

**SECTION 32 90 00
PLANTING**

PART 1 - GENERAL

1.01. DESCRIPTION

- A. This work consists of furnishing and installing all planting materials required for landscaping hereinafter specified in locations as shown.

1.02. TESTING LABORATORY AND ADVISORY SERVICES

- A. Materials testing activities and inspection services required during project construction to be provided by a Testing Laboratory retained and paid for by Contractor.
- B. Arborist inspections for protection of existing tree roots and recommendations for pruning as described below shall be provided by a certified arborist retained and paid for by the Contractor.

1.03. EQUIPMENT

- A. Maintain all equipment, tools and machinery while on the project in sufficient quantities and capacity for proper execution of the work.

1.04. RELATED WORK

- A. Section **32 84 00**, PLANTING IRRIGATION.
- B. Sustainable design requirements and procedures including submittal requirements: Section **01 81 11**, SUSTAINABLE DESIGN REQUIREMENTS.
- C. Procedures and requirements for managing and disposing construction and demolition waste: Section **01 74 19**, CONSTRUCTION WASTE MANAGEMENT.
- D. Arborist responsibilities: Section **01 00 00**, GENERAL REQUIREMENTS
- E. Section **01 45 29**, TESTING LABORATORY SERVICES

1.05. SUBMITTALS

- A. In accordance with Section **01 33 23**, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES
- B. Product Data: Manufacturer's current catalog cuts and specifications of the following:
 - 1. Fertilizers
 - 2. Tree Tie and Stake
 - 3. Tree Root Barrier
 - 4. Iron Sulfate
 - 5. Filter Fabric

6. Perforated Drain Pipe
- C. Samples:
1. Submit following samples along with certificates of compliance / analytical data from approved laboratory for degree of compliance: Plants: Submit typical sample of each variety or entire quantity to site for approval by Resident Engineer.
 2. Organic Mulch: Submit 1-pint sample with list of ingredients.
 3. Organic (Soil) Amendment: Submit 1-pint sample with Technical Data Sheet and STA certification.
 4. Permeable Backfill (Filter Rock): Submit 1-pint sample.
 5. Imported Planting Soil: Submit 1-pint sample
 6. Raised Planter Backfill Mix: Submit 1-pint sample
 7. Lava Rock Aggregate: Submit 1-pint sample with product technical data sheet and lab analysis report demonstrating compliance with specified qualities
 8. Imported Planting Sand: Submit 1-pint sample with product technical data sheet and lab analysis report demonstrating compliance with specified qualities
- D. Delivery Receipts
1. Provide delivery receipts for quantities of organic soil amendments delivered to the site.
- E. Topsoil Analysis (Soil Management) Report
1. After approval of rough grading and topsoil placement, obtain minimum of four representative one quart samples of topsoil taken from accepted site locations at depth of 4" to 6" below finish grade and submit to an accredited Soils Laboratory for evaluation of physical and chemical properties of soil including all major nutrients; pH, salinity, boron, sodium, micronutrients, copper, zinc, manganese and iron; and infiltration rate, soil texture and organic content, along with a summary describing the degree of compliance with the specified requirements. The report shall also include recommendations for modification of the soil for agricultural suitability.
 2. Upon request by Resident Engineer, submit documentation verifying implementation of soil analysis report recommendations to the local agency with Certificate of Completion as required by the State of California Model Water Ordinance
- F. Subsoil Analysis
1. Besides the above required soil samples, take 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 subgrade soil's total combined silt and clay content for determining the total desirable combined silt and clay content of the final imported planting soil cover specified herein.
- G. Imported Planting Soil Analysis
1. See Imported Planting Soil Analysis requirements elsewhere in this specification for comparison to existing soil analysis.

H. Approval of Laboratory Report

1. Upon approval of the Laboratory's report by the Resident Engineer, the recommendations in the report shall become a part of the Specifications and the quantities of soil amendment, fertilizer and other additives shall be adjusted to conform with the report at no additional cost to the Resident Engineer. Request Testing Laboratory to send one copy of test results directly to Resident Engineer. Note that there is a minimum quantity of organic amendment specified elsewhere in this specification section.

1.06. PROJECT/SITE CONDITIONS

- A. Site Visit: At beginning of work, visit and walk the site with the Resident Engineer to clarify scope of work and understand existing project/site conditions.

1.07. WARRANTY AND REPLACEMENT

- A. Pre-Emergence Weed Killer: Warrant the work against weed growth for a period of four (4) months after application.
- B. Warrant all plants and planting to be in a healthy, thriving condition until the end of the maintenance period, and deciduous trees beyond that time until active growth is evident.
- C. Replace all dead plants and plants not in a vigorous condition immediately upon discovery and as directed by the Resident Engineer at Contractor's expense. Install replacement plants before the final acceptance at the size specified.
- D. Warrant all plant material for a period of one year after final acceptance of the maintenance period against plant materials with defects at the time of installation.
- E. Warrant plant installation and maintenance by Contractor against defects for a period of one year.

1.08. DELIVERY AND STORAGE

- A. Delivery:
1. Notify the Resident Engineer of the delivery schedule in advance so the plant material may be inspected upon arrival at the job site. Remove unacceptable plant material from the job site immediately.
 2. Protect plants during delivery to prevent damage to root balls or desiccation of leaves. Protect trees during transport by tying in the branches and covering all exposed branches.
 3. Deliver fertilizer to the site in the original, unopened containers bearing the manufacturer's warranted chemical analysis, name, trade name or trademark, and in conformance to state and federal law.
 4. During delivery: Protect seed from contamination.
- B. Storage:
1. Keep fertilizer in dry storage away from contaminants.
 2. Store plants not installed on the day of arrival at the site as follows:
 - a. Shade and protect plants from the wind when stored outside

- C. Keep plants in a moist condition until planted.

1.09. Lime Treatment of subsoil

- 1. Refer to PART 3 -EXECUTION for mitigation of any lime treatment of soils.

1.10. PLANTING INSTALLATION CONDITIONS

- A. Perform planting operations after the irrigation system is installed, tested, and approved.
- B. No work shall be done when the ground is too wet or in an otherwise unsuitable condition for planting. Special conditions may exist that warrants a variance. Submit a written request to the Resident Engineer stating the special conditions and proposal variance.

1.11. PLANT AND TURF ESTABLISHMENT PERIOD

- A. The Establishment Period for plants and turf shall begin immediately after installation, with the approval of the Resident Engineer, and continue until the date that the Government accepts the project or phase for beneficial use and occupancy. During the Plant and Turf Establishment Period the Contractor shall:
 - 1. Water all plants and turf to maintain an adequate supply of moisture within the root zone. An adequate supply of moisture is the equivalent of 25 mm (1 inch) of absorbed water per week either through natural rainfall or augmented by periodic watering. Apply water at a moderate rate so as not to displace the mulch or flood the plants and turf.
 - 2. Turf receiving sub surface drip shall require 21 days minimum supplemental hand watering until the sod is established.
 - 3. Prune plants and replace mulch as required.
 - 4. Replace and restore stakes and eroded plant saucers as required.
 - 5. In all planting areas including hydroseeded areas, remove grass, weeds, and other undesired vegetation, including the root growth, before they reach a height of 75 mm (3 inches).
 - 6. Spray with approved insecticides and fungicides to control pests and ensure plant survival in a healthy growing condition, as directed by the Resident Engineer.
 - 7. Provide the following turf establishments and maintenance:
 - a. Mow the new lawn at least three times prior to the final inspection. Begin mowing when grass is 100 mm (4 inches) high. Mow to a 65 mm (2-1/2 inch) height.
 - b. Maintain turf height during the entire establishment period. Cut as frequently as growth of grass requires. Cut to a height of two inches (2"), unless otherwise directed by the Landscape Architect.
 - c. Maintain constant moisture to a depth of eight inches (8").
 - d. Trim edges of turf at paving and header-boards at time of second cutting, and at each later cutting.
 - e. Keep turf areas free of undesirable weeds and grasses by the application of suitable selective weed killers or hand pulling.
 - f. Repair all damaged areas as soon as evident.
 - g. Repair any hollow, settled or eroded areas by filling, rolling and resodding.

8. Remove plants that die during this period and replace each plant with one of the same size and species.
9. Check irrigation systems at each watering. Adjust coverage and clean and repair non-functioning heads immediately. Adjust timing of irrigation controller to prevent oversaturation, run-off, or flooding.
10. 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 over 1-inch high at all times.
11. Plant Protection and Replacement
 - a. Protect all areas against damage, including 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 and reseed or resod turf immediately upon discovery of damage or loss, including damage from Deer and Rodents.
12. Fertilizing:
 - a. Upon approval and after submitting fertilizer delivery tags, maintenance fertilization shall begin 30 days after planting is complete. Fertilize all turf and 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.
 - b. During the winter, for quick turf greening effect, calcium nitrate (15.5-0-0) may be applied at the rate of 6 lbs. per 1,000 square feet.
 - c. 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.
 - d. Apply ammonium sulfate fertilizer as necessary to maintain vigorous, green grass between fertilizings mentioned above.
 - e. 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.

1.12. PLANT AND TURF WARRANTY

- A. All work shall be in accordance with the terms of the Paragraph, "Warranty" of FAR clause 52.246-21, including the following supplements:
 1. A One Year Plant and Turf Warranty will begin on the date that the Government accepts the project or phase for beneficial use and occupancy. The Contractor shall have completed, located, and installed all plants according to the plans and specifications. All plants and turf are expected to be living and in a healthy condition at the time of final inspection.
 2. The Contractor will replace any dead plant material and any areas void of turf immediately. A one year warranty for the plants and turf that was replaced, will begin on the day the work is completed.
 3. Replacement of relocated plants, that the Contractor did not supply, is not required unless they die from improper handling and care during transplanting.

Loss through Contractor negligence requires replacement in kind and size.

4. The Government will reinspect all plants and turf at the end of the One Year Warranty. The Contractor will replace any dead, missing, or defective plant material and turf immediately. The Warranty will end on the date of this inspection provided the Contractor has complied with the work required by this specification. The Contractor shall also comply with the following requirements:
 - a. Replace dead, missing or defective plant material prior to final inspection.
 - b. Mulch and weed plant beds and saucers. Just prior to this inspection, treat these areas to a second application of approved pre-emergent herbicide.
 - c. From plants having been installed for one year, remove stakes, guy wires and any required tree wrappings.
 - d. Complete remedial measures directed by the Resident Engineer to ensure plant and turf survival.
 - e. Repair damage caused while making plant or turf replacements.

1.13. PLANT MAINTENANCE PERIOD

- A. Contractor shall begin a 90 day Maintenance Period after Complete Project acceptance by the Government. Contractor shall provide a CLIN on the bid documents and approved schedule of values for this Period after acceptance, to be reviewed and approved by the Resident Engineer.
- B. Replace all dead and damaged plants and plants not in a vigorous condition immediately upon discovery and as directed by the Resident Engineer. Install replacement plants before the end of the Maintenance Period.
- C. Keep all walks and paved areas clean. Keep the site clear of debris resulting from landscape work and maintenance operations.
- D. Check irrigation systems at each watering; adjust coverage and clean and repair non-functioning heads immediately. Adjust timing of sprinkler controller to prevent runoff and flooding.
- E. Maintain adequate moisture depth in soil to ensure vigorous growth, without overwatering. Check rootball of trees and shrubs independent of surrounding soils and hand water as required.
- F. 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 over 1-inch high at all times.
- G. Protect all areas against damage, including 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.
- H. Repair all damaged planted areas. Replace plants and reseed or resod turf immediately upon discovery of damage or loss, including damage from Deer and Rodents.
- I. 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

Resident Engineer.

- J. Keep watering basins in good condition and weed-free at all times.
- K. Replace all damaged, unhealthy or dead trees, shrubs, and ground covers with new stock immediately; size as indicated on the drawings.
- L. 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.
- M. 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.
- N. Apply ammonium sulfate fertilizer as necessary to maintain vigorous, green grass between fertilizings mentioned above.
- O. 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.
- P. At the conclusion of the Maintenance Period, schedule a final review with the Resident Engineer. On such date, all project improvements and all corrective work shall have been completed.
- Q. Submit written notice requesting review at least 10 days before the anticipated review.
- R. Prior to review, weed and rake all planted areas, repair plant basins, mow and edge turf, plumb tree stakes, clear the site of all debris and present in a neat, orderly manner.

1.14. APPLICABLE PUBLICATIONS

- A. The publications listed below, form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation only.
- 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 herein listed 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
- C. American National Standards Institute (ANSI) Publications:
 - 1. Z60.1-04 Nursery Stock
 - 2. Z133.1-06 Tree Care Operations-Pruning, Trimming, Repairing, Maintaining, and Removing Trees and Cutting Brush- Safety Requirements
- D. Hortus Third, A Concise Dictionary of Plants Cultivated in the U.S. and Canada.

- E. 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 and the Soil Management/Analysis Report with verifying implementation.
- F. American Society for Testing and Materials (ASTM) Publications:
 - 1. C136-06 Sieve Analysis of Fine and Coarse Aggregates
- G. Turfgrass Producers International:
 - 1. Turfgrass Sodding.
- H. U. S. Department of Agriculture Federal Seed Act.
 - 1. Rules and Regulations
- I. American Wood Protection Association (AWPA):
 - 1. C2-02 Lumber, Timbers, Bridge Ties and Mine Ties, Pressure Treatment
- J. "Sunset Western Garden Book," Lane Publishing Co., Menlo Park, California; current edition.
- K. Alameda Countywide Clean Water Program (ACCWP) or member agency having jurisdiction over the project work
- L. US Composting Council Compost analysis Program (CAP)
- M. Test Methods for the Evaluation of Composting and Compost (TMECC)
- N. International Society of Arboriculture, Guide for Plant Appraisal, latest version.
- O. United States Composting Council (USCC) Seal of Testing Assurance (STA) program.
- P. TMECC: Refers to "Test Methods for the Examination of Composting and Compost," published by the United States Department of Agriculture and the United States Compost Council (USCC)
- Q. References to "Caltrans Standard Specifications" shall mean the Standard Specifications of the State of California, Business and Transportation Agency, Department of Transportation, CALTRANS.
- R. Manufacturer's recommendations

PART 2 - PRODUCTS

2.01. GENERAL

- A. All plant material shall conform to the varieties specified or shown in the plant list and be true to botanical name as listed in Hortus Third.

2.02. PLANTS

- A. Plants shall be nursery grown in containers and in accordance with ANSI Z60.1, except as otherwise stated in the specifications or shown on the plans. Where the drawings or specifications are in conflict with ANSI Z60.1, the drawings and specification shall prevail.
- B. Plant the variety, quantity and size indicated. The total quantity tabulated on the drawings are considered approximate and furnished for convenience only. Contractor shall perform his/her own plant quantity calculations and shall provide all plants shown on the Drawings.
- C. Tag plants of the type or name indicated and in accordance with the standard practice recommended by the American Association of Nurserymen.
- D. Install healthy, shapely and well rooted plants with no evidence of having been root-bound, restricted or deformed.
- E. 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.
- F. Substitutions will not be permitted, except as follows:
 - 1. If proof is submitted to the Resident Engineer 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 Resident Engineer within 10 days after the effective date of Notice to Proceed.
- G. Tree Form: Trees shall have a symmetrical form as typical for the species/cultivar and growth form.
 - 1. 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 remove, an upright branch at least ½ the diameter of the original leader just below the pruning point shall be present.
 - 2. Potential Main Branches: Braches shall be evenly distributed radially around and appropriately spaced vertically along the trunk, forming a generally symmetrical crown typical for the species.
 - 3. 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:

4.		
	Container	Trunk Diam. in inches
	5 gallon	0.5" to 0.75"
	15 gallon	0.75" to 1.0"
	24" Box	1.5" to 2. 5"
		Soil level from Container Top
		1.25 to 2"
		1.75 to 2.75"
		2.25 to 3"

5. 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.

J. Shrubs

1. Each shrub must stand upright without support.
2. All container shrubs shall be free of girdling roots, defined as those roots greater than 1/8" diameter circling the periphery of the rootball. The top of the rootball shall be free of "Knees" (roots) protruding above the soil, and the bottom shall be free of matted roots.

- K. 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.

- L. Make substitutions only when a plant (or its alternates as specified) is not obtainable and the Resident Engineer authorizes a change order providing for use of the nearest equivalent obtainable size or variety of plant having the same essential characteristics with an equitable adjustment of the contract price.

2.03. GRASS (TURF)

A. Turf Sod

1. Blends as follows
2. Tall Fescue Sod Mix (Grown on Sand)
80% ti 90% Dwarf-type Fescue and Tall-type Fescue
10% to 20% Blue Grass
Available from Delta bluegrass (800) 637-8873
3. Machine cut sod to a uniform thickness of 3/4-inch excluding top growth and thatch. Each individual sod piece shall be strong enough to support its own

weight when lifted by the ends, in vigorous condition, dark green in color, free of disease, weeds and harmful insects. Broken pads, irregularly shaped pieces, and torn and uneven ends will be rejected.

4.

2.04. FERTILIZERS

- A. 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:
1. Type A:
6% Nitrogen, 20% Phosphorus Acid and 20% Potash, (6-20-20).
 2. 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.
 3. Type C:
Complete fertilizer 21% Nitrogen, 7% Phosphoric Acid and 14% Potash (21-7-14).
 4. If commercial fertilizer having this analysis is not obtainable, other similar commercial fertilizer may be used providing it meets the approval of the Resident Engineer.
- B. Maintenance Fertilizer: Type C

2.05. ORGANIC AMENDMENT FOR IN SITU SOILS (ON-GRADE):

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

1.	<u>Percent Passing</u>	<u>Sieve Designation</u>	
	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, min. 0.4%
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., Min. 350
Nitrogen stabilized - dry weight basis, min. 0.5%
Salinity (ECe): 4.0 maximum
Organic Content: 90% minimum
Reaction (pH): 4.0 minimum

- B. Submit sample along with analytical data from an approved laboratory for degree of compliance to the Resident Engineer within two weeks after award of Contract.

2.06. IRON SULFATE

- A. Type: Dry form.

2.07. PLANT BACKFILL

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

Size	Rate
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

- B. Mix the iron, amendment and soil thoroughly for use only 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 only in the top 8 inches.

2.08. RAISED PLANTER BACKFILL MIX

- A. "Raised Planter Backfill Mix" is a mixture 35% Tree & Shrub Planter/Plaster Sand, 35% lava rock, and 30% nitrolized Fir Bark Organic Amendment, and fertilizer ingredients listed below.
- B. Raised Planter Backfill Mix shall be delivered to the site in a damp condition and installed immediately to prevent losing the humus due to wind blow.
- C. Include the fertilizer ingredients as follows:
- | | |
|------------|------------------------------|
| 0.75 pound | Potassium Nitrate 13-0-44 |
| 0.5 pound | Calcium Nitrate 15.5-0-0 |
| 0.5 pound | Urea Formaldehyde 38-0-0 |
| 2.5 pounds | Single Superphosphate 0-25-0 |
| 4.0 pounds | Calcium Carbonate Lime |
| 4.0 pounds | Kaiser 65 Dolomite |
| 1.0 pounds | Iron Sulfate (min. 20% Fe) |

2.09. LAVA ROCK AGGREGATE

- A. Lava Rock Aggregate, Required Properties:

1. Grain Size Distribution

U.S. Std. Sieve Size	% Retained per Screen	% Weight Passing-Cumulative
12.5mm	0	95-100
8 mm	1	90-100
4.75 mm (#4)	58	35-50
1.18 mm (#16)	34	0-20
.850 mm (#20)	.9	0-20
.500 mm (#35)	.1	0-20
.212 mm (#70)	.6	0-20
.150 mm (#100)	1	0-15
.075 mm (#200)	3	0-5

.053 mm (#270)	1	0-5
.045 mm (#325)	.3	0-5

2. Sieve Analysis by ASTM 136
3. PH - 6.0 to 7.8
4. Chloride ppm 9.5 to 19
5. Sulfate ppm .4 to 1.1
6. Absorption 15 to 30%
7. Loose Unit Weight 43 Lbs PCF (ASTM C 29)
8. Absorption: Lava Rock aggregate shall retain a minimum of 18% of its weight in absorbed water and shall be free of toxic materials, insects, diseases, weed seeds and other pests.
9. The sieve analysis shall be as shown above and with not more than 5% passing the #200 sieve. Lava Rock Aggregate meeting the above specification is available from American Soil Products, Richmond, CA (510) 292-3000 and TMT Enterprises, San Jose, CA (408) 432-9040.

2.10. IMPORTED PLANTING SAND

- A. 100% medium/coarse, washed, sharp, angular, silt-free sand

- B. Sieve analysis:

Component	size	Sieve #	% Retained	% Passing
Gravel	4.76 mm	4	0%	100%
Fine Gravel	2.00 mm	10	0-5%	95-100%
Very Coarse Sand	1.00 mm	18	0-10%	90-100%
Coarse Sand	500 micron	35	0-35%	65-100%
Medium Sand	250 micron	60	50-100%	0-50%
Fine Sand	105 micron	140	0-30%	0-20%
Very Fine Sand	53 micron	270	0-15%	0-5%
Silt and Clay		Pan	0-5%	

- C. Reaction (pH) of the saturated sand shall be between 6.0-8.0 as determined on the saturation extract solution:

- D. Permissible range of Salinity, Boron and Sodium as follows:

1. Salinity (Ece) 0-3.0 dS/m
2. Boron 0.1.0 ppm
3. Sodium 0-20 meq/L

2.11. MULCH

- A. Organic Mulch: Natural fir tree bark mulch; 3/4-inch to 1-inch size.
- B. Submit samples of organic and rock mulches to the Resident Engineer for approval within two weeks of award of Contract. Resubmit until acceptable to Resident Engineer, at no extra cost.

2.12. TREE SUPPORT POLES

- A. Support Poles for trees up to 36" box size.
- B. Type: Peeled lodge pole pine logs, clean, smooth, new, and sized as follows:
 - 1. Two-inch (2") diameter by eight feet (8') long for trees less than 8' high and 1" caliper.
 - 2. Three-inch (3") diameter by eight to ten feet (8' - 10') long for trees greater than 8' high and 1" caliper.

2.13. TIES

- A. Rubber strap, 24-inch minimum length without sharp edges adjacent to trunk.

2.14. TREE ROOT BARRIER

- A. Root Barrier shall be black injection molded panels of .080" wall thickness in modules 24d" long by 18" deep manufactured with a minimum 50% post consumer recycled polypropylene plastic with added ultraviolet inhibitors, recyclable
- B. Each panel shall have not less than 4 molded integral vertical root deflecting ribs of at least 0.06" thickness protruding 1/2" at 90 degrees from interior of the barrier panel, spaced 6" apart. A double top edge consisting of two parallel, integral, horizontal ribs at the top of the panel of a minimum 0.06" thickness 3/8" wide and 1/4" apart. A minimum of 9 anti-lift tabs consisting of integral horizontal ridges of a minimum 0.06" thickness.
- C. Panels shall have an instant assembly system by sliding one panel into another.

2.15. PLANTING SOIL (TOPSOIL):

- A. Planting soil is defined as screened imported soil. Satisfactory planting soil shall be free of subsoil, clay, lumps, stones, and other objects over 2" in diameter, and without weeds, roots, and other objectionable material.

2.16. IMPORTED PLANTING SOIL (TOPSOIL):

- A. Imported planting soil shall be fertile, friable, natural, productive soil containing a normal amount of humus, and shall be capable of sustaining healthy plant life. Planting soil shall be free of subsoil, heavy or stiff clay, rocks, gravel, brush, roots, weeds, noxious seeds, sticks, trash, and other deleterious substances. 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, Sorrel, or Bermuda Grass.
- B. Imported planting soil shall have a pH value of between 6.0 and 7.5, a boron concentration of the saturation extract of less than 1 ppm, salinity of the saturation extract at 25 degrees C. of less than 4.0 millimoles, and a sodium absorption rate (SAR) of less than 8.
- C. The silt and clay content of imported planting soil shall not exceed that of the existing soil it is to be placed over. 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. Provide existing

site soil sample analysis report for comparison with the imported soil report.

- D. Make the site of the source of supply of planting soil available to the Resident Engineer for observation and approval prior to any hauling or placing of soil. In addition, submit for approval a 1-quart sample of soil, together with a standard soil analysis report by an accredited soils analyst showing chemical analysis stating source, fertility, agricultural suitability and particle size distribution of the soil. Deliver the sample to the Resident Engineer two weeks before starting the contemplated hauling of the soil. Following approval of the sample, provide a one-half cubic yard sample, which shall be stored at the site of work for comparison with subsequent loads of soil. The comparison sample shall be protected by a cover until the furnishing of all soil has been completed and accepted. Should the soil submittal lack certain requirements which can be added to the soil, the Resident Engineer will consider a request by the Contractor to amend the soil as recommended by the Soils Analyst at the Contractor's expense.

2.17. PRE-EMERGENCE WEED KILLER

- A. Clean non-staining as recommended by a licensed pest control specialist.

2.18. FILTER FABRIC

- A. Needle punched nonwoven geotextile Filter Fabric composed of polypropylene fibers, which are formed into a stable network such that the fibers retain their relative position. Inert to biological degradation and resists naturally encountered chemicals, alkalis, and acids weighing 18 grams per square meter. Meets Aashto M288-06 Class 3 for elongation > 50%.

2.19. PIPE:

- A. Polyvinyl Chloride (PVC) pipe and pipe fittings shall meet extra strength minimum of SDR-35 of the requirements of ASTM Specification D3034.
- B. Perforated and non-perforated corrugated polyethylene pipe, 3- to 10-inch diameter, shall meet the requirements of ASTM D883 and ASTM F412, and shall conform to Section 68 of the Standard Specifications.
1. Corrugated polyethylene pipe fittings shall comply with all requirements of AASHTO M-252-85I for 3- to 10-inch diameter pipe. Couplings shall be split or snap-on type for perforated pipe and split couplings with gaskets for non-perforated pipe. Cutting pipe with integral couplings will not be allowed.
 2. Corrugated polyethylene pipe and fittings manufactured by Advanced Drainage Systems, Inc., shall be considered the standard to determine compliance to this specification.

2.20. PERMEABLE BACKFILL (FILTER ROCK)

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

2.21. ALUMINUM EDGING

- A. 3/16" X 4" by 8' black anodized finish with 12" min long stakes set 1/2" below grade at each joint and maximum 4' spacing, in-line joints without offset or double thickness.

PART 3 - EXECUTION

3.01. FINE GRADING AND SOIL PREPARATION

A. General:

1. Soil in all planting areas shall be moist, but not so moist that it sticks to a hand shovel, and loose and friable to a minimum depth of 12 inches with a relative maximum compaction of 85%. Rip and scarify and dry any areas that do not meet this requirement.
2. Prior to excavating for plant pits and bed, verify the location of any underground utilities. Damage to utility lines shall be repaired at the Contractor's expense. Where lawns have been established prior to planting operation, cover the surrounding turf before excavations are made in a manner that will protect turf areas. Barricade existing trees, shrubbery, and beds that are to be preserved in a manner that will effectively protect them during the project construction
3. No work shall be done when the ground is too wet or in an otherwise unsuitable condition for earthwork and planting. Special conditions may exist that warrants a variance. Submit a written request to the Resident Engineer stating the special conditions and proposal variance.
4. Before proceeding with the work: Carefully inspect all areas and verify all dimensions and quantities. Immediately inform the Resident Engineer of any discrepancy between the drawings and specifications and actual conditions and secure approval to proceed.

B. Lime Treated Soil Removal:

1. Any Lime treated soils shall be removed full depth of treated soil from planting areas and replaced with approved planting soil as accepted by Resident Engineer. Contractor shall field measure and record all lime treated areas on As Built Drawings showing both depth and areas.
2. Following removal of lime treated material, scarify subgrade to a minimum depth of 6 inches prior to backfilling.
3. Test subgrade in all planting areas for drainage by flooding with 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 Resident Engineer.

C. Planting Soil Placement:

1. Inspect planting areas and remove all base rock and other foreign material. Verify placement of planting soil within dripline of trees with Resident Engineer. Except within tree driplines, rip all planting areas in two directions full depth of compacted fill (to a minimum of 12 inches) into undisturbed native soil 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 Resident Engineer to the specified depth to ensure proper percolation/drainage.
2. Prior to placing planting soil secure the Resident Engineers acceptance of the planting areas subgrade condition. Test depth of loose soil with hand shovel in presence of Resident Engineer in several locations as directed. After acceptance of the planting areas subgrade condition, uniformly distribute and spread planting soil backfill over scarified subgrade in planting areas as specified

- and compact to a maximum of 85% relative compaction.
3. Do not work planting soil in a wet or muddy condition or dump or spread in areas where subgrade is not in proper condition.
 4. Water settling, puddling, and jetting of fill and backfill materials as a compaction method is not acceptable.
 5. Provide a minimum of 12" depth in planting areas, or more where shown or specified otherwise.
- D. Planting Soil Placement in Planting Islands and Adjacent to Pavement Areas:
1. 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. Remove all engineered fill, base rock and compacted subgrade full depth of compaction and replace with approved planting soil, a minimum lift of [12"]. Unless shown otherwise, finish grade in planting islands shall be crowned with a minimum 2 % pitch to the edges.
- E. All planting areas soil shall be loose and friable prior to planting. Rip any overly compacted and re-compacted planting areas in two directions full depth of compacted soil prior to planting.
- F. 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.
- G. 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.
- H. Drag to a smooth, even surface. Grade to form all swales. 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 and until such time as permanent drainage and erosion control features have been installed. Refer to Erosion Control Netting below for treatment of slopes 3:1 and steeper.
- I. Finish Grade: Hold finish grade and/or mulch surface in planting areas 1/2-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 for a distance of 12 to 18 inch from the edge of pavement. The remainder of the planting area shall be graded to receive the required 3 inch layer of mulch.
- J. In Situ Soil Preparation:
1. Spread organic amendment, iron and Type A fertilizer evenly over installed and rough graded topsoil in all planting areas including ground cover and shrub areas at the following rates:
 - a. Organic Amendment: 6 cubic yards per 1,000 square feet
 - b. Fertilizer: Type A (6-20-20) at 20 lbs. per 1,000 square feet.
 - c. Iron Sulfate: 10 lbs. per 1,000 square feet
 2. Rototill above additives into soil 6 to 8 inches deep. Keep iron sulfate off pavement and other surfaces to prevent rust staining. Correct all rust damage to

work.

3. Planting soil shall have a pH range of 6.5 to 7.5.

- K. 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 Resident Engineer before any planting.
- L. Contractor shall notify Resident Engineer immediately if any planting soil areas have standing water or fail to drain properly prior to plant installation. Review on site with the Resident Engineer.

3.02. ALUMINUM EDGING

- A. Install in continuous strips as indicated and in accordance with manufacturer's recommendations with stakes spaced 48 inches on center maximum and at all joints.

3.03. 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 Resident Engineer before plant holes are dug. Review location of plants in relationship to irrigation heads and adjust location(s) that interfere with the function of the spray heads as accepted by the Resident Engineer prior to planting. If Subsurface drip is installed, adjust plant locations in relation to the subsurface emitter as required to ensure that the plant roots receive the proper amount of water in order for it to thrive.
- B. Test drainage of plant 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 Resident Engineer. 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 Resident Engineer.
- C. Break and loosen the sides and bottom of the pit to ensure root penetration and water test hole for drainage as required above.
- D. 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.

Size	Rate
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
- E. Carefully remove and set plants 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.

- F. Set plants in backfill with top of the rootball 2 inches above finished grade. 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.
- G. Build 6" high watering basin berms around trees and shrubs to drain through rootball. Stake and/or guy trees as detailed and noted herein. 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.
- H. Remove any soil from top of plant rootballs and secure Resident Engineer's approval of rootball height prior to mulching.
- I. After approval of rootball height, install mulch as required below.
- J. Trees damaged during installation, including broken branches, shall be brought to the attention of the Resident Engineer. Contractor shall replace damaged tree as determined by the Resident Engineer. If replacement is not necessary, Contractor shall prune damaged branches as directed by the Resident Engineer and under the direct supervision of a foreman certified by Western Chapter of International Arboriculture Society (WCIAS) and in accordance with WCIAS standards. See 3.7 Tree, Shrub and Vine Pruning.
- K. Coordinate planting and irrigation and provide hand watering of emitter irrigated areas as required to maintain moist root zones throughout the plant establishment period.

3.04. TREE, SHRUB AND VINE PRUNING

- A. Remove only dead, dying, or broken branches. Do not prune for shape.
- B. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Resident Engineer, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.
- C. Do not apply pruning paint to wounds.

3.05. 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.

3.06. SODDED TURF

- A. Lightly roll surface and re-shape to level humps and hollows. Secure Landscape Architect's approval prior to sodding. Do not sod on dry soil.
- B. Lay first strip of sod along a straight line (use a string in irregular areas). Butt joints tightly, do not overlap edges. On second strip, stagger joints. Use a sharp knife to cut

sod to fit curves, edges and sprinkler heads.

- C. When a conveniently large area has been sodded, water lightly to prevent drying. Continue to sod and to water until installation is complete.
- D. After laying all sod, roll lightly to eliminate irregularities and to form good contact between sod and soil. Avoid a heavy roller and excessive initial watering.
- E. Thoroughly water the completed sod surface to at least 8 inches deep. Repeat sprinkling at regular intervals to keep sod moist at all times until rooted. After sod is established, decrease frequency and increase amount of water per application.
- F. Turf with subsurface drip irrigation shall require 21 days minimum supplemental hand watering until sod is established.
- G. Protect turf areas by erecting fences, barriers and signs necessary to prevent trespass. Keep barriers neat and well maintained.

3.07. MULCH

- A. Except where rock mulch is required, mulch all tree, shrub and ground cover areas with organic mulch to a 3-inch depth, except adjacent to walkways where soil grade is 2 inches below top of pavement, mulch shall be 2 inches deep, and 2-inches deep where planting ground cover plants from flats. Hold bark mulch away from base (trunk) of plant 4" or as directed by the Resident Engineer. Individual trees and/or shrubs planted in non-irrigated areas shall, at minimum, receive bark mulch over their watering basin and berm. No mulch is required around trees in bioswales or bioretention basins.
- B. Install rock mulch to a minimum 3-inch depth where shown.

3.08. ROOT BARRIER

- A. Install in linear fashion along and adjacent to the edges of the planting area as detailed or, if not shown, in accordance with manufacturer's recommendations.

3.09. PRE-EMERGENCE WEED KILLER

- A. Apply pre-emergence weed killer in all areas to receive ground cover planting. Work shall be done under the supervision of a person licensed by the State of California as a pest control applicator and holding a qualified applicator license or a Qualified Applicator Certificate. Obtain approval of the finish grades prior to applying weed killer and coordinate planting and watering with the pest control specialist prior to planting. Take care to keep weed killer off areas to be seeded.

3.10. PLANT AND TURF ESTABLISHMENT PERIOD, WARRANTY, AND MAINTENANCE PERIOD

- A. Refer to Section 1 above

3.11. WATERING

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

3.12. RESTORATION AND CLEAN-UP

- A. Where existing or new turf areas have been damaged or scarred during planting and construction operations, restore disturbed area to their original condition. Keep at least one paved pedestrian access route and one paved vehicular access route to each building clean at all times. In areas where planting work have been completed, clear the area of all debris, spoil piles, and containers. Clear all other paved areas when work in adjacent areas is completed. Remove all debris, rubbish and excess material from the station.

3.13. ENVIRONMENTAL PROTECTION

- A. All work and Contractor operations shall comply with the requirements of Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.

3.14. CONSTRUCTION WASTE MANAGEMENT

- A. General: Comply with Contractor's Waste Management Plan and Section 01 74 19, CONSTRUCTION WASTE MANAGEMENT.
- B. To the greatest extent possible, separate reusable and recyclable products from contaminated waste and debris in accordance with the Contractor's Waste Management Plan. Place recyclable and reusable products in designated containers and protect from moisture and contamination.

3.15. FINAL PLANTING REVIEW AND ACCEPTANCE, per Section 01 77 00.

- A. At the conclusion of the Maintenance Period, schedule a final review with the Owner, the Owner's maintenance person, and 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, 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 rake all planted areas, repair plant basins, mow and edge turf, plumb tree stakes, clear the site of all debris and present in a neat, orderly manner.

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