
   2. Planting Soil: 1-quart of soil; in sealed plastic bags; for soils to be used within the protection zones.

D. Shop Drawings:
   1. Include plans and locations of protection-zone fencing and signage, showing relation of equipment-movement routes and material storage locations with protection zones. Indicate extent of trenching by hand or with air spade within protection zones.
   2. Protection-Zone Signage

E. Qualification Data: For arborist and tree service firm.

F. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

G. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.

H. Survey of Existing Conditions: Provide to Owner a Survey of Existing Conditions. Record existing conditions, including underground utilities, etc. on As Built Drawings by use of field measurements and preconstruction photographs. Make permanent record of measurements, materials, and construction details required to make exact reproduction.

I. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.
   1. Species and size of tree.
   2. Location on site plan. Include unique identifier for each.
   3. Reason for pruning.
   4. Description of pruning to be performed.
   5. Description of maintenance following pruning.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Backfill Soil: Approved planting soil of suitable moisture content and granular texture for placing around tree; free of stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth.

B. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:
   1. Type: Wood and bark chips
   2. Size Range: ½’-2”
   3. Color: Natural Brown.

C. Protection-Zone Fencing: Fencing fixed in position and meeting the following requirements:
   1. Chain-Link Protection-Zone Fencing: Galvanized-steel fencing fabricated from minimum 2-inch opening, 0.148-inch- diameter wire chain-link fabric; with pipe posts, minimum 2-3/8-inch- OD line posts, and 2-7/8-inch- OD corner and pull posts; with 1-5/8-inch- OD top and bottom rails; with tie wires, hog ring ties, and other accessories for a complete fence system.
      a. Height: 72 inches
   2. Gates: Swing access gates matching material and appearance of fencing, to allow for maintenance activities within protection zones.

D. Protection-Zone Signage: Shop-fabricated, rigid plastic or metal sheet with attachment holes pre-punched and reinforced; legibly printed with nonfading lettering and as follows:

1. Text: “Tree Protection Zone. No Heavy Equipment.”
2. Lettering: 3-inch- high minimum, black characters on white background.

E. Tree Branch & Trunk Protection: for branches trunks exposed to, or at risk of exposure to impact by construction equipment.
1. 2x lumber
2. 1/2”-wide steel straps

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas in which work is to be performed. Report in writing to the Owner's Representative all prevailing conditions that will adversely affect the existing plant materials to remain. Do not proceed with work until a solution acceptable to the Owner’s Representative has been arrived at.

B. Survey of Existing Conditions: Record existing conditions, including underground utilities, etc. by use of measured drawings and preconstruction photographs.

C. Starting work constitutes acceptance of the existing conditions and the Contractor shall then, at his expense, be responsible for correcting all unsatisfactory and defective work encountered.

3.2 PREPARATION

A. Locate and clearly identify trees, shrubs, and other vegetation to remain and/or be relocated. Tie a 1-inch blue vinyl tape around each tree trunk at 54 inches above the ground.

B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

C. Tree-Protection Zones: Mulch areas inside tree-protection zones and other areas indicated. Do not exceed indicated thickness of mulch.
1. Apply 4-inch uniform thickness of organic mulch unless otherwise indicated. Do not place mulch within 6 inches of tree trunks.

D. Install and maintain temporary fencing and other required protective devices and exclude construction activities from tree/shrub zones except as supervised by the Arborist / Owner’s Representative.

E. If tree/plant protection zones cannot be protected with fencing, a four-inch layer of mulch with minimum 1.25-inch-thick, metal strap linked plywood shielding shall be maintained in the tree/shrub zone where heavy equipment will be operated.

3.3 PROTECTION ZONES

A. Protect trees and shrubs against cutting, breaking, skinning and bruising of bark; permit no traffic or stockpiling within drip line.

B. Do not change earth surface within drip line of trees and shrubs except as approved in writing by the Owner.

C. Do not park vehicles or store materials, supplies, and construction equipment within Tree Protection Zone.

D. Verify details of protection-zone fencing before retaining last option in "Protection-Zone Fencing" Paragraph below.

E. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people from easily entering protected areas except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.

F. djacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.

G.

1. Chain-Link Fencing: Install to comply with ASTM F 567 and with manufacturer's written instructions.
2. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Architect. Post may be steel driven type, or self-supporting type.
3. Access Gates: Install where required; adjust to operate smoothly, easily, and quietly; free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
4. perational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

H. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Architect. Install one sign spaced approximately every 20 feet on protection-zone fencing, with signs each facing a different direction.

I. Where tree branches & trunks are exposed to, or at risk of exposure to impact by construction equipment, secure 2x lumber radially around tree branches and/or trunk to prevent damage. Secure lumber with steel strapping.

J. Maintain protection zones free of weeds and trash.

K. Maintain protection-zone fencing and signage in good condition as acceptable to Architect and remove when construction operations are complete, and equipment has been removed from the site.
   1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
   2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

3.4 EXCAVATION & TRENCHING

A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Section 312000 "Earth Moving" unless otherwise indicated.

B. Trenching within Protection Zones: Where utility trenches are required within protection zones, excavate under or around tree roots by hand or with air spade, or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots.

C. rrow-tine spading forks to comb soil and expose roots.

D. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches (75 mm) back from new construction and as required for root pruning.

E. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

3.5 ROOT PRUNING

A. Prune tree roots that are affected by temporary and permanent construction. Prune roots as approved by certified arborist.
   1. Generally cutting of roots two inches or greater shall be avoided. Roots one inch and greater in diameter that must be cut shall be cut cleanly and obliquely with the cut surface facing down.
   2. Exposed and pruned roots shall be covered with light well-drained soil backfill and mulch over. The area shall be kept moist. Retain applicable subparagraphs below.
   3. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.

4. Cut Ends: Do not paint cut root ends.
5. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
6. Cover exposed roots with burlap and water regularly.
7. Backfill as soon as possible according to requirements in Section 312000 "Earth Moving."

B. Root Pruning at Edge of Protection Zone: Prune tree roots 6 inches outside of the protection zone by cleanly cutting all roots to the depth of the required excavation.

C. Root Pruning within Protection Zone: Clear and excavate by hand or with air spade to the depth of the required excavation to minimize damage to tree root systems. If excavating by hand, use narrow-tine spading forks to comb soil to expose roots. Cleanly cut roots as close to excavation as possible.

3.6 AIR SPADING:

A. Air spading, or hand removal of soil or tunneling is required for excavation in the Tree Protection Zone of any trees for the installation of infrastructure where roots 2 inches in diameter and larger are encountered. The “critical root zone” is defined as any area around a tree in which a two-inch diameter root is encountered. The Arborist / Owner’s Representative shall define the critical root zone and the Contractor shall excavate using a pneumatic excavator (AIR-SPADE or equivalent) as follows:

B. Trenching for utility lines or other infrastructure may be done mechanically outside the Tree Protection Zone. As the equipment operator approaches the canopy radius, or for certain species up to 1.5 times the canopy radius out from the base of the tree (Oaks, Poplars, Redwoods, etc.) the operator shall be assisted by a spotter who shall inspect the excavation for roots. If a root of two inches diameter is encountered the spotter shall halt mechanical excavation and pneumatic excavation shall proceed. If no other two inch or greater diameter root is encountered in an excavation of two feet forward and two feet deep, the single two-inch root may be cleanly cut proximal to (on the tree side of) any fracture or torn bark. Mechanical excavation may continue until a two-inch diameter root is encountered, and the pneumatic excavation, exploration is then repeated.

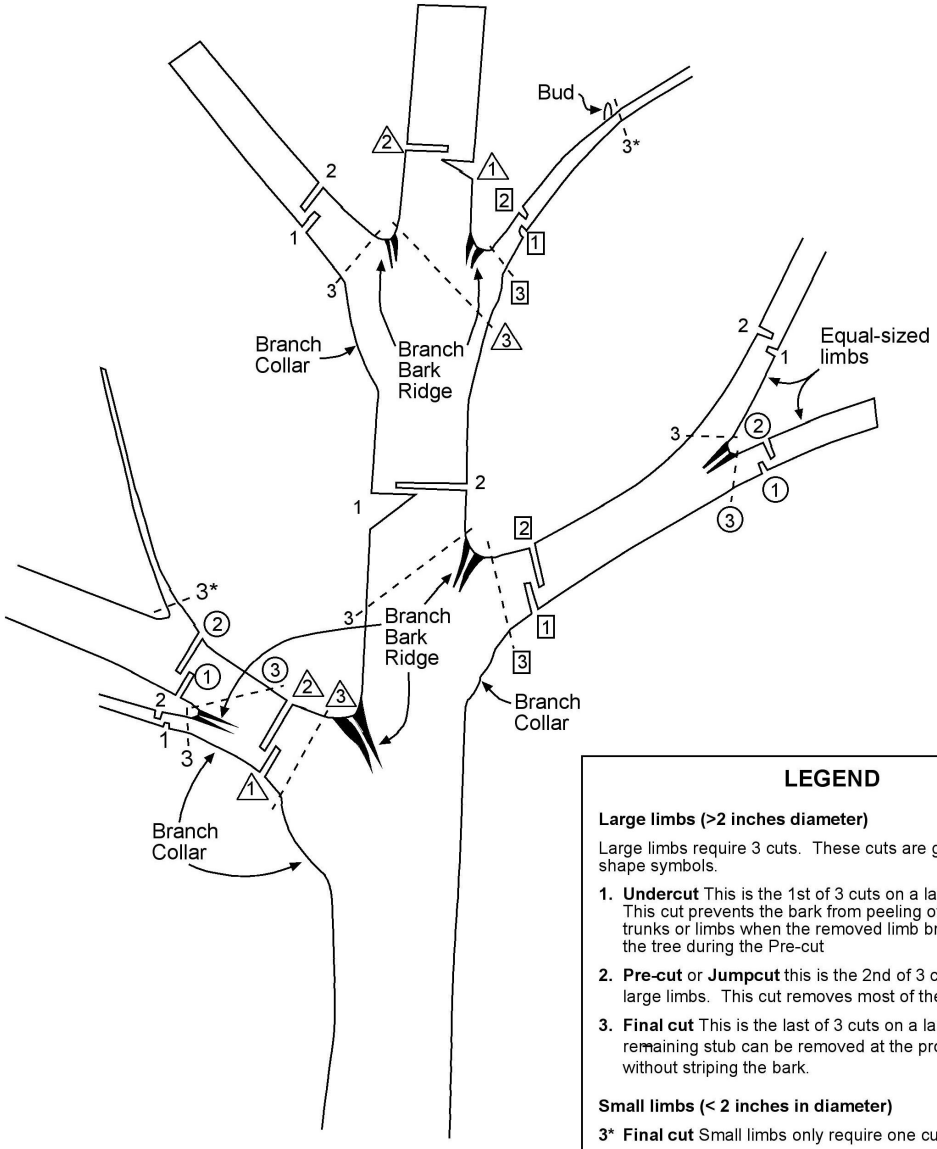
C. The Contractor shall control dust and the spread of soils excavated. The air-spade operator shall moisten the soil to field capacity and to a minimum probe depth of 2.5 feet with a watering needle (hydro-spear) 48 hours prior to pneumatic excavation. The spread of excavated soil shall be contained to the area adjacent to the trench path with upright plywood sheeting.

D. These specifications shall not be considered operating instructions or a requirement to use a specific pneumatic excavation product. It is the responsibility of the Contractor to read and understand the pneumatic excavator operation instructions and safety procedures (including the proper and safe use of air compressor, hoses, excavation tools, etc.) prior to operations.

3.7 TREE PRUNING

A. Obtain specific instruction from Arborist / Owner's Representative for pruning of trees, shrubs, roots or disturbance of soil within spread of tree branches. The Contractor shall utilize protection measures as outlined by Arborist / Owner's Representative, which may include directional drilling, or hand clearing to expose the roots.

B. Provide periodic watering for all planting within Contract limit and any adjacent areas affected by the work. Maintain moisture to a minimum 6" depth, minimum.



C. Using an approved pruning saw, provide selective tree limb pruning as accepted by the Landscape Architect if branches interfere with new construction. Limb diameter shall be limited to 5” diameter and shall be pruned just outside the branch collar in accordance with American National Standards Institute, (ANSI 300) and International Society of Arboriculture, (ISA) standards.

D. Approved branches to be shortened must be cut just above a fork with another living branch which is plus or minus 1/2 the diameter of the removed branch as shown in the pruning figure herein. Branches to be removed which exceed 2" in diameter shall be severed with a 3-step cut to prevent bark peeling. Final cuts must not injure the branch collar or branch bark ridge of the remaining branches and trunk.

E. Prune branches that are affected by temporary and permanent construction.

1. Prune to remove only injured, broken, dying, or dead branches unless otherwise indicated. Do not prune for shape unless otherwise indicated.
2. Do not remove or reduce living branches to compensate for root loss caused by damaging or cutting root system.
3. Pruning Standards: Prune trees according to ANSI A300 (Part 1)

F. Unless otherwise directed by arborist and acceptable to Architect, do not cut tree leaders.

G. Cut branches with sharp pruning instruments; do not break or chop.

H. Do not paint or apply sealants to wounds.

I. Provide subsequent maintenance pruning during Contract period as recommended by arborist.

J. Chip removed branches and stockpile in areas approved by Landscape Architect

3.8 REGRADING

A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

B. Lowering Grade within Protection Zone: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by arborist unless otherwise indicated.

1. Root Pruning: Prune tree roots exposed by lowering the grade. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots as required for root pruning.

C. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

D. Minor Fill within Protection Zone: Where existing grade is 6inches or less below elevation of finish grade, fill with backfill soil. Place backfill soil in a single uncompacted layer and hand grade to required finish elevations.

3.9 FIELD QUALITY CONTROL

A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.10 TREE & PLANT REMOVAL & REPLACEMENT

A. Field Verification: Before removing non-designated trees, shrubs, stumps, bushes, vines, rubbish, undergrowth and deadwood as shown on the Drawings and as specified, obtain verification from Owner's Representative.

B. Repair or replace trees, shrubs, and other vegetation indicated to remain or to be relocated that are damaged by construction operations, in a manner approved by Architect.
   1. Submit details of proposed pruning and repairs.
   2. Perform repairs of damaged trunks, branches, and roots within 24 hours according to arborist's written instructions.
   3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect.

C. Backfill and compact areas excavated and open pits and holes resulting from removal operations. Comply with requirements herein and as specified in Earthwork, Section 02300 for backfill materials, compaction, and installation methods.

D. Remove all stumps and roots in their entirety. Tree trunks shall be removed minimum depth of 2 1/2 feet below existing grade or finish grade, whichever is deeper. Stump grinding is an acceptable method of removal of roots and stumps of trees and shrubs; however, the chip contaminated soil shall be replaced with approved clean planting soil in planting areas and with approved clean fill soil in all other areas.

E. Backfill and compact voids excavated and open pits and holes resulting from removal operations. Comply with Earthwork Specification for backfill materials, compaction and installation methods. Unless required otherwise, in planting areas backfill holes with clean approved planting soil compacted to 90% relative compaction to a minus 12 inches below finish grade and 85% relative compaction for the top 12 inches, except as required elsewhere to a greater degree by Civil or Structural Engineer. In non-planting areas backfill holes with approved fill soil compacted to 95% relative compaction.

F. Remove and replace trees indicated to remain that are more than 25% dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Architect determines are incapable of restoring to normal growth pattern.

A. Plant Replacement: Contractor shall replace trees cut or severely damaged due to the Contractor’s work as follows:
   1. An ISA Certified Arborist may be retained by the Owner to determine the condition of trees in question as to their ability to survive in a healthy condition and in their original shape, or a pruned aesthetically pleasing shape acceptable to the Owner. Comply with recommendations to rehabilitate as recommended by the Arborist, or to replace in accordance with the requirements below.

2. Trees size shall be determined by Diameter at Brest Height (DBH). Replacement of trees and shrubs shall also include providing acceptable plant installation, automatic irrigation system and a minimum maintenance period of 120 days. If plant(s) is not acceptably maintained and is not healthy and thriving at the end of the 120-day maintenance period, the Contractor shall continue the maintenance work until such time that healthy tree(s) and/or shrub(s) is achieved.
3. Replace any damaged planting in kind using "specimen" plants as follows and at no cost to Owner:
    a. Trees up to 3” DBH: Replace with 36" box size.
    b. Trees 3” to 6” DBH: Replace with 72" box size.
    c. Trees 6” to 12” DBH: Replace with 84" box size.
    d. Trees 12” DBH and larger: Tree value shall be determined by Arborist using Council of Tree and Landscape Appraisers (CTLA) method. Replace damaged tree with largest available nursery boxed tree and cash difference between value of damaged tree and nursery stock replacement cost.
    e. Shrubs: Replace with 15-gallon can size.
4. Plant and maintain new trees as specified.

B. Excess Mulch: Rake mulched area within protection zones, being careful not to injure roots. Rake to loosen and remove mulch that exceeds a 3-inch uniform thickness to remain.

C. Soil Aeration: Where directed by arborist, aerate surface soil compacted during construction. Aerate 10 feet beyond drip line and no closer than 36 inches to tree trunk. Drill 2-inch-diameter holes a minimum of 12 inches (300 mm) deep at 24 inches o.c. Backfill holes with an equal mix of augered soil and sand.

3.11 CLEANUP AND DISPOSAL

A. Disposal: Remove excess excavated material, displaced trees, trash, and debris and legally dispose of them off Owner's property.

B. Clean excess soil may be distributed on site as accepted by Owner's Representative, if it does not adversely affect specified finish grades or percolation of water into planting soil.

C. Upon completion of work under this Section, remove all tools, equipment and temporary protections, enclosures, and structures.

3.12 MEASUREMENT AND PAYMENT

A. Full compensation for complying with the above provisions shall be considered as included in the contract price for the various Bid Items and no separate payment will be made.

END OF SECTION

SECTION 32 13 12 - LANDSCAPE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide Portland cement concrete site work complete, including the following principal items:
   1. Retaining walls, stairs, planters, seat walls and benches.
   2. Curbs, walks and pavements, including aggregate bases.
   3. Footings for posts and structures.

B. Related requirements specified elsewhere include:
   1. Section 31 20 00, EARTHWORK

1.2 QUALITY ASSURANCE

A. Reference and Standards
   1. Perform work in accordance with all applicable laws, codes and regulations required by the City of Sausalito.
   2. Reference to "Standard Specifications" shall mean the current Standard Specifications of the State of California, Business and Transportation Agency, Department of Transportation, CALTRANS.
   3. The American Concrete Institute (ACI): "Manual of Concrete Practice," Parts 1, 2 and 3.
   4. The American Concrete Institute (ACI): “Recommended Practice for Concrete Formwork” (ACI 347R)
   5. The American Concrete Institute (ACI): "Hot Weather Concreting", 305R-99
   6. The American Concrete Institute (ACI): Guide for Concrete Slab construction, 302.1R-07
   7. The American Concrete Institute (ACI): "Standard Specification for Cold Weather Concreting, 306.1-90 (R2002)
   8. United States Voluntary Product Standard for Construction & Industrial Plywood (PS 1-95).
   9. American Plywood Association’s “Guide to Plywood Grades” (APA).
   10. West Coast Lumber Inspection Bureau’s “Standard Grading Rules No. 17” (WCLIB)
   11. Concrete Reinforcing Steel Institute (CRSI): “Manual of Standard Practice” and “Recommended Practice for Placing Reinforcing Bars”.
   12. American Welding Society: AWS A5.1 and AWS D1.1 and D1.2.
   13. Americans with Disabilities Act (ADA), Federal ADA/State of California Title 24 Standards.
   14. California Code of Regulations, Title 24, 2010 Edition, also known as California Building Code (CBC).

B. Stipulations
   1. Finish Surface Tolerance: 1/4-inch maximum variation in 10 feet.
   2. At no point shall paving surface fail to drain.

3. Finish Concrete Surface Slip Resistance: Shall have a minimum slip resistance coefficient of 0.65 on concrete pavement with less than 5% slope and 0.8 on concrete pavement with more than 5% slope.

4. Walls retaining soil that retain 18 inches or more of soil shall receive Dampproofing per Caltrans Standard Specifications, Section 54.
5. Contractor shall pour adjacent slabs in a way that does not impact finish quality or construction (expansion) joint dimensional stability.

C. Testing and Inspection, per Section 01 45 00.

D. Conform to ACI 306, Section 5.13 during hot weather and cold weather.

E. Requirements of ACI 318 shall govern work, materials and equipment related to this Section; specifications herein set minimum results required, and references to procedures are intended to establish minimal guides.

F. The Contractor shall be responsible for quality of concrete in place and shall bear burden of proof that concrete meets minimum requirements. Contractor shall confirm that site soils do not contain elevated levels of sulfate that would require sulfate resistant concrete as outlined in ACI 306. If the site soils contain elevated levels of sulfate, it is the Contractor's responsibility to request mixes that meet the requirements.

G. Placing of concrete by means of pumping will be an acceptable method of placement providing that the Contractor can demonstrate that:
1. Specified concrete strengths will be met.
2. Equipment has a record of satisfactory performance under similar conditions and using a similar mix.
3. Trial batches have been successfully made.

H. Installer Qualifications: Concrete work shall be by firm with 5 years experience with work of similar scope and quality.

I. Formwork Design Criteria: Formwork shall conform to ACI 347-04 and CBC.
1. Formwork:
   a. Shall prevent leakage or washing out of cement mortar.
   b. Shall resist spread, shifting, and settling.
   c. Shall reproduce accurately required lines, grades and surfaces within tolerances specified.
2. Safety: The Contractor shall be responsible for adequate strength and safety of all formwork including falsework and shoring.
3. Formwork allowable tolerances: Formwork shall produce concrete within tolerance limits recommended in ACI 347-04, unless otherwise noted.

1.3 TESTS

A. The Owner will select a qualified testing laboratory to take samples for testing during the course of the work as considered necessary. Costs for such tests will be paid by the Owner. Contractor shall cooperate in arranging tests and shall be responsible for notifying the designated laboratory in sufficient time to allow taking of samples at time of pour.

B. Should tests show that concrete is below specified strength, Contractor shall remove all such concrete, as directed by the Owner. Full cost of removal of low strength concrete, its replacement with concrete of proper specified strength and testing, shall be borne by Contractor.

1.4 COORDINATION

A. Coordinate items of other trades. Contractor shall be responsible for the proper installation of all accessories embedded in the concrete and for the provision of holes, openings, etc., necessary to the execution of the work of the trades.

1.5 SUBMITTALS.

A. Samples of all materials under this Division shall be supplied for testing as requested by the Owner.

B. Material certificates in lieu of material laboratory test reports when permitted by Engineer. Material certificates shall be signed by the manufacturer and Contractor certifying that each material item complies with or exceeds requirements. Provide certification from admixture manufacturers that chloride content complies with requirements.

C. Submit color additive manufacturer’s color chart and sample chip(s), indicate color additive number, and required dosage rate.

D. Submit two full-scale mock-up (minimum 4’ by 4’) sample panels of all concrete finishes and color. The samples shall include curing compound if any is to be used, and include an expansion joint and a score joint, as indicated on the Drawings. Approved samples shall be kept at the job site to serve as a prerequisite for all finishes until acceptance of the Work.

E. Submit one-pint samples of aggregate for exposed aggregate finished concrete paving in color range as specified.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Supply ready mixed concrete throughout. Batch, mix and transport in accordance with ASTM C-94, "Specifications for Ready Mixed Concrete."

B. Mix and deliver concrete in quantities that will permit immediate use only.

C. Indiscriminate addition of water for any reason will be cause for rejection of the load.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Cement and aggregates shall have proven history of successful use with one another. Sources of cement and aggregate shall remain unchanged throughout work.

B. Mixes:
1. Ready-mixed concrete shall meet requirements of ASTM C94.
2. The Contractor shall perform tests or assemble the necessary data indicating conformance with specifications.
3. For each mix, submit data showing that proposed mix will attain the required strength in accordance with requirements of Caltrans Standard Specifications, Section 90.
4. Instruct Laboratory to base mix design on use of materials specified and approved by the Owner's Representative.
5. Mix design shall include compression strength test reports per CBC Section 1905A.6.3.
6. Insure mix designs will produce concrete to strengths specified and of uniform density without segregation.
7. If mix yield exceeds 1-cubic yard, modify mix design to no more than one cubic yard, without changing cement content.
8. Introduction of calcium chloride will not be permitted.
9. Mix design shall be in accordance with CBC Section 1905A.3.

C. Concrete Types (See Drawings for any other miscellaneous items not listed below):

TYPE	28-DAY STRENGTH	AGGREGATE SIZE	FINISH & COLOR	COMMENTS
Slab on grade	3,000	1" X #4	See Drawings	

2.2 FORMWORK MATERIALS

A. Curbs may be formed with approved metal form systems.

B. Chamfer Strips: Meadow-Burke Concrete Accessories, PVC type CSF ½-inch or as otherwise shown, all exposed corners.

C. Form Release Agent: Must not stain or otherwise adversely affect architectural concrete surfaces. "Nox-Crete Form Coating"; Industrial Synthetics Corp.'s "Synthex"; or equal.

D. Form Ties: Burke "Penta-Tie," or equal, cone and rod type with 1-inch break-back.

2.3 REINFORCING MATERIALS

A. New, free of rust, Billet steel bars: Current ASTM designation A615.

B. Bar Reinforcement: ASTM A615.
   1. #3 and smaller: Grade 40.
   2. #4 and larger: Grade 60.
   3. Tie wire: #6 minimum, black and annealed.

C. Bar Reinforcement recycled content shall be a minimum of 75% recycled post-consumer steel.

D. Wire Fabric Reinforcement: ASTM A185. Size (6” by 6” / W1.4 By W1.4 (#10 ga. by #10 ga.)

E. All reinforcing steel, bolts anchors, sleeves, etc. shall be securely anchored in place before concrete is placed. All reinforcing details, fabrication and installation shall conform to ACI Standard 315, latest edition, except as noted. Stagger all splices where practical and not otherwise detailed. Minimum concrete protection for reinforcement shall be as follows unless otherwise noted:
   1. 3" clearance where concrete is placed against the earth.
   2. 2" clearance where concrete is exposed to earth or weather but placed in forms.

F. Accessories: Metal and plaster spacers, supports, ties, etc. as required for spacing, assembling and supporting reinforcing in place. Legs of accessories to be of type that will rest on forms without embedding into forms. Galvanized metal items where exposed to moisture, or use other approved non-corrodible, non-staining supports.

2.4 CONCRETE MATERIALS

A. Portland Cement: ASTM C150, Type II, except if water or soil is high in sulfates use Type V Portland Cement as described above under Quality Assurance. Use one brand of cement throughout project.

B. Fly Ash: ASTM C618, Class Type C or Type F. Can use with pozzolan, ground granulated blast furnace slag and silica furme.

C. Aggregates: ASTM C33, materials from established sources with proven history of successful use in producing concrete with minimum shrinkage.

D. Water: Clear and potable, free from deleterious impurities.

E. Admixtures:
   1. Admixtures are optional; however, a water reducer or plasticizing admixture shall be included in the concrete mix and it must be compatible with color pigments where color pigments are required. Any proposed admixture shall comply with ASTM C494.
   2. Where more than one admixture is proposed, include statement from admixture manufacturer indicating that admixtures proposed for use are compatible, such that desirable effects of each admixture will be realized.

3. Accelerating admixtures and admixtures containing more than 0.05 percent chloride ions are not permitted. If an accelerator is used, it shall be an non-chloride accelerator.
4. Liquid admixtures shall be considered part of the total water.

2.5 CONCRETE MIXES

A. Concrete mixes shall be approved and shall be in accordance with Caltrans Standard Specifications Section 90. Unless otherwise noted, mix shall contain not less than 590 pounds of cementitious material per cubic yard (Class "2", 3,000 psi,) Type II Portland cement and a maximum aggregate blend of 1" by #4.

B. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast furnace slag, and silica fume as needed to reduce the amount of Portland cement by 15 to 40 percent. Limit by percentage of weight of cementitious materials other than Portland cement in concrete mix.

C. Lampblack: As supplied by batch plant for plain non-colored concrete work. Concrete for non-colored pavements shall be darkened by the addition of lampblack at the mixer. The proportion of lampblack or other approved colorant shall be that required to properly darken the concrete to reduce glare, and shall be subject to the approval of the Owner's Representative. Provide ¾ pound of lampblack per cubic yard of concrete unless required otherwise.

2.6 ANCILLARY MATERIALS

A. Aggregate Base: Crushed aggregate, R-78 minimum, 3/4-inch maximum, conforming to Standard Specification 26.1.02A, Class 2.

B. Expansion Joint Material
1. Fiber Expansion Joint: A non-extruding resilient filler, saturated with high quality bituminous materials having preserving characteristics. Conform to ASTM-D1751-04.

C. Dampproofing: Per CALTRANS Standard Specifications, Section 54.

D. Curing Materials for non-colored Concrete:
1. Waterproof Paper: ASTM C171, Type 1.1.1.1, regular. Same as Sisalkraft Division of St. Regis Paper Co.'s "Orange Label", or equivalent.
2. Impervious sheeting: 4 mil white polyethylene laminated to 10 oz. Burlap, ASTM C171, Type 1.1.3, fungus-resistant.
3. Curing Compound: ASTM C309. Product: Sealtight 1100 Clear-Series by WR Meadows, Burke Azua Resin Cure by Edocol, or equal that will not discolor concrete or affect bonding of other finishes applied thereafter, and which restricts loss of water to not more than 0.500 grams per sq. centimeter of surface when tested per ASTM C156, "Test Method for Water Retention by Concrete Curing Materials."

E. Grout: Premixed high strength non-shrink grout requiring only addition of water at the site. Burke's "Non-Ferrous, Non-Shrink Grout"; Master Builders "Masterflow 928 Grout", or equal.

F. Patching Mortar: Mix in proportions by volume of one part cement to two parts fine sand.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. Install all concrete work true to line and grade as indicated on the drawings.

B. Correct irregularities to the satisfaction of the Owner's Representative.

C. Plain non-colored, exposed concrete shall contain lampblack, approximately 3/4 pound of lampblack per cubic yard, as accepted by Owner’s Representative.

D. The intent of the Grading Drawings is to provide positive drainage and to maintain slopes on walkways as required by the Americans with Disabilities act and California Title 24 throughout the project site. Notify the Owner's Representative immediately of any discrepancies between the Drawings and actual field conditions and/or conflicts between the design and Code requirements.

3.2 PREPARATION

A. Examine subgrades and installation conditions. Do not start concrete work until unsatisfactory conditions are corrected.

B. Provide subgrade preparation and the base material installation complete, including clearing, grading, excavation, filling and dewatering. Take every precaution to obtain a subgrade of uniform bearing power compacted to a minimum of 95% relative compaction as determined by the ASTM D1557 laboratory test procedure and in Sections 19 and 20 of the Caltrans Standard Specifications.

C. Subgrade shall be kept moist and shall not be allowed to dry out before placement of concrete. Place no material on muddy subgrade. Remove un-compactable material and replace with clean fill and compact as required.

D. Aggregate base, where indicated, shall be placed and compacted in conformance with Caltrans Standard Specifications 26-1.04 and 26-1.05.

E. Obtain approval of subgrade from Owner's Representative prior to placing steel and concrete.

3.3 FORMS

A. Forms shall be constructed in accordance with ACI 318, Section 6.1 and shall be of sufficient strength and sufficiently tight to prevent visible distortion or leakage of mortar and fines.

B. Curb and pavement edge forms shall extend full depth of concrete and shall be coordinated with installation of planting root barriers where required. Curves shall be formed with flexible

metal or wood made up of thin laminations. Curve forms shall extend one stake space straight beyond tangent point. Where curbs and pavement are adjacent to areas to receive root barriers, provide smooth uniform edges. Remove any excess concrete as required to allow installation of root barriers without gaps between curbs and/or pavement and barriers

C. Maintain forms within the following tolerances.

1. Top of Form: Plus or minus 1/8 inch in 10 feet and no abrupt variations; at required elevation to plus 3/8 inch.
2. Face of Form: Plus or minus 1/4 inch in 10 feet longitudinal and no abrupt variations; perpendicular to surface plus or minus 1/8 inch.

D. Form Ties: Align form ties as accepted by Owner's Representative. Obtain approval of form work from Owner's Representative prior to placing concrete.

E. Forms may be reused upon cleaning and coating with parting compound to ensure separation from concrete without damage.

F. After concrete is placed, the following minimum times shall elapse before removal of forms.
1. Footing sides: 24 hours.
2. Curbs: 1 hour

3.4 REINFORCEMENT

A. All concrete footings, walls, grade-beams shall be steel reinforced unless specifically noted to be "not reinforced." If no reinforcement is shown, reinforce in same manner as that shown in similar places or as accepted by Owner's Representative.

B. Fabricate and place reinforcement as indicated on the Drawings and in accordance with ACI "Detailing Manual" SP-66. No reinforcement shall be placed prior to distribution of the approved shop drawings.

C. Secure reinforcement in position by suitable supports and by wiring at intersections with tie wire. Supports shall be of sufficient number and strength to resist crushing or displacement under full load. Metal shall not extend to surface of concrete.

D. At time of placing concrete, reinforcing shall be free of excessive rust, mill scale, or other bond reducing matter. Immediately before placing concrete, check and adjust position, support and anchorage.

3.5 CLEANING, PATCHING AND DEFECTIVE WORK

A. Where concrete is under strength, out of line, level or plumb, or shows objectionable cracks, honeycombing, rock pockets, voids, spalling, exposed reinforcement, signs of freezing, mismatched color, or is otherwise defective, and, in the Owner's Representative's judgment, these defects impair proper strength or appearance of the work, the Owner's Representative will require its removal and replacement at the Contractor's expense.

B. Immediately after stripping and before concrete is thoroughly dry, patch minor defects, form-tie holes, honeycombed areas, etc., with patching mortar colored and textured to match concrete. Remove ledges and bulges.

C. Compact mortar into place and neatly file defective surfaces to produce level, true planes. After initial set, dress surfaces of patches mechanically or manually to obtain same texture as surrounding surfaces.

D. Rock Pockets:
   1. Cut out to full solid surface and form key.
   2. Thoroughly wet before casting mortar.
   3. Where the Owner's Representative deems rock pocket too large for satisfactory mortar patching as described, cut out defective section to solid surface, and replace.

E. Cleaning
   1. Insure removal of bituminous materials, form release agents, bond breakers, curing compounds, if permitted and other materials employed in work of concreting that would otherwise prevent proper application of sealants, liquid waterproofing, and other delayed finishes and treatments.
   2. Where cleaning is required, take care not to damage surrounding surfaces or leave residue from cleaning agents.

3.6 MIXING AND PLACING CONCRETE

A. Conform to applicable requirements set forth in Caltrans Standard Specifications Section 51-1.09 and Section 90.

3.7 JOINTS AND GROOVES IN FLAT WORK

A. Plane of joints shall be perpendicular to surface. Where new pavements join existing, joints shall align.

B. Sawn Contraction Joints:
   1. General: Provide where shown. Saw cut straight, true, and uniform, 1/8 -inch wide and not less than 1/4 of slab thickness in depth , unless otherwise noted. Cut with a power saw fitted with an abrasive or diamond blade.
   2. Commence saw cutting operations after concrete has cured long enough to resist damage by the saw cutting operations and early enough to avoid random contraction cracks.
   3. Contractor shall coordinate form removal and sequencing of adjacent concrete placement to minimize unnecessary saw cutting of adjacent surfaces.
   4. Contractor shall plan for the use of varying types of saw cutting apparatus to provide acceptable finishes in areas limited in accessibility.
   5. Fill saw cut over-runs and inadvertent saw cutting of adjacent surfaces with cement mortar to match color and finish of sawn pavement.

6. If the joint pattern is not shown, provide joints not exceeding 6 feet in either direction and located to conform to column centerlines, wall corners, etc. as accepted by Owner's Representative.

C. Expansion Joints in Flat Work: Provided at the location and intervals as shown on the drawings, and at all locations where concrete paving abuts buildings, curbs, walls, columns, or other structures, and not more than 16 feet on center. Specified and shown joint material shall be placed with top edge 1/8" 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 an edging tool to provide a smooth uniform impression. All edges shall be struck before and after brooming.

3.8 FINISHING

A. Flatwork and Curbs
   1. Surface Finishes

B. Washed Exposed Aggregate Finish:
   1. Place concrete using specified aggregate/concrete mix, screed tamp and bull float to desired elevation. A compatible water-reducing retarding admixture may be added in warm weather if desired. Apply surface retardant as soon as screeding and floating is complete.
   2. If concrete is pumped into forms, lightly top seed surface of concrete with additional 3/8" size aggregate as required to match approved sample.
   3. Cover slab with acceptable curing cover to prevent drying out. If fog cure is employed, start no sooner than recommended by retardant manufacturer.
   4. Check retarded surface at regular intervals to determine optimum time for removing retarded surface mortar.
   5. Broom and wash aggregate surface to remove mortar to its optimum (approximately 1/8" to 1/16" at surface stone depth) to match sample.
   6. After aggregate is exposed, proceed with proper curing.

3.9 CURING

A. Cure non-colored exposed concrete in accordance with Caltrans Standard Specifications Section 90-7.

B. When applying Curing Compound, apply after initial set of fresh concrete when bleed water has evaporated from surface using a "Hudson-type" airless sprayer in accordance with manufacturer's specifications.

C. Only water or curing compounds which impart no permanent color or gloss shall be used for curing concrete.

3.10 CLEANUP: Per Section 01 77 00.

3.11 MEASUREMENT AND PAYMENT

A. Full compensation for complying with the above provisions shall be considered as included in the contract price for the various Bid Items and no separate payment will be made.

END OF SECTION

SECTION 32 33 00 - SITE FURNISHINGS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Furnish and install all site furnishings shown on drawings and specified in accordance with the manufacturer's instructions and as shown on the drawings and as specified.

B. Related requirement specifications elsewhere:
   1. Section 32 13 12, SITE CONCRETE

1.2 REFERENCES

A. Perform work in accordance with all applicable laws, codes and regulations required by the City and the State of California.

B. Manufacturer’s Instructions:
   1. Where required in the Specifications that materials, products, processes, equipment or the like to be installed or applied in accordance with manufacturer’s instructions, directions or specifications, or words to this effect, it shall be constructed to mean that said application or installation shall be in strict accordance with printed instructions furnished by the manufacturer of the material for use under conditions similar to those at the job site.
   2. All site furnishings shall be anchored or otherwise secured to prevent movement, unless stated otherwise. Provide concrete footings, corrosion resistant clips, etc. as accepted by the Owner's Representative.

C. Reference Standards:
   1. State of California, Business and Transportation Agency, Department of Transportation: “Standard Specifications.”
   2. Manufacturers’ specifications and recommendations.

1.3 COORDINATION

A. Coordinate items of other trades. Contractor shall be responsible for the proper installation of all accessories embedded in concrete and for the provision of connections, holes, openings, etc., necessary to the execution of the work of the trades.

1.4 SUBMITTALS:

A. Trash Receptacles, including required leveling spacers.

B. Bike Racks

C. Tree Grates

D. Bollards

E. Drinking Fountain

PART 2 - MATERIALS

2.1 TRASH RECEPTACLES

A. Model: CG35 (Waste, Recycling, Compost), Colors: Sky Blue (Recycling), Black (Waste), Fir Green (Compost). Contractor to confirm colors, openings, and graphics match existing Sausalito standards. Manufacturer – BEARSAVER/SECURR, PO Box 1438 Guasti, CA 91734, 909-212-5379.

2.2 BIKE RACK

A. Model: 696C Vroom Bicycle Rack Large, Casting in Ground, powder-coated aluminum, RAL 7026 Granite Grey; manufacturer: Vestre, 663 San Juan Avenue, Los Angeles, CA 90291, (212-634-9658).

2.3 TREE GRATES

A. Model: ADA-M6058, with two (2) holes for tree stakes, 100% recycled gray iron, 60” x 60,” RAL 7026 Granite Grey; contractor to submit shop drawings. Manufacturer: Ironsmith, 41-701 Corporate Way #3 Palm Desert, CA 92260, (800-338-4766).

2.4 BOLLARDS

A. Model: 99 622 Non-Illuminated System Bollard Tube, 7 ½” dimeter with B79817 Anchorage Kit, RAL 7026 Granite Grey; manufacturer: Bega, 1000 BEGA Way, Carpinteria, CA 93013, (805-684-0533).

B. Model: 71 127 Non -Illuminated Cap, 7 ½” diameter, RAL 7026 Granite Grey; manufacturer: Bega, 1000 BEGA Way, Carpinteria, CA 93013, (805-684-0533).

2.5 DRINKING FOUNTAIN

A. Model : LK4420BF1U, Elkay Outdoor ez H2o Upper Bottle Filling Station Bi-Level Pedestal Non-Filtered Non-Refrigerated Drinking Fountain; color: Evergreen (EVG). Manufacturer: ELKAY 1-800-476-4106.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

A. Install manufactured items in accordance with the manufacturer's instruction and as shown in the drawings and as specified herein.

B. Perform all work in accordance with all applicable laws, codes and regulations required by the State of California and the City of Sausalito.

C. Set all work true and square, plumb, and level. Remove and replace any wood that splits during or after erection until acceptance. Keep nailing neatly lined up.

D. Fabricate wood in as long pieces as practical unless otherwise indicated. End joints shall occur at supports. Keep all work clean, accurately cut, closely fitted and set to the required lines and levels. Blunt exposed edges by sanding or with plane.

E. Place washer under the head and nut of bolts where same bear on wood, except head of carriage bolt. Drill bolt holes same diameter as bolt.

F. Size bolts to fit flush with nuts. Countersink nuts and bolts as detailed.

G. Hammers with scored faces shall not be used in nailing.

H. Supply all miscellaneous metal units and install as specified herein under the Sections entitled "Miscellaneous Metalwork" and "Galvanizing." Hot-dip galvanize all metal fastenings, angles, etc., after complete fabrication.

I. Galvanized metal that is cut, damaged, or modified after fabrication shall be immediately painted with Zinc-rich paint to prevent rusting.

J. Touch up paint any damaged surfaces to match original finish as accepted by Owner's Representative.

K. Set site furniture, level. Provide spacers under furniture to level as specified herein and acceptable to Owner’s Representative

L. Transport, store and handle precast units and manufactured items in a manner to avoid hairline cracks, staining or other damage. Store units free of the ground and protected from mud or rain splashes. Cover units, secure covers firmly, and protect the units from dust, dirt or other staining material.

3.2 TRASH RECEPTACLES

A. Install level and in accordance with the manufacturer's instruction and as shown. Provide spacers under receptacles to level as specified and acceptable to Owner’s Representative.

3.3 BIKE RACKS

A. Install in accordance with the manufacturer's instruction and as shown.

3.4 TREE GRATES

A. Install in accordance with the manufacturer's instruction and as shown.

3.5 BOLLARDS

A. Install in accordance with the manufacturer's instruction and as shown.

3.6 DRINKING FOUNTAIN

A. Install in accordance with the manufacturer's instruction and as shown.

3.7 CLEANUP, per Section 01 77 00.

3.8 MEASUREMENT AND PAYMENT

A. Full compensation for complying with the above provisions shall be considered as included in the contract price for the various Bid Items and no separate payment will be made.

B. Trash Receptacles, Bike Racks, Tree Grates Bollards and the Drinking Fountain: The unit of measure for payment shall be per each unit. Payment shall be made at the bid price per item for each item complete in place and shall include the cost of installation as required. Full compensation for all incidentals arising from this work shall be considered as included in the price paid per unit of measure and no further compensation shall be allowed.

END OF SECTION

SECTION 32 84 00 - IRRIGATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. The work in this section consists of furnishing, layout and installing an irrigation system complete, including certification of irrigation system installation as required by the State of California Model Water Ordinance described herein.

B. Related work specified elsewhere includes:
1. Section 31 20 00, EARTHWORK
2. Section 32 90 00, PLANTING

1.2 CALIFORNIA MODEL WATER EFFICIENT LANDSCAPE ORDINANCE REQUIREMENTS

A. Contractor shall be familiar with and follow the State of California Model Water Ordinance, California Code of Regulations, Title 23 Waters, Division 2, Department of Water Resources, Chapter 2.7. Also, the Contractor is responsible to follow all local water ordinances.

B. Pursuant to the requirements of the California Model Water Efficient Landscape Ordinance, the Contractor shall submit a Certification of Installation to the Local Jurisdiction /water purveyor as described in the construction documents and these specifications. Certification shall at a minimum include the following documents:

PART 1. Project Information Sheet
PART 2. Certification of Installation according to the landscape documentation package.
PART 3. Irrigation Scheduling and Controller Programming
PART 4. Schedule of Landscape and Irrigation
PART 5. Landscape Irrigation Audit Report
PART 6. Soil Management/Analysis Report with verifying implementation, see Planting Specification for analysis requirements.

1.3 QUALITY ASSURANCE

A. Manufacturer's Specifications: Follow manufacturer's current printed specifications and drawings in all cases where the manufacturers of articles used in the Contract furnish directions covering points not specified or shown in the drawings.

B. Ordinances and Regulations: All local, municipal, and state laws, codes and regulations governing or relating to all portions of this work are hereby incorporated into and made a part of these Specifications. Anything contained in these Specifications shall not be construed to conflict with any of the above codes, regulations, or requirements of the same. However, when these Specifications and Drawings call for or describe materials, workmanship or construction of a better quality, higher standard, or larger size than is required by the above codes and regulations, the provisions of these Specifications and Drawings shall take

precedence. Furnish without extra charge additional materials and labor required to comply with above rules and regulations.

C. References, Codes and Standards:
1. State of California Model Water Efficient Landscape Ordinance
2. California Environmental Quality Act (CEQA)
3. Water Use Classification of Landscape Species (WUCOLS IV).
4. American Society of Irrigation Consultants (ASIC) Design Guidelines.
5. California Landscape Standards, California Landscape Contractors Association, (CLCA) Sacramento, California.
6. CAL-OSHA, Title 8, Subchapter 4-Construction Safety Orders and Subchapter 7-General Industry Safety Orders.
7. California Electric Code.
8. California Plumbing Code (UPC) published by the Association of Western Plumbing Officials.
9. NFPA 24, Section 10.4, Depth of Cover.
10. Underwriters Laboratories (UL): Electrical wiring, controls, motors and devices, UL listed and so labeled.
11. American Society of Testing Materials (ASTM).

D. Furnish without extra charge any additional material and labor when required by the compliance with all above mentioned codes and regulations, though the work be not mentioned in these specifications or shown on the drawings.

E. Experience: Assign a full-time employee to the job as supervisor for the duration of the Contract with a certified landscape technician, irrigation certification through CLCA or minimum of four (4) years of experience in landscape irrigation installation.

F. Labor Force: Provide a landscape installation and maintenance force thoroughly familiar with, and trained in, the work to be accomplished to perform the task in a competent, efficient manner acceptable to the Owner's Representative.

G. Explanation of Drawings:
1. Due to the scale of the Drawings, it is not possible to indicate all piping offsets, fittings, sleeves, etc., which may be required. Carefully investigate the conditions affected all of the work and plan accordingly and furnish all required fittings. Install system in such a manner to avoid conflicts with planting, utilities, and architectural features.
2. Do not install the irrigation system as shown on the Drawings when it is obvious in the field that obstructions, grade differences or discrepancies in arc dimensions exist that might not have been considered in engineering. Bring such obstruction or differences to the attention of the Owner's Representative. Notify and coordinate irrigation Work with applicable contractors for location and installation of piping and sleeves through or under walls, pavement, and structures. In the event this notification is not given, the Contractor shall assume full responsibility for any revision necessary.

H. Trench Interference with Tree Root Systems:
1. Prior to trenching, layout main and lateral line locations within Drip Line of trees and review locations with Owner's Representative. Relocate any lines that may interfere

with existing root systems to avoid or reduce damage to root systems as accepted by Owner's Representative.

2. Mechanical Trenching is not allowed within dripline of existing trees to be protected except as approved by Landscape Architect

I. Coordinate plant locations with emitter locations.
   1. Adjust plant locations in relation to the subsurface emitter s as required to ensure that the plant roots receive the proper amount of water for it to thrive.
   2. Coordinate planting and irrigation and provide hand watering of emitter irrigated and drip irrigated areas as required to maintain moist root zones until end of plant establishment period.

1.4 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

A. The Drawings show, if applicable, existing above and below grade structures and utilities that are known to the Owner. Locate known existing installations before proceeding with construction operations that may cause damage to such installations. Existing installations shall be kept in service where possible and damage to them shall be repaired with no adjustment of Contract Sum. Verify with Owner if As Built drawings are available.

B. If other structures or utilities are encountered, request Owner's Representative to provide direction on how to proceed with the Work. If a structure or utility is damaged, take appropriate action to ensure the safety of persons and property.

C. Verify location of existing irrigation systems to be removed and/or replaced. Maintain any existing systems as required by the Drawings and Specifications, including temporary retention of systems necessary to maintain existing on site and adjacent planting.

1.5 SUBMITTALS

A. Materials List:
   1. Submit required copies of the cut sheets and a complete list of materials proposed for installation, along with any proposed substitutions clearly identified and obtain the Owner Representative's written approval thereof before proceeding. Use only accepted materials and items of equipment.
   2. List all materials by manufacturer's name and model number.
   3. Submit to Local Water Purveyor with copy to the Owner Certification of Installation as required by the State of California Model Water Ordinance.

B. Substitutions:
   1. If the Contractor desires to substitute a product, he shall list each item and note it as a "substitution" and provide the following information:

      a. Descriptive information describing its similarities to the specified product.

   2. If the product is approved and, in the opinion of the Owner's Representative, the substituted product does not perform as well as the specified product, the Contractor shall replace it with the specified product at no additional cost to the Owner.

C. Operations and Maintenance Manuals:
   1. Prior to the final acceptance of the irrigation system, furnish three (3) individually bound Operation and Maintenance Manuals to the Owner's Representative for use by the Owner. The manuals shall contain complete enlarged drawings, diagrams and spare parts lists of all equipment installed showing manufacturer's name and address. In addition, each Service Manual shall contain the following:
      a. Index sheet indicating the Contractor's name, address and phone number.
      b. Copy of the Landscape Irrigation Audit
      c. Copy of the 12-month irrigation schedule and estimate of annual water consumption
      d. Copies of equipment warranties and certificates.
      e. List of equipment with names, addresses and telephone numbers of all local manufacturer representatives.
      f. Complete operating and maintenance instructions in sufficient detail to permit operating personnel to understand, operate and maintain all equipment.
      g. Parts list of all equipment such as controllers, valves, solenoids and heads.

D. As-Built Drawings:
   1. Dimension the location of the following items from two (2) permanent points of reference such as building corners, sidewalks, road intersections, etc.:
      a. Connection to existing water lines/meter.
      b. Connection to electrical power.
      c. Gate valves.
      d. Routing of irrigation pressure lines (a dimension at least every 100 feet and as required to identify all changes in direction and location).
      e. Remote control valves.
      f. Routing of control valves.
      g. Quick coupling valves.
      h. All sleeve locations.
      i. Routing of all control wiring.
      j. Include all invert elevations below 12".
   2. Deliver a reproducible As-Built Drawing to the Landscape Architect or Owner’s Representative within seven (7) working days before the date of final review. Delivery of the record drawings shall not relieve the Contractor of the responsibility of furnishing required information in the future.

E. Controller Plan:
   1. Provide one Irrigation Diagram plan in each controller housing. The plan shall show the area controlled by each valve in different colors and for orientation, any major permanent structure such as buildings and roads.
   2. Charts to be waterproof and hermetically sealed between two pieces of transparent 10 mil thick plastic and installed in each controller on the door as accepted by the Owner's Representative no later than the time of the coverage test of the irrigation system.

F. Maintenance Material - supply the following tools to the Owner:
   1. Three (3) sets of specialized tools required for removing, disassembling and adjusting each type of irrigation, valve or other equipment supplied on this project.
   2. Two (2) keys for each type of equipment enclosure.
   3. Two (2) keys for each type of automatic controller.

4. Two (2) keys for each type of valve (including square type key for valves larger than 2")
5. Two (2) quick-coupler keys and matching hose swivels for each type of quick-coupling valve installed.
6. All lock keys shall be keyed alike.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Furnish and deliver materials in manufacturer's packaging, bearing original legible labeling.

B. The Contractor is cautioned to exercise care in handling, loading, unloading, and storing PVC pipe and fittings. All PVC pipe shall be transported in a vehicle which allows the length of the pipe to lie flat so as not to subject it to undue bending or concentrated external load at any point. Any section of pipe that has been dented, cracked, or otherwise damaged shall be discarded and, if installed, shall be replaced with new piping.

1.7 SEQUENCING AND SCHEDULING

A. Acceptance: Do not install main line trenching prior to acceptance by Owner's Representative of rough grades completed under another Section.

B. Coordination: Coordinate with the work of other sections to insure the following sequence of events:
1. Sleeves and Conduits: Installation of all sleeves and conduits to be located under paving and through walls prior to placement of those materials.
2. Bubbler Heads: Install after placement of tree, but prior to backfill with planter soil mix.
3. On-Structure Equipment: Install piping and risers after waterproofing is accepted.
4. Irrigation Head in Pots: Install riser and seal the penetration of the pot prior to backfill of pot with drainage materials and planter soil mix.
5. Coordinate work schedule with Owner to avoid disruption of landscape maintenance of existing landscaping.
6. Install piping prior to soil preparation (planting soil amendment installation).

1.8 WARRANTY

A. In addition to manufacturer's guarantees and warranties, work shall be warranted for one (1) year from date of final acceptance against defects in material, equipment, and workmanship. Warranty shall also cover repair of damage to any part of the premises resulting from leaks or other defects in materials, equipment and workmanship to the satisfaction of the Owner.

B. Include a copy of the warranty form in the Operation and Maintenance Manual.

1.9 OPERATION

A. Routine: Inspect and adjust all spray heads and control valves including raising or lowering of spray head heights to accommodate plant growth and weather conditions.

B. Controller: Inspect regularly for power interruption and reset clock as required. Adjust station timing to accommodate changes in plant growth and weather conditions.

C. System Failure: Perform all repairs within one (1) operating period. Replacements to match removed products and materials in all respects. Report promptly all damage not resulting from Contractor's operations. Repair all damage caused by Contractor at no expense to Owner.

D. Climate Change: Set and program automatic controllers in response to seasonal requirements and requirements of newly planted materials.

PART 2 - PRODUCTS

2.1 PIPE

A. Pressure Main Line Pipe and Fittings: All PVC fittings shall bear the manufacturer's trademark name, material designation, size, applicable I.P.S. schedule and NSF seal of approval.

B. All main line pipe shall be solvent welded and shall be schedule 40 unless shown otherwise on the Drawings.
1. PVC Pressure Rated Pipe: ASTM D2241 NSF approved Type I, Grade I, solvent welded PVC with an appropriate standard dimension ratio (S.D.R.).
2. PVC Scheduled Pipe: ASTM D1785 NSF approved, Type I,
3. Grade I, solvent welded PVC.
4. PVC Solvent-weld Fittings: ASTM D2466 Schedule 40, 1-2, II-I NSF approved.
5. Solvent Cement and Primer for PVC solvent-weld pipe and fittings: Type and installation methods prescribed by the manufacturer.
6. Connections between Main Lines and RCVs: Schedule 80 PVC (threaded both ends) nipples and fittings unless required otherwise by local jurisdiction.
7. Valves 2-inch and larger shall be flanged only.
8. Copper pipe shall be Type K or Red Brass where threaded joints are required and Type L otherwise.

C. All lateral line pipe shall be solvent welded and shall be schedule 40 unless shown otherwise on the Drawings.

2.2 CONDUITS & SLEEVES

A. Sleeving shall be Schedule 40 PVC pipe sleeves and a minimum of two times the aggregate diameter of all pipes contained within the sleeve. Provide vertical sweep for all electrical conduit on each side of hardscape and terminate ends at 12" minimum depth and 12" from hardscape surface.

2.3 BACKFLOW PREVENTION DEVICE – reuse existing

A. As required by Code and as shown on Drawings. Verify with Owner if Anti-freeze Jacket is required and provide as required.

B. Riser assemblies from main line burial depth to backflow preventers shall be Schedule 40 brass pipe.

C. All metallic pipe and fittings installed below grade shall be painted with two coats of Koppers #50 Bitumastic, or approved equal. Pipes may be wrapped with an approved asphaltic tape in lieu of the liquid-applied coating.

2.4 BACKFLOW PREVENTION DEVICE ENCLOSURE

A. "Smooth Touch" enclosure without sharp edges, by Strong Box, available from V.I.T., Escondido, CA (800) 729-1314 or equal. Coordinate size of enclosure with plumbing for minimum clearance and size. Enclosure to include concrete footing with hasp and staple to receive padlock. Padlock N.I.C.

2.5 CONTROLLERS(S):

A. Wall-mounted if located in Visitor Information Enclosure. Otherwise pedestal-mounted irrigation controller, as shown on drawings, and with the following minimum requirements.

B. Shall be weather – based and be compatible with rain shut off sensor.

C. Shall be user-friendly. The controller must have a minimum 20-character readout display describing actions or options, or a full visible panel of buttons, dials, or switches that control all different functions separately.

D. Shall have the ability to start a programmed sequence of valves a minimum of 5 times a day per program.

E. Shall have ability to easily and quickly change watering schedules due to change in weather.

F. Provide portable hand-held remote device compatible with controller and capable of operating all control valves.

G. Provide rain shut off device as manufactured by Control System manufacturer capable of shutting off all control valves. Locate in a location exposed to rain and hardwire to controller.

2.6 CONTROLLER GROUND

A. Provide each pedestal controller with its own ground rod. Separate the ground rods by a minimum of eight feet. The ground rod shall be an eight foot long by 5/8" diameter U.L. approved copper clad rod or as recommended by controller manufacturer. Install no more than 6" of the ground rod above finish grade. Connect #8 gauge wire with a U.L. approved

ground rod clamp to rod and back to ground screw at base of controller with appropriate connector. Make this wire as short as possible, avoiding any kinks or bending. Install within pedestal housing base unless otherwise noted.

B. Provide each irrigation controller with its own independent low voltage common ground wire.

2.7 CONTROLLER ENCLOSURES

A. Type: Use one of the following (unless noted otherwise on the Drawings). Verify correct equipment to fit the specified equipment:
   1. Stainless steel, NEMA Type 3 rated, with back panel, padlocking hasp and padlock Rain Bird, Le Meur, "Strong Box" or approved equal. See Detail for pedestal construction.
   2. Rain Bird, “Non-Central” Controller Assemblies
      a. LXMM – ESP – LXM Cabinet, Powder Coated Steel
      b. LXMMPED – ESP-LXM Pedestal, Powder Coated Steel
   3. from Rain Bird Services Corporations “Package Systems" for “Central Control” projects. Available from Rain Bird Services Corporation (RBSC) (888) 444-5756.
   4. Le Meur, (714) 822-5100.
   5. "Strong Box" available from John Deere, (800) 347-4272.

2.8 MASTER CONTROL VALVE

A. Master control valve shall be a 24 VAC, industrial type, solenoid control valve, Griswold 2000 series or equal. Valve shall be equipped with spring loaded packless diaphragm, cast iron body and bronze trim. The valve shall be of the normally open type and shall be equipped with four-prong (cross) flow control. Valve shall be slow closing without chatter settings or adjustment. Valve shall have a mechanical self-purging internal control system with tapered, serrated, scrubbing rod through diaphragm for positive, variable port opening and cleaning. No solenoid port screens. Valve solenoid shall be corrosion-proof, molded in epoxy to form one integral unit with no connection shunts and shall be 24 VAC, 3 watt maximum.

2.9 FLOW SENSORS

A. Compatible with controller and as recommended by controller manufacturer.

2.10 ISOLATION VALVE

A. Valves 3 inches and smaller: 125 lb. WSP bronze gate valve with screw-in bonnet, non-rising stem and solid wedge disc, NIBCO T-113 K, or approved equal. Valves shall be line size.

B. Valves larger than 2”: shall have square nut stem and o-ring connections for key operation.

2.11 QUICK COUPLER VALVES:

A. Quick coupler valves shall be as listed on the Drawings with 10" diameter black box and black lid similar to isolation valve box described below.

2.12 BOX FOR ISOLATION & QVALVE & QUICK COUPLER VALVES

A. 10" diameter black plastic, Ametek, Brooks, Christy, Rain Bird with bolt down black lid marked "irrigation," or accepted equal. Avoid locating valve in paved areas. Provide H/20 Loading concrete box with bolt-down concrete lid if valve is located in paved area. Obtain location approval by Owner's Representative.

2.13 REMOTE CONTROL VALVE: As shown on Drawings and with the following minimum requirements:

A. Remote control valves shall be those normally manufactured for irrigation systems and shall have a slow, consistent speed of closure through entire closing operation, including last portion. To ensure this, the effective diaphragm working area/valve seating opening ratio must be a minimum 3 to 1.

B. Shall be mechanically self-cleaning to help prevent diaphragm or solenoid port plugging. To ensure this, the flush rod should be tapered to vary the size of the port opening as the diaphragm raises and lowers, thus allowing trapped material to escape. Rod is to be finished with a serrated surface to help scrub trapped material out. Screens not acceptable.

C. Shall have removable valve seat so valve can be repaired without removal from irrigation line.

D. Shall have ability to operate manually without the use of wrenches or special keys.

E. Shall have one-piece solenoid that attaches directly to valve without shunts or clips that can be lost.

F. Shall have cross top handle to adjust maximum travel of diaphragm to allow "tuning" of valve and closure.

2.14 BOX FOR REMOTE CONTROL VALVE

A. Rectangular black plastic valve box - Ametek, Carson, Christy, Rain Bird or accepted equal with non-hinged bolt down. Box body shall have knock outs. Do not saw cut body. The minimum size box is as shown on Drawings. Increase box size as required to fit. Valve box lids are to indicate the controller letter and station number of valve as accepted by Owner's Representative. Also refer herein to required polyurethane tag at valve solenoid control wire under Control Wires. Locate the identification in center of the lid. Provide separate box for each valve. Provide H/20 Loading concrete boxes with bolt-down concrete lids for all valves that occur in paved areas.

2.15 DECODERS

A. Controller shall interface with decoders, each capable of controlling 1, 2, 4 or 6 remote control valves. Provide a sensor decoder for flow sensor(s) on two wire path.

B. Wire connections from decoder output to solenoid shall be 14AWG. Wire distance from decoder output to solenoid under normal conditions shall not exceed 150 feet. Install in valve box secured and with bottom of decoder facing up.

C. Contractor shall indicate associated valve numbers on manufacturer provided label on decoder with permanent marker.

2.16 CONTROL WIRES

A. 14AWG for two-wire cable path shall be twisted and jacketed Paige P7072D wire,or approved equal within Sch. 40 PVC 1.25 inch conduit. Coated wire shall not be accepted as an equal. Acceptable equal products must consist of two separately PE jacketed wire twisted inside of a PE jacket.

B. Contractor shall install 14AWG wire cable for wire path length up to 10,000 feet, and 12AWG wire cable for wire path length up to 15,000 feet.

C. Wire jacket colors shall be such to facilitate the identification of various wire path zones: provide chart for wire type, color and associated valves

D. The controller shall provide a minimum of three, two-wire paths per output module. Contractor shall not connect any two wire path from one output module to another output module.

E. Wire connection from decoder output to solenoid shall be colored to match the associated decoder output station color; red and blue colored wires shall not be used for connection between decoder output and solenoid.

2.17 WIRE SPLICES

A. Provide polyurethane tag at valve solenoid control wire that shows the controller number and station number. Also refer to valve box lid identification

B. All connections and splices in the red/blue two wire path must be made with 3M DBR/Y-6 waterproof connectors installed per manufacturer’s instructions in valve box with open end of connector facing down.

2.18 SPRAY HEADS

A. Pop-up as shown on drawings and with the following minimum requirements:

B. Shall have approximately 30 psi water pressure coming out of nozzle to prevent "fogging" or misting. Shall have pressure-compensating devices.

C. Shall have ability to prevent low head drainage. Use heads with integral check valves.

D. EXAMPLE – Rain Bird 1800 Spray Body with SAM -PRS Series

E. Shall not have spray blocked by turf or shrubbery

2.19 SWING JOINTS

A. Bubblers: Use Dura, Lasco, Rain Bird or equal pre-assembled swing joints with O-rings.

2.20 QUICK COUPLING VALVE

A. Dura 1-inch 1-A2-1-11-18 pre-assembled swing joint with O-rings and Dura quick lock to receive stabilizing rod.

2.21 TREE BUBBLERS

A. As shown on drawings

2.22 IN-LINE DRIP IRRIGATION

A. As specified herein and as shown on the drawings and in accordance with manufacturer's recommendations. Provide all miscellaneous valves, filters fittings etc. required for a complete, operable system including the following:

1. Rain Bird XFD/XFS/XFCV with "Copper Shield" technology. Drip system in accordance with "RainBird Xerigation Low-Volume Landscape Irrigation Design Manual" and as shown on the drawings as required for a complete working system.
2. Pop-up operation indicator
3. Air/vacuum relief valves
4. Flush valves

B. Drip Valve Assembly: Size valve box large enough and deep enough to contain assembly and allow convenient access and easy removal of filter screen. Position filter pointed down, approximately 45 degrees.

C. Pressure regulator: Size regulator in accordance with flow rate. Do not over size. Use factory pre-set regulator at 30 PSI.

2.23 Y-STRAINER

A. "Y"-Strainer upstream of remote-control valves, Brass, 100 mesh.

2.24 RCV IDENTIFICATION TAGS:

A. Plastic or brass tags with valve number, approximately 2" by 2" with number imprinted, as accepted by Owner.

2.25 MISCELLANEOUS INSTALLATION MATERIALS

A. Solvent Cement and Primers for Solvent-weld Joints: Make and type approved by manufacturer(s) of pipe and fittings. Maintain cement proper consistency throughout use.

B. Pipe and Joint Compound: Permatex: Do not use on irrigation inlet port.

2.26 MISCELLANEOUS EQUIPMENT/ACCESSORIES

A. Sleeves and Conduits: See Drawings.

B. Key(s) for Quick-Coupling Valves:
1. Type: Same manufacturer as Quick-Coupling Valve.

2.26 OTHER EQUIPMENT: As shown on Drawings and required for a fully functional irrigation system.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Sleeves and Conduits: Verify that all installed sleeving and conduits are undisturbed and are free of defects or errors introduced by the work of other sections.

B. Water Meter/Water Pressure: Test and verify that existing water pressure is the minimum pressure at maximum system g.p.m. to operate the irrigation system as indicated on the drawings.

C. Stub-outs: Verify that all stub-outs to be provided under another contract are correctly sized, located and installed as noted on Drawings.

D. Notification: Submit written notification to Owner's Representative within ten (10) working days of above inspections describing all acceptable and non-acceptable site conditions.

3.2 CONNECTIONS TO SERVICES

A. Provide and coordinate connection of irrigation controller to electrical power source.

3.3 INSTALLATION

A. Install irrigation system components in accordance with this Section, with the Drawings, with the manufacturer's recommendations, and with established industry standards. The Contractor shall do nothing that may jeopardize any manufacturer warranty.

B. Automatic Controller:
   1. General: Install with lock box cutoff switch per local code and manufacturer's current printed specifications. Provide each controller with its own independent low voltage common ground wire.
   2. Connection to Valves: Connect remote control valves to controller in clockwise sequence to correspond with station setting beginning with Stations 1, 2, 3, etc.
   3. Labeling: Affix controller letter (i.e., "A") on inside of controller cabinet door with minimum of one inch (1") high permanent letter.
   4. Irrigation Diagram: Affix a non-fading, waterproof copy of irrigation diagram to cabinet door below controller name. Irrigation diagram to be sealed between two plastic sheets, 20 mil. minimum thickness. Use a legible reduced copy of the Record Drawing for the irrigation diagram clearly showing all valves operated by the controller, station, number, valve size, and type of planting irrigated. Color code area operated by each valve.

C. Control Wiring:
   1. General: Install control two wire in Sch 40 PVC conduit in common trenches with irrigation mains and laterals wherever possible. Lay to the bottom side of pipe line. Provide looped slack at valves.
   2. Extra Length: Provide 36 inches (36") extra wire at each remote control valve splice to facilitate the removal of the remote control bonnet to finish grade without cutting wires.
   3. All connections and splices in the red/blue two wire path must be made with 3M DBR/Y-6 waterproof connectors installed per manufacturer's instructions in valve box with open end of connector facing down.
   4. Any splices in the two wire path not associated with a decoder shall be housed in separate valve boxes with 36 inches loop of slack wire.
   5. Contractor shall indicate two wire path directions in permanent marker within 6 inches of two wire splice on wire jacket or conduit.
      a. Incoming wire shall be marked 'controller' on wire jacket or conduit.

b. Each outgoing two wire path shall be marked with connected valves on wire jacket.

6. Contractor shall ensure all connections to be watertight with no electrical leakage to ground or shorting between conductors.
7. Detection Wire: Install a bare #12 copper wire or greater on top of the PVC supply line for the purpose of possible future mine detection search.

D. Grounding
1. All grounding and installation of equipment specified shall be installed in compliance with the manufacturer's recommendations and in accordance with local, state, and federal requirements.
2. Both the controller and the decoders shall be grounded to ground rods or plates with less than 10 OHMS resistance.
3. Irrigation controller and pad shall not fall within the sphere of influence of a ground rod or plate.
4. At a minimum earth ground shall be connected at the first decoder of each wire path leaving the controller, and every twelve valve/decoder or 1,000 feet of two wire run (whichever is shorter), and at the last valve/decoder in any wire run exceeding 50 feet from main wire path.

E. Rain Shutoff Switch:
1. Install switch in area not affected by irrigation or rain shadow. Provide wires in rigid conduit as accepted by Owner's Representative.

F. Excavating and Trenching:

1. Prior to trenching, layout main and lateral line locations within Drip Line of trees and review locations with Owner's Representative. Relocate any lines that may interfere with existing root systems to avoid or reduce damage to root systems as accepted by Owner's Representative.
2. Dig trenches wide enough to allow a minimum of three inches (3") between parallel pipe lines. Provide a minimum cover from finish grade as follows:
   a. 24-inches Deep: Over pipe on pressure side of irrigation control valve, control wires and quick-coupling valves.
   b. 36-inches Deep: Over all pipe and pipe sleeves under roadways, parking lots, entrance to parking lots and Fire-Access Lanes per NFPA 24, Section 10.4.4.
   c. 18-inches Deep: Over pipe on non-pressure side of irrigation control valve.
   d. Direct Burial PVC Piping Under Pavement: Provide a minimum of 4 inches of sand backfill on all sides and 24 inches cover to bottom of paving.

G. Conduits and Sleeves:
1. Coordination: Provide conduits and sleeves and coordinate installation with other trades.
2. Extent: Install conduits and sleeves where control wires and pipes pass under paving or through walls as shown on Drawings. Extend twelve inches (12") beyond edges of paving and walls and cap ends until ready for use.

H. Pipeline Assembly:

1. Install pipe and fittings in accordance with manufacturer's current printed Specifications.
2. Clean all pipes and fittings of dirt, scale and moisture before assembly.
3. Solvent-welded Joints for PVC Pipes:
   a. Solvents: Use solvents and methods specified by pipe manufacturer.
   b. Curing Period: Minimum of one (1) hour before applying any external stress on the piping and at least 24 hours before placing the joint under water pressure.
4. Threaded Joints for Plastic Pipes:
   a. Use Permatex on all threaded PVC fittings except spray heads and quick coupler valve ACME threads.
   b. Joining: Use strap-type friction wrench only. Do not use metal-jawed wrench. Assemble finger tight plus one or two turns.
5. Laying of Pipe:
   a. Bedding On-grade: Remove from trench all rocks or clods. Bed pipe in at least 2 inches of soil excavated from trench. Backfill on all sides of piping to provide a uniform bearing.
   b. Snaking: Snake pipe from side to side of trench bottom to allow for expansion and contraction. Minimum allowance for snaking is one (1) additional foot per 100 ft. of pipe.
   c. Moisture Restrictions: Do not lay PVC pipe when there is water in the trench. Do not assemble PVC pipe unless the pipe is dry.

I. Closing of Pipe and Flushing of Lines
1. Capping: Cap or plug all openings as soon as lines have been installed to prevent entrance of materials that would obstruct the pipe. Leave in place until removal is necessary for completion of installation.

J. Detection Wire and Warning Tape
1. Install a bare # 12 copper wire or greater on top of the PVC supply line for the purpose of possible future mine detection search.

K. Control Valves:
1. Install in valve boxes where shown on Drawings and group together where practical. Install box flush with finish grade, not necessarily level. If valve occurs in drainage swale, relocate out of drainage swale as approved by Owner's Representative.
2. Where two or more valves are installed adjacent to each other, provide at least six inches (6") separation. Align boxes in a row, perpendicular with pavement edge.
3. Permanently mark valve box lid with 2" black valve number and controller letter or with numbered metal tag inside box as approved by Owner's Representative.
4. Refer to control wiring for required spare wire in each valve box.

L. Install “Y”-Strainer upstream of remote-control valves at backflow preventer with two pressure gauges, one upstream and one downstream of each strainer/filter.

M. RCV Identification Tags:
1. Install in remote control valve box as recommended by manufacturer and as accepted by Owner’s Representative.

N. Pop-up Spray Heads

1. Place all irrigation heads in planting areas with top of heads set to finish grade or top of mulch as required.
2. Place part-circle pop-up heads two inches (2") from edge of and flush with top of adjacent walks, header boards, curbs and mowing bands or paved areas and 12 inches (12") from building foundations at time of installation.

O. Bubblers:
1. Coordinate installation with planting contractor to insure timely and proper placement of heads at new planting.

P. In-Line Drip Irrigation
1. Coordinate plant locations with emitter locations. Refer to QUALITY ASSURANCE herein.
2. Coordinate hand watering of emitter irrigated and drip irrigated areas. Refer to QUALITY ASSURANCE herein.
3. Coordinate emitter spacing with planting types and plant spacing as accepted by Landscape Architect. Install emitters at uniform 18 inches on center maximum and 2 to 4 inches deep, except where emitter spacing and depth is shown otherwise.
4. Adjust spacing on slopes to prevent over watering at base of slopes.
5. Install system in accordance with manufacturer's recommendations and as shown on the Drawings as required for a complete working system.
6. Provide air/vacuum relief valves at all high points on systems.
7. Provide filter as shown and as recommended by emitter manufacturer.
8. Tape pipe ends during installation and do not allow dirt or debris to enter pipe.
9. Use emitter line with the specified emitter flow rate and emitter spacing. Assemble dripper line to allow water to flow continuously and directly, with no dead ends or dead-end loops between control valve and flush valve.
10. Use fittings at sharp bends and do not allow dripper line to kink.
11. Install emitter line around perimeter of planter not more than 3 inches off edge for ground cover, 18 inches maximum for shrub planting.
12. Adjust alternate rows so emitters are spaced in a triangular pattern.
13. Collect water from multiple dripper lines and convey the water to automatic line flush valve.
14. Install flush valve at end(s) of collector laterals so that entire system will flush and be free of dirt and debris.
15. Flush valves shall be open when water is turned on for the first time and after a break in the main or lateral lines. Extend collector lateral as required and locate flush valve at convenient accessible location.
16. Flush the systems weekly through the first month of the maintenance period.
17. Thoroughly saturate soil prior to planting. Provide additional surface watering as required to keep plant root systems moist during planting establishment period.

3.4 MISCELLANEOUS EQUIPMENT

A. Install miscellaneous equipment with concrete footings, brackets, etc., as required and as recommended by the manufacturer.

3.5 FIELD QUALITY CONTROL

A. Testing of Irrigation System:
   1. Make hydrostatic tests with risers capped when welded PVC joints have cured at least 24 hours. Center load piping with backfill to prevent pipe from moving under pressure. Keep all couplings and fittings exposed.
   2. Install two (2) pressure gauges at opposite ends of main line system. Pump system up to a minimum of 125 psi the day preceding the scheduled test and verify that pressure is holding. Inspect system early following day and immediately notify Owner's Representative if the test confirmation must be postponed.
   3. Apply continuous static water pressure of 125 psi in accordance with Caltrans Standard Specifications Section 20-2, except after a drop in pressure (5 psi maximum), then the pressure must stabilize and remain stable for a one (1) hour minimum period before acceptance of the test.
   4. Leaks detected during tests shall be repaired and test repeated until system passes tests at no additional cost to Owner.

B. Irrigation Audit Report with Certificate of Completion
   1. Per the requirements of the California Model Water Efficient Landscape Ordinance, the Contractor shall perform an irrigation audit and provide a report with certificate of completion to the local agency that may include, but is not limited to: inspection, system tune-up, system test with distribution uniformity, reporting overspray or run off that causes overland flow, and preparation of an irrigation schedule. Irrigation audits shall be conducted by a CLIA Certified landscape Irrigation Auditor by the Irrigation Association. Operation of the irrigation system outside the normal watering window is allowed for auditing and system maintenance.

C. Adjustment of the System:
   1. Flush and adjust all irrigation heads for optimum performance and to prevent overspray onto walks, roadways and buildings. Adjust the arc and radius as applicable.
   2. Include as a part of the work any nozzle changes or arc adjustments necessary due to daytime windy conditions during grass establishment period. After grass has been established and watering can be performed during calm early morning or evening hours, make any required adjustments to nozzles and arcs.
   3. Set all irrigation heads perpendicular to finished grades unless otherwise noted on the drawings.
   4. When the landscape irrigation system is completed and before planting, perform a coverage test in the presence of the Owner's Representative to determine if the water coverage for planting areas is adequate.
   5. Test controllers individually in the presence of the Owner's Representative and the Landscape Architect. Demonstrate that all control valves operate electronically. Provide vehicles and radio equipment as necessary to expedite this process.
   6. Demonstrate to Owner's Representative that irrigation scheduling programmed into controller is adequate for plant requirements without causing runoff, and that scheduling capacities of controller are utilized.

3.6 IRRIGATION SCHEDULING AND CONTROLLER PROGRAMMING

A. Per the requirements of the California Model Water Efficient Landscape Ordinance All irrigation schedules and programs shall be developed, managed and evaluated to utilize the minimum amount of water required to maintain plant health.

B. Irrigation controller Scheduling and Programming Parameters to be conducted by a CLCA Certified Irrigation manager and submitted to the local agency as part of the Certificate of Completion.

C. Parameters used to set the automatic controller shall be developed for each of the following:
   1. Plant establishment period
   2. Established landscape period
   3. Temporary irrigated area (if applicable)

D. Each irrigation schedule shall consider for each station all of the following that apply:
   1. Irrigation interval (days between irrigation)
   2. Irrigation run times (hours or minutes per irrigation event to avoid runoff
   3. Number of cycle starts required for each irrigation event to avoid runoff
   4. Amount of applied water scheduled to be applied on a monthly basis
   5. Application rate setting
   6. Root depth setting
   7. Plant type setting
   8. Soil type
   9. Slope factor setting
   10. Shade factor setting
   11. Irrigation uniformity or efficiency setting

E. Total annual applied water shall be less than or equal to Maximum Applied Water Allowance (MAWA). Actual irrigation schedules shall be regulated by automatic irrigation controllers using current reference evapotranspiration data (CIMIS or soil moisture sensor data).

3.7 BACKFILL AND COMPACTING

A. General: After the system is operating and required tests and reviews have been made, backfill excavations and trenches with clean soil, free of debris.

B. Backfill for All Trenches: Regardless of the type of pipe covered, compact to minimum 95% density under pavements and 85% under planted areas.

C. Finishing: Dress off areas to finish grades. Re-dress any areas which subsequently settle.

D. Owner's testing agency will test backfill compaction in areas under paving.

3.8 MAINTENANCE

A. The entire irrigation system shall be under fully automatic operation for a period of 2 days prior to any planting.

B. The Owner's Representative reserves the right to waive or shorten the operation period.

C. Maintain/repair system for full duration of plant maintenance period.

3.9 REVIEWS PRIOR TO ACCEPTANCE

A. Notify the Owner's Representative in advance for the following reviews, according to the time indicated:
   1. Supply line pressure test and control wire installation - 72 hours.
   2. Coverage and controller test - 72 hours.
   3. Final review - 7 days.

B. No reviews will commence without record drawings, without completing previously noted corrections, or without preparing the system for review.

3.10 FINAL REVIEW AND CLEANUP.

A. Operate each system in its entirety for the Owner's Representative at time of final review. Any items deemed not acceptable by the Owner's Representative shall be reworked to the complete satisfaction of the Owner's Representative.

B. Provide evidence to the Owner's Representative that the Owner has received all accessories and equipment as required before final review can occur.

C. Final acceptance and start of warranty period will occur no earlier than the end of the plant maintenance period.

D. For time of final review, Contractor shall arrange a meeting with the Owner's maintenance personnel to demonstrate the operation of the irrigation systems automatically in order to verify acceptance and to familiarize the maintenance personnel with the system and recommended programming.

3.11 MEASUREMENT AND PAYMENT

A. Full compensation for complying with the above provisions shall be considered as included in the contract price for the various Bid Items and no separate payment will be made.

END OF SECTION

SECTION 32 90 00 - PLANTING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide planting work and planting maintenance complete as shown on the drawings and as specified including staking and layout of the landscaping, including soil sampling as required by the State of California Model Water Ordinance.

B. Related work specified elsewhere includes:

1. Section 31 10 00, SITE CLEARING
2. Section 31 10 01, PLANT PROTECTION
3. Section 31 20 00, EARTHWORK
4. Section 32 84 00, IRRIGATION

1.2 QUALITY ASSURANCE

A. Reference Standards:
1. All local, municipal and state laws, codes and regulations relating to all portions of this work are to be incorporated as part of these Specifications. These specifications shall not be construed to conflict with any of the above codes, regulations or requirements. The Specifications and Drawings shall take precedence when they call for materials, workmanship or construction of a better quality or higher standard than required by the above mentioned codes and regulations. Furnish without extra charge additional materials and labor required to comply with above rules and regulations.
2. State of California Model Water Ordinance
3. Bay Area Stormwater Management Agencies Association (BASMAA) Regional Biotreatment Soil Specifications.
4. Public utility agency having jurisdiction over the project work.
5. "American Standards for Nursery Stock," American Association of Nurseryman, 230 Southern Building, Washington, D.C. 20005.
6. International Society of Arboriculture, Guide for Plant Appraisal, latest version.
7. US Composting Council Compost Analysis Program (CAP)
8. US Composting Council (USCC) Seal of Testing Assurance (STA) program.
9. Test Methods for the Evaluation of Composting and Compost (TMECC)
10. Manufacturer's recommendations.

B. Qualifications:
1. Experience: Assign a full-time employee to the job as foreperson for the duration of the Contract who is certified landscape technician, certification through CLCA or minimum of five (5) years experience in landscape installation and maintenance supervision, with experience or training in turf management, entomology, pest control, soils, fertilizers and plant identification
2. Labor Force: Provide a landscape installation and maintenance force thoroughly familiar with, and trained in, the work necessary to complete the tasks described herein in a competent, efficient manner acceptable to the Owner.

C. Requirement
1. Site Visit: At beginning of work, visit and walk the site with the Owner's Representative to clarify scope of work and understand existing project/site conditions.
2. Supervision: The foreperson shall directly supervise the work force at all times and be present during the entire installation. Notify Owner's Representative of all changes in supervision.
3. Identification: Provide proper identification at all times for landscape maintenance firm's vehicles and a labor force uniformly dressed in a manner satisfactory to Owner's Representative.
4. Protect all existing and new plants from construction activities, deer & rodents: Contractor shall be responsible for protection of all planting per Part 3.

D. Plant Material Standards:
1. Quality and Size of Plants: Conform to the State of California Grading Code of Nursery Stock, No. 1 grade. Use only nursery-grown stock which is free from insect pests and diseases.
2. Comply with federal and state laws requiring inspection for plant diseases and infestations, including Phytophthora. Submit inspection certificates required by law with each shipment of plants, and deliver certificates to the Owner. Obtain clearance from the County Agricultural Commissioner as required by law, before planting plants delivered from outside the County in which planted.

E. Soils & Amendment Testing
1. All soils & amendments to be tested for suitability by one of the following accredited soil testing laboratories (or approved equal). Components of the test shall include all major nutrients, pH, salinity, boron, sodium, micronutrients, copper, zinc, manganese and iron, adsorption rate, organic content and texture. The laboratory report shall include recommendations for adjusting fertilizer and amendment quantities.

Lucchesi Plant & Soil Consulting
Los Gatos, CA (408) 337-2575

Waypoint Analytical, Inc.
4741 E. Hunter Ave, Suite A, Anaheim, CA 92807; (717) 282-8777

Control Laboratories
42 Hangar Way, Watsonville, CA 95076; (831) 724-5422

Perry Laboratory
424 Airport Boulevard , Watsonville, CA 95076; (831) 722-7606

Wallace Laboratories, LLC
365 Coral Circle, El Segundo, CA 02345; (310) 615-0016

2. Upon approval of the laboratory's report by the Landscape Architect, the recommendations in the report shall become a part of the Specifications and the soil preparation procedures, quantities of soil amendment, fertilizer and other additives shall be adjusted to conform with the report at no additional cost to the owner. Note that there is a minimum quantity of organic amendment specified elsewhere in this specification section.

3. Significant issues with soil quality will require soil to be retested in the locations identified on Soil Analysis Plan, prior to proceeding with plant installation, to ensure that the recommendations in the report have been followed and the In-Situ Topsoil is horticulturally suitable as described in Part 2.

1.3 DEFINITIONS

A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms. Subsoil is defined as either existing site soil located below the topsoil prior to construction activities, or select fill used for rough grading during construction. Subsoil cannot be considered for use as planting soil.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow.

D. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects larger than 2 inches (50 mm) in diameter; and free of weeds, roots, toxic materials, or other non-soil materials.

E. Planting Soil: Approved existing topsoil or imported planting soil, meeting the requirements herein. Subsoil cannot be considered for use as planting soil.

1.4 SUBMITTALS

A. The following shall be submitted to the landscape architect for approval prior to the installation of landscape materials and products.
   1. Manufacturer’s Technical data sheets for fertilizers, and all other products and materials listed herein.
   2. Manufacturer’s technical data sheets for amendments. Reports to be dated no more than 3 months prior to soil preparation.
   3. 1-pint samples of imported soils, organic amendments/compost, mulches, and cobbles.

B. Submit planting soil and organic amendment laboratory reports a minimum of 3 weeks prior to beginning soil prep. See below for required soil analysis reports.

C. Required Soil Analysis Reports. Reports to be dated no more than3 months prior to soil preparation.

   1. Soil Analysis Plan: Contractor to submit annotated plan showing confirmed locations of all required soil tests. Each location is to be identified with a unique label.
   2. Existing Planting Soil Analysis: After approval of the Soil Analysis Plan, rough grading, and topsoil placement, contractor to obtain 3 representative samples of in situ topsoil taken from approved site locations at depth of 4" to 6" below finish grade and submit to

an accredited soils testing laboratory for “horticultural suitability" analysis, including particle size, infiltration rate, and evaluation of physical and chemical properties of soil and recommendations for adding amendments and fertilizers to the soil.

3. Subsoil Analysis: In addition to the above required soil samples, contractor to obtain one representative sample of any subgrade soil that is to receive a layer of imported planting soil over it. The laboratory report shall include the soil’s infiltration rate, total combined silt and clay content for determining the total allowable combined silt and clay content of the imported planting soil specified herein.
4. Imported Planting Soil Analysis: Contractor to submit an " horticultural suitability" analysis report from an accredited soils testing laboratory, including particle size, infiltration rate, and evaluation of physical and chemical properties of soil and recommendations for adding amendments and fertilizers to the soil. Soil to conform to requirements in Part 2.
5. Amended Planting Soil Analysis: Significant issues with soil quality will require soil to be retested in the locations identified on Soil Analysis Plan, prior to proceeding with plant installation, to ensure that the recommendations in the report have been followed and the final Planting Soil is horticulturally suitable as described in Part 2.

D. The Contractor is responsible to follow all local water ordinances and make available to the local agency the soil analysis report and verification of its implementation as required.

E. Delivery Receipts upon request by Owner, provide delivery receipts for quantities of soil & amendments delivered to the site.

F. Representative photos of trees with measuring pole and plant species (unless trees or plants previously tagged at nursery by landscape architect). Identified and dated photos of trees and plants to be the trees and plants delivered to site and not a stock photograph.

G. Entire plant quantity delivered to the site. Plants to be reviewed prior to installation during a single site visit.

1.5 WARRANTY AND REPLACEMENT

A. Maintenance Period: See Part 3.

B. Warrant the work against weed growth for a period of four (4) months after application of Pre-Emergence Weed Killer.

C. Warrant all plants to be in a healthy, thriving condition until the end of the maintenance period, and deciduous trees, shrubs and vines beyond that time until active growth is evident.

D. Replace all dead and damaged plants and plants not in a vigorous condition immediately upon discovery and as directed by the Owner's Representative and at no cost to the owner. Install replacement plants before the final acceptance of the maintenance period in the size specified.

E. Warrant all products, prepared soils and plant material installed and maintained by contractor against defects for a period of one year after final acceptance of the maintenance period.

PART 2 - PRODUCTS

2.1 SUBSOIL

A. Submit soil analysis report from an approved soils laboratory for approval by the Landscape Architect. Refer to Part 1 for soil testing requirements.

2.2 EXISTING PLANTING SOIL (ON-GRADE):

A. Existing Planting Soil is defined as on-site topsoil that is either to be removed and stockpiled for reuse or to remain in place during construction. Satisfactory planting soil shall be free of subsoil, clay, lumps, stones, and other objects over 4" in diameter, and without weeds, roots, and other objectionable material. The soil shall be fertile, friable, natural, productive soil containing a normal amount of humus, and shall be capable of sustaining healthy plant life. Soil shall not be infested with nematodes or with other noxious animal life or toxic substances. Soil shall be obtained from well-drained, arable land, and shall be of an even texture. Soil shall not be taken from areas on which are growing any noxious weeds such as morning glory, equisetum, or Bermuda grass, etc.

B. If herbicide contamination is suspected then a radish/ryegrass growth trial must be performed. Consult with Landscape Architect prior to decision to test or not.

C. Amended Planting Soils are to conform with the following target levels. Elements are expressed as mg/kg dry soil or mg/l for saturation extract.

pH value	6.5-7.9,	iron	4-15 mg/kg
lime	none present	manganese	0.6-3.0 mg/kg
salinity (ECe)	0.5-3 milli-mho/cm	zinc	1-3 mg/kg
chloride	<150 ppm	copper	0.2-3.0 mg/kg
nitrate	20-30 ppm	boron	0.2-0.5 mg/kg
SAR	<3	magnesium	25-100 mg/kg
phosphorus	8-20 mg/kg	sodium	<200 mg/kg
potassium	60-180 mg/kg	sulfur	25-100 mg/kg

D. If sufficient on-site surface topsoil is not available, contractor to provide imported planting soil as specified below. Placement of dissimilar soils shall be coordinated with irrigation zones by the contractor to maintain separate valves for dissimilar soils.

E. Submit soil analysis report from an approved soils laboratory for approval by the Landscape Architect. Refer to Part 1 for soil testing requirements.

2.3 IMPORTED PLANTING SOIL (ON-GRADE):

A. Imported planting soil shall be screened and shall be free of subsoil, heavy or stiff clay, rocks, gravel, brush, roots, weeds, noxious seeds, sticks, trash, and other deleterious substances.

B. Imported Planting Soils are to conform with the following target levels. Elements are expressed as mg/kg dry soil or mg/l for saturation extract.

pH value	6.5-7.9,	iron	4-15 mg/kg
lime	none present	manganese	0.6-3.0 mg/kg
salinity (ECe)	0.5-3 milli-mho/cm	zinc	1-3 mg/kg
chloride	<150 ppm	copper	0.2-3.0 mg/kg
nitrate	20-30 ppm	boron	0.2-0.5 mg/kg
SAR	<3	magnesium	25-100 mg/kg
phosphorus	8-20 mg/kg	sodium	<200 mg/kg
potassium	60-180 mg/kg	sulfur	25-100 mg/kg

C. The silt and clay content of Imported Planting Soil shall not exceed that of the existing soil it is to be placed over. Except where otherwise required, it shall be a "Sandy Loam" as classified in accordance with USDA Standards with a combined total of between 25% to 40% Clay and Silt.

D. Submit soil analysis report from an approved soils laboratory for approval by the Landscape Architect. Refer to Part 1 for soil testing requirements.

E. Following approval of the sample, provide a one-half cubic yard sample, which shall be stored at the site of work for comparison with sample and subsequent loads of soil. The comparison sample shall be protected by a cover until the installation of all soil has been completed and accepted.

2.4 ORGANIC AMENDMENT FOR PLANTING SOILS (ON-GRADE):

A. Ground Redwood or Ground Fir Bark with the following properties:

Percent Passing	Sieve Designation		
100	9.51 mm	3/8"	
50-60	6.35 mm	1/4"	
20-40	4.76 mm	No. 4	
0-20	2.38 mm	No. 8	8 mesh

Redwood Sawdust

Dry bulk density, lbs. per cu. yd.	260-280
Nitrogen stabilized - dry weight basis	0.4% minimum
Salinity (ECe):	4.0 maximum
Organic Content:	90% minimum
Reaction (pH):	4.0 minimum

Ground Fir and/or Pine Bark

Dry bulk density, lbs. per cu. yd.	350 minimum
Nitrogen stabilized - dry weight basis,	0.5% minimum
Salinity (ECe):	4.0 maximum
Organic Content:	90% minimum
Reaction (pH):	4.0 minimum

B. Submit sample, product's technical data sheet, and analysis report from an approved soils laboratory for approval by the Landscape Architect. The analysis report should include compliance to the specifications above and directions for product use.

2.5 PLANTS

A. Plant the variety, quantity and size indicated on drawings. The total quantities indicated on the drawings are considered approximate and furnished for convenience only. Contractor shall perform plant quantity calculations and provide all plants shown on the drawings.

B. Measure trees and shrubs with branches in normal position. Height and spread dimensions indicated refer to the main body of the plant, and not from branch tip to tip.

C. Take precautions to ensure that the plants will arrive at the site in proper condition for successful growth. Protect plants in transit from windburn and sunburn. Protect and maintain plants on site by proper storage and watering.

D. Install healthy, shapely and well rooted plants with no evidence of having been root-bound, restricted or deformed.

E. Tag plants of the type or name indicated and in accordance with the standard practice recommended by the American Association of Nurserymen.

F. Substitutions will not be permitted, except as follows:
   1. If proof is submitted to the Landscape Architect that any plant specified is not obtainable, a proposal will be considered for use of nearest equivalent size or variety with an equitable adjustment of contract price.
   2. Substantiate and submit proof of plant availability in writing to the Landscape Architect within 10 days after the effective date of Notice to Proceed.

G. Tree Form
   1. Trees shall have a symmetrical form as typical for the species/cultivar and growth form.
   2. Central Leader for Single Trunk Trees: Trees shall have a single, relatively straight central leader and tapered trunk, free of co-dominant stems and vigorous, upright branches that compete with the central leader. Preferably, the central leader should not have been headed; however, in cases where the original leader has been removed, an upright branch at least ½ the diameter of the original leader just below the pruning point shall be present.
   3. Potential Main Branches: Branches shall be evenly distributed radially around and appropriately spaced vertically along the trunk, forming a generally symmetrical crown typical for the species.
   4. Headed temporary branches should be distributed around and along the trunk as noted above and shall be no greater than 3/8" diameter, and no greater than ½ diameter of the trunk at point of attachment.

H. Tree Trunk
   1. Trunk diameter and taper shall be sufficient so that the tree will remain vertical without the support of a nursery stake.

2. Trunk shall be free of wounds (except properly-made pruning cuts), sunburned areas, conks (fungal fruiting-bodies), wood cracks, bleeding areas, signs of boring insects, galls, cankers and/or lesions.
3. Tree trunk diameter at 6" above the soil surface shall be within the diameter range shown for each container size below, except where shown otherwise:

Container	Trunk Diameter	Soil level from Container Top
5 gallon	0.5" to 0.75"	1.25 to 2"
15 gallon	0.75" to 1.0"	1.75 to 2.75"
24" Box	1.5" to 2. 5"	2.25 to 3"
36" Box	>2.5"	2.25 to 3"
60" Box	>2.5"	3-6"

4. Tree trunks shall be undamaged and uncut with all old abrasions and cuts completely callused over. Do not prune plants prior to delivery.

I. Tree Roots
1. Trunk root collar (root crown) and large roots shall be free of circling and/or kinked roots. Contractor may be required to remove soil near the root collar in order to verify that circling and/or kinked roots are not present.
2. The tree shall be well rooted in the container. When the trunk is lifted the trunk and root system shall move as one and the rootball shall remain intact.
3. The top-most roots or root collar shall be within 1" above or below the soil surface. The soil level in the container shall be within the limits shown in above table.
4. The rootball periphery shall be free of large circling and bottom-matted roots.
5. On grafted or budded trees, there shall be no suckers from the root stock.

2.6 FERTILIZERS

A. General Landscape Fertilizers
Commercial fertilizer, pelleted or granular form, conform to the requirements of Chapter 7, Article 2, of the Agricultural Code of the State of California for fertilizing materials as follows:

Type A:
6% Nitrogen, 20% Phosphorus Acid and 20% Potash, (6-20-20)

Type B:
21 gram planting tablets 20% Nitrogen, 10% Phosphoric Acid and 5% Potash (20-10-5) available from Agriform or 10gm BestPacks packets 20% Nitrogen, 10% Phosphoric Acid and 5% Potash (20-10-5) available from Best Fertilizer Co.

Type C (Maintenance Fertilizer)
Complete fertilizer 21% Nitrogen, 7% Phosphoric Acid and 14% Potash (21-7-14).

If commercial fertilizer having the above analysis is not obtainable, other similar commercial fertilizer may be used providing it meets the approval of the Landscape Architect.

2.7 IRON OR FERROUS SULFATE: Dry form.

A. Essential 20% Ferrous (Iron) Sulfate. A soluble product that can be broadcast or incorporated. Analysis of 20% Iron, 18% Sulfur.

2.8 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 a 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.

2.9 FILTER FABRIC / PERMEABLE LANDSCAPE FABRIC

A. Polyester or polypropylene non-woven filter fabric with uniform fiber distribution by "Terra Bond" #1115, "Mirafi, Inc." #140N, or approved equal.

2.10 PERMEABLE DRAIN ROCK

A. Permeable drain rock used in subsurface drain installations to be Class 2 permeable material in conformance with Section 4-68 "Subsurface Drains" of the Caltrans Construction Manual; gradation to 3/4" maximum size. Submit Sample for approval.

2.11 ROOT BARRIER

A. UB 18-2 as manufactured by Deep Root Corporation (800) 458-7668, Root Solutions, Inc. (800) 554-0914, or equal. Install a minimum of 6 panels/12 linear feet centered on each tree, where tree is within 8 feet of sidewalk, paving, or utilities.

2.12 TREE STAKES

A. Lodge pole pine logs, clean, smooth, un-treated.

B. Unless otherwise shown on drawings, provide two-inch (2") diameter by eight feet (8') long for trees less than 8' high and 1" caliper.

C. Unless otherwise shown on drawings, provide three-inch (3") diameter by eight to ten feet (8' - 10') long for trees greater than 8' high and 1" caliper.

D. 2” O.D. Lodge pole tree stakes, painted black

2.13 TREE TIES

A. Unless otherwise shown on drawings, provide rubber strap, 24-inch minimum length without sharp edges adjacent to trunk, V.I.T. cinch-tie, Dublin, CA, (818)882-9530, or approved equal.

B. Black corded rubber tree ties w/ clips by greensleeves.com

C. Biodegradable VStrap webbing by Treestrap.

2.14 MULCH

A. Organic Mulch:
1. Fir tree or pine tree bark, dark in color; 3/4-inch to 1-inch size.
2. Decorative Fir bark, dark in color; Medium 1/2-inch to 1-1/2-inch size.
3. Walk-On Bark; Coarsely shredded White Fir, Red Fir or Pine bark.
4. Redwood Bark; Single grind (Coarse) Coast Redwood Bark (Gorilla Hair)
5. Redwood Bark; Double grind (Fine) Coast Redwood Bark
6. Cedar mulch by American Soil and Stone
7. Forest floor bark mulch by American Soil and Stone

PART 3 - EXECUTION

3.1 PLANT PROTECTION AND REPLACEMENT

A. Inspect and protect all existing and new plants and trees against damage from construction activities, erosion, trespass, insects, rodents, deer, disease, etc. and provide proper safeguards, including trapping of rodent and applying protective sprays and fencing to discourage deer browsing. Maintain and keep all temporary barriers erected to prevent trespass.

B. Repair all damaged planted areas. Replace plants immediately upon discovery of damage or loss.

3.2 LIME TREATED SOIL

A. If site work includes Lime Treatment of the subsoil, the Contractor shall remove full depth of treated soil beyond 12” from structure(s) and replace with approved planting soil.

B. Following removal of lime treated material, scarify subgrade to a minimum depth of 6 inches and test for drainage.

C. Test subgrade in all planting areas for drainage by flooding with minimum 4-inch depth of water puddle and verify complete absorption of standing water within two hours. If standing water is still present after two hours, provide perforated pipe and drain rock "French Drain" system in bottom of non-draining planters and connect to storm drainage system, as accepted by Owner's Representative prior to backfilling with approved planting soil.

3.3 GENERAL PREPARATION OF PLANTING SOIL

A. Submit soil analysis report of amended soils from an approved soils laboratory for approval by the Landscape Architect. Refer to Part 1 for soil testing requirements.

B. All planting soils to be amended as specified in soil laboratory analysis report(s).

C. Provide a minimum of 12” depth of amended planting soil in allplanting areas, or more where shown or specified otherwise. Install soil in maximum 12” lifts. Compact each lift prior to installing subsequent lifts.

D. Thoroughly wet down the planting areas to settle the soil and confirm irrigation coverage and operation. Allow soil to dry so as to be workable as described herein.

E. After the rototill work, float areas to a smooth, uniform grade as indicated on the drawings. Slope all planting areas to drain. Roll, scarify, rake and level as necessary to obtain true, even planting surfaces. Remove rocks, sticks and debris 2 inches or larger in shrub and ground cover areas. Secure approval of the grade by the Landscape Architect before any planting.

F. Prior to planting, soil shall be loose and friable to a minimum depth of [12”] with a relative maximum compaction of 85%. Rip and scarify any overly compacted and re-compacted planting areas (in two directions full depth of compacted soil) prior to planting.

G. Water settling, puddling, and jetting of soil and backfill materials as a compaction method is not acceptable.

H. Prior to planting, soil shall be moist, but not so moist that it sticks to a hand shovel. Do not work planting soil in a wet or muddy condition or dump or spread in areas where subgrade is not in proper condition.

I. Provide planting soil as a final lift in all planting areas within and adjacent to paved areas and other construction where native site soil has been covered by engineered fill and/or base rock. Unless otherwise shown or specified, finish grade in planting islands shall be crowned with a minimum 2% pitch to drain.

J. Finish Grade: Hold finish grade and/or mulch surface in planting areas1/2-inch below adjacent pavement surfaces, tops of curbs, manholes, etc. The subgrade of the mulch in mulched planting areas shall be a minus 2 inches at a distance of 12 to 18 inch from the edge of pavement. Drag finish grade to a smooth, even surface. Grade to form all swales and berms. Pitch grade with uniform slope to catch basins, streets, curb, etc., to ensure uniform surface drainage. Areas requiring grading include adjacent transition areas that shall be uniformly sloped between finish elevations. Slope surface away from walls so water will not stand against walls or buildings. Control surface water to avoid damage to adjoining properties or to finished work on the site. Take required remedial measures to prevent erosion of freshly graded areas.

K. 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.

3.4 PREPARATION OF IN-SITU PLANTING SOIL

A. In-Situ Planting Soil is defined as top soil left in its original place and undisturbed during construction activities which is to receive new planting

B. Except within tree driplines, rip all planting areas in two directions full depth to a minimum of 12“ into undisturbed native subsoil prior to amending. Scarification of any planting area which

cannot be accomplished with a tractor shall be accomplished by an alternative method approved by the Owner's Representative to the specified depth to ensure proper percolation/drainage.

C. Inspect planting areas and remove all base rock and other foreign material. Verify placement of planting soil within dripline of trees with Owner's Representative.

D. Test depth of loose soil with hand shovel in presence of Owner's Representative in several locations as directed.

E. After acceptance of the planting condition, uniformly mix and amend soil with required fertilizers, nutrients, etc. per specifications herein and recommendations given in soils reports.

F. In the case of a contradiction between the quantity of organic amendment required by the soils laboratory analysis and the specified quantity below, the greater of the two quantities shall take precedence. Spread organic amendment, iron and Type A fertilizer evenly over installed and rough graded on-site topsoil in all planting areas including ground cover and shrub areas at the following rates:
   1. Organic Amendment: 6 cubic yards per 1,000 square feet
   2. Fertilizer: Type A (6-20-20) at 20 lbs. per 1,000 square feet.
   3. Iron Sulfate: 10 lbs. per 1,000 square feet

G. Rototill above additives into soil 8-12" inches deep. Keep iron sulfate off pavement and other surfaces to prevent rust staining. Correct all rust damage to work.

H. Final planting soil shall have a pH range of 6.5 to 7.5.

3.5 PREPARATION OF IMPORTED PLANTING SOIL (ON-GRADE)

A. Uniformly distribute and spread Subsoil or select fill in planting areas to achieve rough grading and compact to a maximum of 85% relative compaction.

B. Except within tree driplines, rip all planting areas in two directions full depth to a minimum of12"into undisturbed native subsoil prior to backfilling. Scarification of any planting area which cannot be accomplished with a tractor shall be accomplished by an alternative method approved by the Owner's Representative to the specified depth to ensure proper percolation/drainage.

C. Thoroughly water-settle subsoil to required subgrade prior to installing Top Soil.

D. Prior to placing planting soil secure the Owner's Representatives acceptance of the planting areas subgrade condition. Test depth of loose soil with hand shovel in presence of Owner's Representative in several locations as directed.

E. After acceptance of the planting areas subgrade condition, uniformly distribute and spread planting soil backfill over scarified subgrade in planting areas as specified.

F. Mix and amend soil with required fertilizers, nutrients, etc. per specifications herein and recommendations given in soils reports.

3.6 ROOT BARRIER

A. Install in continuous sheet parallel and adjacent to curb or pavement edge as required on drawings and in accordance with manufacturer's recommendations. Set top of barrier approximately ½-inch above finished soil surface to allow concealment with mulch, as accepted by Owner's Representative

3.7 EROSION CONTROL NETTING

A. Verify finished grades and provide Jute Mesh and single grind Redwood bark mulch on all slopes 3:1 and steeper as accepted by the Owner's Representative. 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.

3.8 TREE AND SHRUB PLANTING

A. Mark tree and shrub locations on site using stakes, gypsum or similar approved means and secure location approval by the Landscape Architect before plant holes are dug. Adjust location as required prior to planting.

B. Review location of plants in relationship to irrigation heads and adjust location(s) that interfere with the function of the spray heads. Adjust locations as required to ensure that the plant roots receive the proper amount of water in order for the plants to thrive.

C. Square Tree Pits
   1. Drilled tree pits shall be modified to a square pattern with pit walls scarified to promote root penetration.

D. Excavate tree, shrub and vine pits as follows:

	Width	Depth
Boxed Trees	Box + 24"	Box depth
Canned Trees (15 gc)	Can + 18"	Can depth
Canned Shrubs/Vines (1- 5 gc)	Can + 12"	Can depth

E. Test drainage of plant beds and tree pits by filling with water (minimum 6"). The retention of water in planting beds and plant pits for more than two (2) hours shall be brought to the attention of the Landscape Architect. If rock, underground construction work, tree roots, poor drainage, or other obstructions are encountered in the excavation of plant pits, alternate locations may be selected by Landscape Architect.

F. Break and loosen the sides and bottom of tree pits to ensure root penetration and water test hole for drainage as required above.

G. Excavate plant hole or tree pit keeping excavated planting soil layer on the surface when backfilling around the plant. Carefully set plants as detailed without damaging the rootball. Superficially cut edge roots vertically on three sides. Remove bottom of plant boxes before planting. Remove sides of boxes after positioning the plant and partially backfilling.

H. Set plants in backfill with top of the rootball 1 inch above finished grade of adjacent soil. Backfill remainder of hole and soak thoroughly by jetting with a hose and pipe section. Water backfill until saturated the full depth of the hole.

I. Backfill plant holes with mix as specified, free from rocks, clods or lumpy material. Backfill native soil free of soil amendments under rootball and foot tamp to prevent settlement. Backfill remainder of the hole with soil mix and place plant tablets or packets (Type B fertilizer) 3 inches below finish grade and 1/2-inch from roots at the following rates:

1 gallon can plant	-	1 tablet or packet
5 gallon can plant	-	3 tablets or packet
15 gallon can plant	-	6 tablets or packet
24-inch box plant	-	6 tablets or packet
36-inch box plant	-	8 tablets or packet

J. Except for acid loving plants (Azaleas, Rhododendrons, Ferns, Camellias, etc.), use a soil mix of 2 parts soil from the hole, and 1 part amendment with iron added at the following rates:

1 gallon can plants	-	iron, 1/4 cup
5 gallon can plants	-	iron, 1/3 cup
15 gallon can plants	-	iron, 1/2 cup
24" box and larger	-	iron, 1 cup

Mix the iron, amendment and soil thoroughly for use in the top 8 inches of backfill around plants. For acid loving plants, mixture to be 1/2 soil from the hole and 1/2 amendment.

K. Remove any soil from top of plant rootballs and secure Landscape Architect's approval of rootball height prior to mulching.

L. After approval of rootball height, install mulch as required below.

M. Stake and/or guy trees as detailed. Drive stake(s) until solid (at least 12" beyond bottom of rootball) and remove excess stake protruding above top tree tie to prevent rubbing against branches. Avoid driving stakes through rootball. If subgrade does not accept stakes to a stable degree, delete stakes and guy the trees as specified herein and as detailed. Locate tree ties to avoid contact with tree branches. Locate top tie at tree flex point.

N. Build watering basin berms around trees and shrubs to drain through rootball. Water backfill until saturated the full depth of the hole.

3.9 GROUND COVER PLANTING

A. Plant in neat, straight, parallel and staggered rows as indicated on plan. Plant first row one-half required ground cover spacing behind adjacent curbs, structures, or other plant bed limits. Plant ground cover to edge of water basins of adjacent trees and shrubs.

3.10 MULCH

A. Mulch all tree, shrub and ground cover areas with organic mulch to a 3-inch depth, except mulch to 2-inch depth where planting with ground cover plants from flats.

B. Hold bark mulch away from base (trunk) of plant 4" or as directed by the Landscape Architect.

C. Individual trees and/or shrubs planted in non-irrigated areas shall, at minimum, receive bark mulch over their watering basin and berm.

D. Install rock mulch to depth as detailed, minimum 2-inches for full coverage of soil surface, whichever is greater.

3.11 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. Provide supplemental hand watering of trees and shrubs, as required, to maintain a moist root zones throughout plant establishment period.

3.12 PRE-MAINTENANCE PERIOD REVIEW AND APPROVAL OF PLANTING

A. Maintain plants from time of delivery to site until final acceptance of landscape installation.

B. Receive approval of the installed planting prior to commencement of planting establishment maintenance period. Notify the Landscape Architect or Owner's Representative a minimum of seven (7) days prior to requested review. Before the review, complete the following:
   1. Complete all construction work.
   2. Present all planted areas neat and clean with all weeds removed and all plants installed and appearing healthy.
   3. Plumb all trees and tree and shrub supports.
   4. No partial approvals will be given.

3.13 PLANTING ESTABLISHMENT MAINTENANCE

A. General Requirements
   1. **Maintenance Period:** The planting establishment maintenance period required shall be 90 calendar days after all planting and irrigation is complete and as approved by Owner's representative. A longer period may be required if the plant material is not acceptably maintained during the maintenance period. The start of the maintenance period to be confirmed by Owner's representative. Contractor to notify landscape architect of start and end dates of maintenance period. The maintenance period may be suspended at any time upon written notice to the Contractor that the landscaping is not being acceptably maintained, and the day count suspended until the landscape is brought up to acceptable standards as determined by the Owner Representative.
   2. Planting establishment maintenance immediately follows, coincides with, and is continuous with the planting operations, and continues after all planting is complete and accepted; or longer where necessary to establish acceptable stands of thriving plants.
   3. Protect all areas against damage, including erosion, trespass, insects, rodents, disease, etc. and provide proper safeguards. Maintain and keep all temporary barriers erected to prevent trespass.

4. Keep all walks and paved areas clean. Keep the site clear of debris resulting from construction or maintenance activities.
5. Repair all damaged planted areas, and replace plants immediately upon discovery of damage or loss.
6. Check irrigation systems at each watering; adjust coverage and clean heads immediately. Adjust timing of controller to prevent flooding.
7. Maintain adequate moisture depth in soil to ensure vigorous growth. Check rootball of trees and shrubs independent of surrounding soils and hand water as required.
8. Keep contract areas free from weeds by cultivating, hoeing or hand pulling. Use of chemical weed killers will not relieve the Contractor of the responsibility of keeping areas free of weeds at all times.

B. Tree and Plant Maintenance
1. Maintain during the entire establishment period by regular watering, cultivating, weeding, repair of stakes and ties, and spraying for insect pests. Prune when requested by the Landscape Architect.
2. Keep watering basins in good condition and weed-free at all times.
3. Replace all damaged, unhealthy or dead trees, shrubs, grasses, vines and ground covers with new stock immediately; size as indicated on the drawings.

C. Fertilizing:
1. Upon approval and after submitting fertilizer delivery tags, maintenance fertilization shall begin 30 days after planting is complete. Fertilize all ground cover areas by broad-casting Type C (21-7-14) fertilizer at the rate of 5 lbs. per 1,000 square feet evenly throughout. Reapply every forty-five (45) days until acceptable.
2. Early spring and fall substitute a complete fertilizer such as 15-15-15 applied at the rate of 6 lbs. per 1,000 square feet, to help insure continuing adequate phosphorus and potassium.
3. Observe plant's color, and if a soil pH imbalance is suspected, take soil samples and obtain laboratory analysis for confirmation. Take necessary action recommended in laboratory analysis such as top dressing with soil sulfur, leaching soil, etc.

3.14 FINAL PLANTING REVIEW AND ACCEPTANCE

A. At the conclusion of the Maintenance Period, schedule a final review with the Owner, the Owner's maintenance person, and/or the Landscape Architect. On such date, all project improvements and all corrective work shall have been completed. If all project improvements and corrective work are not completed, continue the planting establishment maintenance period at no additional cost to the Owner until all work has been completed. This condition will be waived by the Owner under such circumstances wherein the Owner has granted an extension of time to permit the completion of a particular portion of the work beyond the time of completion set forth in the Agreement.

B. Submit written notice requesting review at least 10 days before the anticipated review.

C. Prior to review, weed and restore all planted areas,plumb trees and tree supports, clear the site of all debris and present in a neat, orderly manner.

3.15 MEASUREMENT AND PAYMENT

A. Full compensation for complying with the above provisions shall be considered as included in the contract price for the various Bid Items and no separate payment will be made.

B.

END OF SECTION