1.3-1.02 Acceptable plants are those which satisfy minimum performance standards for the special site area in question and are easily maintained. For example, to be acceptable for Brush Management Zone 2, the plant must meet the performance standards for that zone.

1.3-1.03 Prohibited plants are those which do not satisfy the minimum performance standards for the site area in question. In addition, there are a number of invasive species that are not allowed in any required landscape area. The use of these materials elsewhere on a site is strongly discouraged. Where existing, these plants shall be eradicated. **Table 1** contains a list of Prohibited Plants.

TABLE 1
PROHIBITED SPECIES

Botanical Name	Common Name
Ailanthus altissima	Tree-of-Heaven
Arundo donax	Giant Reed
Broussonetia papyrifera	Paper Mulberry
Cortaderia selloana	Pampas Grass
Nicotiana glauca	Tree Tobacco
Pennisetum setaceum	Fountain Grass
Spartium junceum	Spanish Broom
Tamarix spp	Tamarisk
Ricinus communis	Castor Bean

1.3-1.04 Plant material used for erosion control on disturbed soil areas and slopes should achieve 100 percent soil coverage within two years of being installed.

1.3-1.05 Palm tree sizes are based on brown trunk height using the following methods for measurement for the type of palm shown:

- Fan Palms - Measured from the ground line to the base of the first living frond.
- Feather Palms - Measured from the ground line to the base of the heart leaf where the heart leaf breaks away from the trunk.

1.3-1.06 Plant material used adjacent to coastal bluffs shall be native or naturalized to minimize the need for irrigation beyond initial plant establishment. Existing exotic and other plant materials that require regular irrigation should be removed and replaced with native or naturalized plant material.

1.3-1.07 Plant material are to be selected to be less than or equal to the Maximum Applied Water Allowance (MAWA) Water Budget calculation formula and specifications in Section 2.3-13.10.

1.3-2 Lawns

1.3-2.01 Areas of lawn shall be minimized and concentrated where used

1.3-2.02 Lawn areas shall not exceed 10 percent of the planting area on a premises, excluding required common areas, active recreation areas, areas located within the public right-of-way between the curb and public sidewalk, and areas of turf used for bioretention and infiltration basins. This restriction does not apply to single dwelling unit residential uses in residential zones.

1.3-2.03 The minimum dimension of a lawn bounded by impervious surfaces on two or more sides is 8 feet in all directions unless subsurface or low volume irrigation is used (low pressure irrigation through tubing or lateral lines and low volume emitters such as drip lines or bubblers).

1.3-2.04 Lawn areas located on slopes, where the toe of slope is adjacent to hardscape (as defined in Section 113.0103 of the Land Development Code), shall not exceed a gradient of 25 percent (4:1).

1.3-3 Vehicular Use Areas Not Within Street Rights-of-Way

1.3-3.01 Landscape improvements, including, but not limited to, plants, berms, signs, and structures shall be selected, positioned, and maintained to avoid obstructing views of motorists near intersections of aisles, drives, and pedestrian walkways.

1.3-3.02 Trees shall be selected and maintained such that scaffold branches are a minimum of 60 inches above the finish grade as measured at the trunk.

1.3-3.03 Plant materials with known surface root problems shall not be used in vehicular use areas.

1.4 SITE PREPARATION CRITERIA

1.4-1 When so indicated on the approved landscape plans, soils testing by a certified agronomic soil testing laboratory and/or 24 hour percolation tests (see **Sec. 2.3-13.08**) shall be conducted and report recommendations implemented prior to the installation of plants and irrigation systems.

1.4-2 Certified soil test and percolation test results and any proposed construction document revisions shall be submitted to the City. Written approval of revised construction documents is required prior to the installation of plantings and irrigation systems.

1.4-3 Soil amendments are to be used when needed to improve water retention in the soil, to improve the functional structure of the soil for greater water infiltration and percolation, to balance pH, and to optimize plant growth.

1.5 INSTALLATION CRITERIA

1.5-1 All drainage shall comply with the Storm Water Standards of the Land Development Manual.

1.5-5.01 All planting areas shall be designed to effectively handle all drainage onsite.

1.5-5.02 Concentrated flows shall be handled on-site using low impact development practices.

1.5-2 Only trees which are not self-supporting shall be staked or guyed.

1.5-4 Herbaceous groundcovers shall be planted with triangular spacing at a distance that will typically ensure 100 percent coverage within one-year of installation.

1.5-5 For irrigated areas, the rate of seed application shall be sufficient to typically provide 100 percent coverage within six months of installation.

1.5-6 All required planting areas shall be covered with mulch (organic or inorganic) to a minimum depth of 3 inches, excluding slopes requiring revegetation. All exposed soil areas without vegetation shall also be mulched to this minimum depth.

1.6 MAINTENANCE CRITERIA

1.6-1 Trees shall be watered deeply, but infrequently, to promote deeper rooting, and shall be fertilized as required by sound horticultural practices.

1.6-2 Plants shall be pruned in accordance with professional trimming standards to maintain their intended shapes and sizes, and to insure the health of the specimen and the safety of the public.

1.6-2 Tree guys and stake ties shall be inspected and adjusted periodically, and removed when necessary, to insure that they are adequately surrounding the tree without girdling trunks or branches.

1.6-4 Plants shall be pruned to avoid blocking walks, passageways and sight distance views for vehicular traffic.

1.6-5 Dead plants shall be replaced, damaged branches shall be removed, and overgrown areas shall be thinned by the selective removal of unnecessary plants.

1.6-6 Shrubs and vines used for screening trash enclosures and service areas shall be pruned to maximize screening while allowing access to the storage/service areas.

1.6-7 Shrubs, trees, and vines for screening adjacent properties shall be kept pruned so they do not interfere with pedestrian traffic and do not encroach excessively onto the adjacent property.

1.6-8 Trees shall be selected based upon the site characteristics including soil type, soil area, drainage, and adjacent improvements. Trees selected should grow to maturity without impacts to sidewalks, curbs, and other public improvements.

1.7 STREETS RIGHTS-OF-WAY AND OPEN SPACES MATERIAL GUIDELINES

All planting in street rights-of-way and those in open space areas that are to be maintained by the City, either directly or by administered contract shall comply with this section.

1.7-1 Plant Selection

1.7-1.01 In areas of existing development without an approved street tree plan[1], the tree selection(s) shall match the existing, permitted, predominate species unless the species is not listed in the Street Tree Selection Guide (www.sandiego.gov/street-div/pdf/treeguide.pdf).

1.7-1.02 In newly developing areas without an approved street tree plan, tree selection shall be coordinated to achieve continuity.

1.7-1.03 Plant selection shall be limited to those species which are considered relatively disease and pest-free and require minimal trimming to be maintained in a safe and attractive condition.

1.7-1.04 Substitutions of plant material in the street rights-of-way must be approved by the City Manager.

1.7-1.05 The planting of trees such as Cinnamomum, Ficus, Fraxinus, Schinus and other species with surface root systems that tend to damage sidewalks shall not typically be used in public rights-of-way. They will only be considered under appropriate site conditions and where maintenance responsibilities have been assigned to the satisfaction of the City Manager.

1.7-1.06 High water use plants, characterized by a plant factor of 0.7 to 1.0, are prohibited in street medians.

[1] Street tree plans, if adopted, are located in the applicable community plan. If there is no adopted street tree plan contact the City Arborist for the appropriate tree.

1.7-2 Installation Criteria

1.7-2.01 Per Section 1.4, Site Preparation Criteria, a soil percolation test shall be performed by filling a 12"x 12"x 12" square hole with water, waiting 12 hours, and then completely refilling. All percolation test operations shall be conducted in the presence of a licensed landscape architect, contractor, civil engineer or related professional. If all the water is not absorbed within 12 hours of the second filling, tree installations shall include the following:

- 150 cubic feet of topsoil to a maximum depth of three feet.
- A four-inch minimum diameter perforated drain line connected to a storm drain or sump. When connecting to a storm drain, a cleanout shall be installed at the connection to allow inspection of sources of non-storm water discharges caused by excessive irrigation.
- Sumps when approved, shall be a minimum 12 inches in diameter and extend four feet below the planting trench depth. A minimum three-inch diameter pipe with removal cap on top shall be extended to the surface for inspection.
- A subsurface irrigation system.

1.7-2.02 Non-biodegradable root barriers shall be installed around new trees in the public right-of-way to direct tree root growth downward and away from adjacent sidewalks, curbs, gutters, driveways, and other public improvements. Root barriers may be eliminated where the combination of tree species, soil type, soil area, and drainage conditions can be shown to afford equivalent protection against tree root damage to public improvements.

1.7-3 Maintenance Criteria

1.7-3.01 Trees with a low spreading branch structure shall typically not be used in the street rights-of-way, and individual specimens shall be selected, planted, and pruned, if necessary, such that major scaffold branches are at least 8 feet above the finish surface or finish grade, as measured at the trunk.

1.7-3.02 Trees shall be positioned and kept maintained so that any branches that extend out over dedicated street rights-of-way have a minimum of 14 feet 6 inches of clearance above the surface of the street.

1.7-4 Public Improvements Adjacent to Existing Trees

1.7-4.01 Sidewalk, curb, gutter or driveway renovation or replacement within four feet of an existing tree shall be performed following procedures that would protect

the existing tree. These procedures could include root pruning, modification to the alignment of the proposed public improvement, erecting temporary barriers during construction, or modification to the construction detail of the improvement. Where the combination of existing conditions and the proposed public improvement would preclude tree preservation, trees that are removed should be replaced with new street trees.

1.7-4.02 Public improvement work adjacent to existing trees shall be performed in accordance with the provisions of the public right-of-way permit.

1.8 WATER FEATURES

1.8-1 Manmade water features including pools, spas, ponds, lakes, waterfalls, fountains, artificial streams and similar features where water is artificially supplied are subject to the regulations for high water use landscape features.

1.8-2 Recirculating water systems shall be used as a source for water features.

1.8-3 Where available, recycled water shall be used as a source for manmade water features with the exception of pools and spas and similar features that are prohibited from using recycled water by state law.

1.8-4 Constructed wetlands that are non-irrigated and that are used for on-site wastewater treatment or stormwater best management practices are not water features and are not subject to the MAWA Water Budget calculation formula in Section 2.6.

required by the plant list shall be delivered with a proper plant patent attached. Any plants which are not labeled or are not as indicated on the Plans and Specifications shall be rejected and shall be removed from the site immediately.

800-1.4.2 **Trees.** ADD the following:

1. Trees shall have a uniform trunk taper from the base of the tree, continuing up the main leader. Palms shall be un-skinned unless specified otherwise.
2. Trees with naturally occurring central leaders shall remain un-pruned or unaltered from the nursery.
3. Trees Planted In Turf Areas.
   a) Trees shall be spaced to permit the most effective use of mechanized maintenance equipment and operation of the irrigation system.
   b) Trees shall have a minimum of 12 horizontal feet between other trees and vertical objects.
   c) Provide a 4 foot diameter mulched area around the base of the tree; there shall be no mulch on crown of tree.
   d) Plant spacing shall be set to the mature width and height of plants and trees.
   e) On trees with a canopy larger than 12 feet in diameter, tree wells shall extend 6 feet in radius from the tree truck. On trees with a canopy smaller than 12 feet in diameter, tree wells shall extend to the edge of the dripline.
   f) Dense tree groves shall not be planted in turf areas.

800-1.4.5 **Sod and Stolons (turf grass).** ADD the following:

1. Sod and stolons species shall be as **specified on the Plans or in the Special Provisions**. Material shall be delivered and installed within 24 hours of harvesting with shipping documentation to verify the origin, harvest date, stolon preparation date, and shipment date. All material shall be from the same growing ground.

ADD:

800-1.4.7 **Vines.**

1. Vines shall be of the specified type and size.

800-1.5.3 **Tree Stakes.** DELETE in its entirety and SUBSTITUTE with the following:

1. The type of tree stake and length shall be as designated on the Plans or in the Special Provisions.
2. The tree support stakes shall be 10 feet (3 m) long.

ADD:

800-1.5.4 Tree Ties.

1. Tree ties shall be manufactured of virgin flexible vinyl meeting ASTM-D412 standards for tensile and elongation strength. Material shall be black or ultraviolet resistance.
2. Tree ties shall be manufactured with a double back locking configuration and secured with one galvanized nail to prevent slippage.
3. Tree ties shall elongate with the tree growth and shall prevent damage to the tree.

ADD:

800-1.6 Erosion Control Matting.

1. **Jute.**
   a) Jute matting shall be of open weave with approximately 1 in^2 (1 inch x 1 inch) (25.4 mm x 25.4 mm) mesh. It shall be manufactured from loosely twisted jute yarn varying in thickness no more than half its normal diameter.
   b) Matting shall be made smolder resistant by treatment with chemicals which are non-leaching and non-toxic to vegetation. An identification mark to differentiate it from untreated jute cloth shall be present.
2. **Excelsior.**
   a) Excelsior blanket shall consist of a cured wood excelsior mat.
   b) Fibers shall be evenly distributed over the entire area of matting. 80% of fibers shall be at least 6 inches (152.4 mm) long with consistent thickness.
   c) The topside of the matting shall be covered with 2 inch by 1 inch (50.8 mm x 25.4 mm) biodegradable extruded plastic mesh.
   d) The blanket shall be made smolder resistant without chemical additives.
3. **Staples.**
   a) Staples for erosion control matting shall be 11 gage steel wire bent in a "U" shape with 6 inches (152.4 mm) minimum length.
4. **Root Barriers.**
   a) Root barriers shall be equivalent to the following:
      i. Type LB 12-2 or UB 18-2 for installations at existing trees or approved equal.
      ii. UB 24-2 for installations at new construction, as manufactured by DeepRoot or approved equal.

SECTION 801 - INSTALLATION

801-1 **GENERAL.** DELETE in its entirety and SUBSTITUTE with the following:

1. This section includes specifications for the preparation, planting, and irrigation system construction for landscape areas shown on the Plans.
2. Unless otherwise specified, walls, curbs, planter boxes, walks, irrigation systems, and similar improvements shall be constructed following rough grading and before landscaping.
3. Work on the irrigation system including hydrostatic tests, backfill and densification of trenches, and other excavations shall be performed before topsoil placement. Preliminary operational tests of the automatic control system and coverage tests shall be performed after top soil placement.
4. Trees or shrubs which have been identified to remain as shown on the Plans shall be protected. Construction fencing minimum 5 feet (1.5 m) high shall be placed around the drip line of the tree or cluster of trees to protect the entire area. No material shall be stored nor shall equipment be permitted within the fenced area. Pruning of the tree canopy shall not be permitted without written recommendation of a certified arborist submitted and approved by the Engineer. Digging or excavation shall not occur under the drip line of the tree unless authorized by the Engineer. Failure to properly protect the identified trees may result in charges based on the assessed value of the tree and other damages once valued by a certified arborist.

801-2.1 **General.** ADD the following:

1. The subgrade soil below the proposed topsoil shall be scarified in a cross pattern to a depth of 3 inches (76.2 mm) for subgrade for Class A or B topsoil. Stones over 1 inch (25.4 mm) in greatest dimension shall be removed from the scarified area. The subgrade depth shall be verified by the Engineer prior to topsoil import.

801-2.2.1 **General.** DELETE in its entirety and SUBSTITUTE with the following:

1. Planting areas shall be free of weeds and other extraneous materials to a depth of 10 inches (254 mm) below finish grade before topsoil Work.
2. Soil shall not be worked when it is so wet or so dry as to cause excessive compaction or the forming of hard clods or dust.
3. Class "C" topsoil shall be scarified and cultivated to a finely divided condition to a depth of 8 inches (203.2 mm) minimum below finish grade. During this operation, all stones over ½ inches (12.7 mm) in greatest dimension shall be removed.
4. **Unless otherwise specified on the Plans or Special Provisions**, the topsoil shall be Class A and shall be 15 inches (381 mm) thick.
5. The soil shall be prepared in accordance with the recommendations of the soil analysis results stated in 800-1.1.2, "Class 'A' Topsoil".

6. If leeching is required per the recommendations of the soil analysis results, amendments shall be blended into the soil prior to leeching. Leeching shall be performed until analysis results are in compliance with agriculture suitability standards.

7. After compaction, topsoil shall be within ± 0.1 foot (0.3 m) of finish grade.

801-2.2.2 **Fertilizing and Conditioning Procedures.** DELETE in its entirety and SUBSTITUTE with the following:

1. The planting area shall be brought to finish grade before spreading the soil amendment materials specified.

2. Soil amendment materials shall be uniformly spread at the prescribed rate as recommended in the soil test results.

3. The quantities of materials necessary for the planting area shall be at the Work site and verified by delivery tickets furnished to the Engineer before spreading.

4. After spreading, the soil amendments shall be cultivated into the upper 15 inches (381 mm) of soil by suitable equipment operated in at least 2 directions at right angles.

5. The resulting soil shall be in a friable condition.

6. All planting areas shall be fertilized in a uniform manner at the application rate identified in the soil analysis recommendations.

7. Fertilization of turf areas shall be accomplished by uniformly spreading 50% of the specified quantity in one direction. The remaining 50% of the fertilizer quantity shall be spread perpendicular to the previous direction, immediately after the initial application. Each of the applications shall be spread uniformly in parallel, overlapping passes, to provide uniform results.

801-2.3 **Finish Grading.** DELETE in its entirety and SUBSTITUTE with the following:

1. The finish grade shall be smooth, uniform, and free of abrupt grade changes and depressions to ensure surface drainage.

2. The finish grade adjacent to paving, curbs, or headers shall be ½ inch (12.7 mm) in lawn areas and 2 inches (50.8 mm) in shrub or groundcover areas.

3. The soil shall be watered and allowed to settle to provide a stable surface. After the soil has dried out to a workable condition, the planting areas shall be regraded, raked, and smoothed to the required grades and contours.

4. Topsoil shall be mechanically compacted to a minimum relative compaction of 85%. Finish surfaces shall be clean and suitable for planting.

801-3 **HEADER INSTALLATION.** To paragraph (2), DELETE in its entirety.

801-4.1 **General.** DELETE in its entirety and SUBSTITUTE with the following:

1. The types, sizes, and quantities of plant materials shall be as specified in the Special Provisions or shown on the Plans.

2. All plants shall be reviewed and approved prior to planting, including plants previously approved at the nursery. You shall be responsible for the condition of all plants, planted or otherwise, until the completion of the Work.

3. Planting shall be performed with materials, equipment, and procedures favorable to the optimum growth of the plants and in compliance with these procedures.

4. Except as noted for specimen planting, all planting shall follow the completion of the irrigation system.

5. Soil shall be fertilized prior to planting per the recommendations of the soil analysis results.

6. Application of the herbicides shall be **as specified in the Special Provisions**.

801-4.2 Protection and Storage. ADD the following:

1. Sun sensitive plants, stolons, and sod shall be stored in the shade or screened from the sun.

801-4.3 Layout and Plant Location. DELETE in its entirety and SUBSTITUTE with the following:

1. Prior to planting, perform a detailed layout within the planting areas to be approved by the Engineer.

2. The first row of plants in areas designated for center-to-center spacing of plants shall be located at one-half of designated spacing form the edge of the area **unless specified otherwise on the Plans or Special Provisions**.

3. Plants shall be located to prevent irrigation blockage.

801-4.5 Tree and Shrub Planting. DELETE in its entirety and SUBSTITUTE with the following:

1. Planting holes shall be the depth of and twice the width of the plant container or ball and shall be larger, if necessary, to permit handling and planting without injury or breakage of the root ball or root system. Any plant with a broken or cracked root ball before or during planting shall not be planted.

2. Containers shall be removed in such a manner that the roots are not injured. Balled plant wrappings shall be loosened or cut back after the plant is positioned in the planting hole.

3. The native soil at the bottom and sides of planting holes shall be scarified.

4. Prepared backfill mix for shrub planting shall consist of 20% to 40% by volume of Type 1, 2, or 3 organic soil amendments mixed with native soil, depending on soil conditions at each site, as approved by the Engineer. On projects requiring soil analysis of native soil, backfill mix shall be determined by the recommendation of the soil analysis results and as approved by the Engineer.

5. Planting installation shall conform to the following requirements:

   a) The bottom of the planting pit shall be compacted.

   b) The plant shall be set at the approximate center of the hole and plumb so that the crown of the plant is 1 inch (25.4 mm) above finish grade.

c) Backfill shall be added in 6 inch (152.4 mm) lifts and shall be hand tamped to finish grade.

d) The backfill shall be thoroughly water-settled and additional backfill added to fill any remaining void below finish grade.

e) After the water has drained, the specified number of fertilizer tablets shall be placed in the planting hole in the presence of the Engineer.

f) A circular watering basin the circumference of the dripline of the tree or a minimum of 36 inch in circumference (914.40 mm), 4 inches (101.6 mm) high shall be left around the plant. The bottom of the basin shall be at approximate finish grade or slightly lower. Type 1, 5, 10, or 13 mulch shall be spread at least 4 inches (101.6 mm)) thick in the basin leaving 3 inches (76.2 mm) of clearance around the base of the tree or shrub.

6. Basins of planted container material shall not be planted or seeded.

7. After planting, the plant shall be plumb, with the root crown 1 inch (25.4 mm) above finish grade.

801-4.6.1 **Method "A" Tree Staking.** DELETE in its entirety and SUBSTITUTE with the following:

801-4.6.1 **Tree Staking.**

1. The tree shall be staked with the type and length of stake **specified on the Plans or in the Special Provisions**.

801-4.6.2 **Method "B" Tree Staking.** DELETE in its entirety and SUBSTITUTE with the following:

801-4.6.2 **Guying.**

1. Guying shall be done as **specified on the Plans or in the Special Provisions**.

801-4.6.3 **Guying.** DELETE in its entirety.

801-4.7 **Ground Cover and Vine Planting.** DELETE in its entirety and SUBSTITUTE with the following:

1. Soil preparation and fine grading shall be completed prior to ground cover planting.

2. Ground cover and vines shall be planted in moist soil and spaced as indicated on the Plans. Soil shall be moist within the total root zone of the material being planted.

3. Each plant shall be planted with its proportionate amount of container soil to minimize root disturbance. Soil moisture shall be such that the soil does not crumble when removing plants.

4. Following planting, ground cover and vine areas shall be regarded to restore smooth finish grade and to ensure proper surface drainage. A 2 inch (50.8 mm) layer of the specified mulch shall be spread over the planted areas **unless specified otherwise**.

pest and fungi control, plant replacement, and mulch replenishment. Maintenance shall continue until Final Acceptance.

801-7 MEASUREMENT. DELETE in its entirety and SUBSTITUTE with the following:

801-7 MAINTENANCE OF EXISTING TREES.

1. You shall immediately notify the Engineer if a tree appears to be or may be unstable as a result of trimming or root pruning activities.
2. All measures will be taken to minimize the removal of tree roots in order to maintain the health and stability of the tree. Those measures include but are not limited to ramping over roots, meandering around roots, and reinforcing sidewalk with rebar to strengthen sidewalk. Removal of tree roots shall be the last option when the hardscape is being replaced or newly constructed.

ADD:

801-7.1 Tree Trimming.

1. Trees shall be trimmed per ANSI A300 Standards for Tree Care Operations 1 week prior to root pruning or as directed by the Engineer. Tree trimming shall include:
   a) Removal of low branches overhanging residential streets to a height above the street grade of 14 feet (4.3 m) unless otherwise directed.
   b) Removal of low branches overhanging sidewalks shall be trimmed to a height of 8 feet (2.4 m) unless otherwise directed.
   c) Removal of the dead, broken, diseased, and insect-infested branches and stubs larger than ½ inch (12.7 mm) in diameter.
   d) Pruning end branches to lighten end weights where such overburden appears likely to cause breakage of limbs based upon a certified arborist report and under their supervision of this Work.
   e) Removal of cross limbs and water sprouts (suckers).
2. Final pruning cuts shall be made without leaving a stub. Final pruning cuts shall be made in a manner to favor the earliest covering of the wound with callous growth. The wound shall be as small as practicable. The cambium tissues at the edge of the cut shall be alive and healthy. Extremely flush cuts which produce large wounds and weaken the tree at the cut shall not be made.
3. Pruning and cutting tools shall be kept sharpened to a condition that shall not permit leaving a scraped cambium edge on final cuts. Such tools shall also be kept clean and free from infectious materials.
4. The use of climbing spurs or spike shoes shall not be permitted.
5. Trimming of the trees shall provide adequate clearance from obstructed street standard, globe, or sign. Trim tree limbs shall clear all adjacent structures by 5 feet (1.5 m).

6. In the event that high voltage aerial utility wires present a hazard to your personnel or others near the Work Site, the Work shall immediately cease and you shall notify San Diego Gas & Electric. The Work shall then commence in accordance with the instructions from the utility company.

ADD:

801-7.2 Root Pruning for Re-configured Sidewalk.

1. At locations where the width of the walk will be reduced or moved over to enlarge the tree well, the Resident Engineer and certified arborist may arrange for root pruning after the existing walk has been demolished and removed and prior to installation of new walk. Coordinate the scheduling of root pruning within 1 week of the concrete repair Work to start. Roots shall be cut at the locations established by the Engineer based upon a report from a certified arborist.

ADD:

801-7.3 Root Pruning for Sidewalk Replacement.

1. Prune the trees roots in accordance with the Contract Documents. You shall coordinate the scheduling of root pruning within 1 week of the concrete repair Work to start. The Work includes cutting all roots necessary for satisfactory forming for replacement sidewalk to a depth of 12 inches (304.8 mm), 21 inches (533.4 mm) on the curb side, along the edge of the new walk or curb for a distance of 10 feet (3 m) in each direction from the center of the trunk, unless otherwise directed by the Engineer based upon a report from a certified arborist. If the walk will not be replaced, roots shall be cut in straight lines parallel to the walk or the curb. The root cut shall not be more than 3 inches (76.2 mm) from edge of existing walk or curb for a length of 10 feet (3 m) in each direction from the center of the trunk.
2. Roots more than 2 inches (50.8 mm) in diameter shall be preapproved for removal by the Engineer based upon a report from a certified arborist. Roots shall be cut at the nearest node to encourage roots to grow away from the walk. Root cutting shall not impact the trunk flare. Roots shall be cleanly cut from the new walk edge. Backfill excavated areas with Class A topsoil or decomposed granite as directed by the Engineer to existing grade and compact sufficiently to not settle when walked upon.
3. In order to protect existing trees, surface roots in the parkway area or planter strip shall not be damaged or removed outside of the pruning area and no construction equipment or supplies including spoils shall be placed in or upon this area.

ADD:

801-7.4 Root Pruning on Curb Side.

1. Prune the tree roots as noted in the Contract Documents based upon a report from a certified arborist. You shall coordinate the schedule of this Work within 1 week of the concrete repair Work scheduled. Roots shall be cut following the

removal of the existing curb and prior to the installation of the new curb when practical.

2. The Work includes cutting all roots necessary to a depth of 21 inches (533.4 mm) only along the edge of the new curb line adjacent to the tree, in order to provide forming area for new curb. This shall be done for a minimum distance of 10 feet (3 m) on the curb side of tree. In cases where the curb will not be replaced, roots shall be linear cut no further than 3 inches (76.2 mm) from edge of existing curb for a minimum length of 10 feet (3 m) from the tree trunk.

ADD:

801-7.5 Equipment.

1. Cuts shall be made with a root cutting machine such as Vemeer, Doscocil Inc., or approved equal as approved by the Engineer. Any shredded roots shall be cut clean to the nearest root node. Use of a tree stump grinder for root pruning shall not be acceptable.

ADD:

801-7.6 Root Barrier.

1. Install root barriers for trees within 10 feet (3 m) of hardscape for new construction, where the root pruning and walk construction has been completed, or as directed by the Engineer. Root barriers installed on either the curb side or walk side shall be continuous, 20 feet (6.1 m) in length, and centered on the tree or as directed by the Engineer. The Engineer may allow for alterations to the root barrier in order to accommodate necessary root locations based upon an arborist report.

2. Where trees requiring root barriers are 18 feet (5.5 m) or less apart, the barrier shall be installed continuously between trees. The barrier shall be placed 1 inch (25.4 mm) above finish grade against the back of the curb or the front edge of the walk. Vertical raised ribs on barrier shall be faced toward the tree(s). The barrier shall be installed vertically, or if conditions allow, with the top inclined towards the tree.

3. The barrier shall not be installed with the top inclined away from the tree. The root pruning trench shall be backfilled to the top of the barrier. The tree shall be inspected by the Engineer for stability prior to the backfilling of the root pruning trench.

801-8 PAYMENT. DELETE in its entirety and SUBSTITUTE with the following:

801-8 MEASUREMENT.

1. Landscaping and irrigation Work shall be measured as specified in the Contract Documents and as shown in the Bid.

2. Tree maintenance Work shall be measured by the tree trimming, root pruning, or root barrier required for each tree.

ADD:

801-9 PAYMENT.

1. The payment for landscaping and irrigation Work shall be included under the lump sum Bid items or for the Contract Unit Prices shown in the Bid and shall also include the payment for the Plant Establishment Period Work.

2. The payment for tree maintenance Work shall be included in the following Bid items:

   a) Tree Trimming

   b) Root Pruning

   c) Root Barrier

3. When used, Decomposed Granite (DG) shall be included in the Bid item for "Remove and Replace Miscellaneous Hardscape with Topsoil" unless a separate Bid item has been provided.

E.6 SD-A Tree

Source: County of San Diego LID Manual

MS4 Permit Category

Site Design

Manual Category

Site Design

Applicable Performance Standard

Site Design

Primary Benefits

Volume Reduction

Description

Trees planted to intercept rainfall and runoff can be used as storm water management measure that provide additional benefits beyond those typically associated with trees, (i.e. energy conservation, air quality improvement, and aesthetic enhancement). Typical storm water management benefits associated with trees include:

- **Interception of rainfall** – tree surfaces (roots, foliage, bark, and branches) intercept, evaporate, store, or convey precipitation to the soil before it reaches surrounding impervious surfaces
- **Reduced erosion** – trees protect denuded area by intercepting or reducing the velocity of rain drops as they fall through the tree canopy
- **Increased infiltration** – soil conditions created by roots and fallen leaves promote infiltration
- **Treatment of storm water** – trees provide treatment through uptake of nutrients and other storm water pollutants (phytoremediation) and support of other biological processes that break down pollutants

Typical tree system components include:

- Trees of the appropriate species for site conditions and constraints
- Available growing space based on tree species, soil type, water availability, surrounding land uses, and project goals
- Staking and planting requirements (see Standard Drawing: SDL-101)

- Optional suspended pavement design to provide structural support for adjacent pavement without requiring compaction of underlying layers
- As needed root barrier devices; a root barrier is a device installed in the ground, between a tree and the sidewalk, intended to guide roots down and away from the sidewalk in order to prevent sidewalk damage.
- Optional tree grates; maximize available space for pedestrian circulation and protect tree roots from compaction.
- Optional shallow surface depression for ponding of excess runoff
- Optional planter box drain

Design Adaptations for Project Goals

Storm water volume credits are only allowed for new trees implemented within the project footprint.

Site design BMP to provide incidental treatment. Trees primarily functions as site design BMPs for incidental treatment. Benefits from trees as a site design BMP are accounted by adjustment factors presented in **Appendix B.2.2**. Trees as a site design BMP are only credited up to 0.25 times the DCV from the project footprint (with a maximum single tree credit volume of 400 ft^3).

Storm water pollutant control BMP to provide treatment. Applicants are allowed to design trees as a pollutant control BMP and obtain credit greater than 0.25 times the DCV from the project footprint (or a credit greater than 400 ft^3 from a single tree). For this option to be approved by the City Engineer, applicant is required to do infiltration feasibility screening (Worksheet C.4-1/Form I-8) and provide calculations supporting the amount of credit claimed from implementing trees within the project footprint. The City Engineer has the discretion to request additional analysis before approving credits greater than 0.25 times the DCV from the project footprint (or a credit greater than 400 ft^3 from a single tree).

Design Criteria and Considerations

Trees must meet the following design criteria and considerations and the requirements of Standard Drawing SDL-101 where applicable. Deviations from the below criteria may be approved at the discretion of the City Engineer if it is determined to be appropriate:

	Siting and Design	Intent/Rationale
□	Tree species is appropriately chosen for the development (private or public). For public rights-of-ways, local planning guidelines and zoning provisions for the permissible species and placement of trees are consulted.	Proper tree placement and species selection minimizes problems such as pavement damage by surface roots and poor growth.

<table>
<tr><th></th><th>Siting and Design</th><th>Intent/Rationale</th></tr>
<tr><td>□</td><td>Location of trees planted along public streets follows local requirements and guidelines. Vehicle and pedestrian line of sight are considered in tree selection and placement.
Unless exemption is granted by the City Engineer the following minimum tree separation distance (from the tree trunk) is followed
<table>
<tr><th>Improvement</th><th>Minimum distance to Tree</th></tr>
<tr><td>Traffic Signal, Stop sign</td><td>20 feet</td></tr>
<tr><td>Underground Utility lines (except sewer)</td><td>5 feet</td></tr>
<tr><td>Sewer Lines</td><td>10 feet</td></tr>
<tr><td>Above ground utility structures (Transformers, Hydrants, Utility poles, etc.)</td><td>10 feet</td></tr>
<tr><td>Driveways</td><td>10 feet</td></tr>
<tr><td>Intersections (intersecting curb lines of two streets)</td><td>25 feet</td></tr>
</table></td><td>Roadway safety for both vehicular and pedestrian traffic is a key consideration for placement along public streets.</td></tr>
<tr><td>□</td><td>Underground utilities and overhead wires are considered in the design and avoided or circumvented. Underground utilities are routed around or through the planter in suspended pavement applications. All underground utilities are protected from water and root penetration.</td><td>Tree growth can damage utilities and overhead wires resulting in service interruptions. Protecting utilities routed through the planter prevents damage and service interruptions.</td></tr>
<tr><td>□</td><td>Suspended pavement design was developed where appropriate to minimize soil compaction and improve infiltration and filtration capabilities.
Suspended pavement was constructed with an approved structural cell.</td><td>Suspended pavement designs provide structural support without compaction of the underlying layers, thereby promoting tree growth.
Recommended structural cells include poured in place concrete columns, Silva Cells manufactured by Deeproot Green Infrastructures and Stratacell and Stratavault systems manufactured by Citygreen Systems.</td></tr>
<tr><td>□</td><td>A minimum soil volume of 2 cubic feet per square foot of canopy projection area is provided for each tree. Canopy projection area is the ground area beneath the tree, measured at the mature tree drip line.

Applicant uses soil amendments (SD-F), as necessary. Soil amendments result in healthier plant growth, reduced irrigation demands, and reduced need for fertilization and maintenance</td><td>The minimum soil volume is required to support a healthy tree.

A lower amount of soil volume may be allowed if certified by a landscape architect or agronomist that the installed soil volume will be adequate for health tree growth. The retention credit from the tree must be directly proportional to the soil volume installed for the tree.</td></tr>
</table>

	Siting and Design	Intent/Rationale
□	DCV from the tributary area draining to the tree is equal to or greater than the tree credit volume	The minimum tributary area ensures that the tree receives enough runoff to fully utilize the infiltration and evapotranspiration potential provided. In cases where the minimum tributary area is not provided, the tree credit volume must be reduced proportionately to the actual tributary area.
□	Inlet opening to the tree that is at least 18 inches wide. A minimum 2 inch drop in grade from the inlet to the finish grade of the tree. Grated inlets are allowed for pedestrian circulation. Grates need to be ADA compliant and have sufficient slip resistance.	Design requirement to ensure that the runoff from the tributary area is not bypassed. Different inlet openings and drops in grade may be allowed at the discretion of the City Engineer if calculations are shown that the diversion flow rate (Appendix B.1.2) from the tributary area can be conveyed to the tree. In cases where the inlet capacity is limiting the amount of runoff draining to the tree, the tree credit volume must be reduced proportionately.

Conceptual Design and Sizing Approach for Site Design and Storm Water Pollutant Control

- Determine the areas where trees can be used in the site design to achieve incidental treatment. Trees reduce runoff volumes from the site. Refer to **Appendix B.2.2**. Document the proposed tree locations in the SWQMP.
- When trees are proposed as a storm water pollutant control BMP, applicant must complete feasibility analysis in **Appendix C and D** and submit detailed calculations for the DCV treated by trees. Document the proposed tree locations, feasibility analysis and sizing calculations in the SWQMP. The following calculations should be performed and the smallest of the three should be used as the volume treated by trees:
    - Delineate the DMA (tributary area) to the tree and calculate the associated DCV.
    - Calculate the required diversion flow rate using **Appendix B.1.2** and size the inlet required to convey this flow rate to the tree. If the proposed inlet cannot convey the diversion flow rate for the entire tributary area, then the DCV that enters the tree should be proportionally reduced.
        - For example, 0.5 acre drains to the tree and the associated DCV is 820 ft^3. The required diversion flow rate is 0.10 ft^3/s, but only an inlet that can divert 0.05 ft^3/s could be installed.
        - Then the effective DCV draining to the tree = 820 ft^3 * (0.05/0.10) = 420 ft^3
    - Estimate the amount of storm water treated by the tree by summing the following:
        - Evapotranspiration credit of 0.1 * amount of soil volume installed; and
        - Infiltration credit calculated using sizing procedures in **Appendix B.4**.

Permeable Pavement can also be designed as a structural BMP to treat run on from adjacent areas. Refer to INF-3 factsheet in **Appendix E** and **Appendix B.4** for additional guidance.

B.2.2 Adjustment to DCV

When the following site design BMPs are implemented the anticipated volume reduction from these BMPs shall be deducted from the DCV to estimate the volume for which the downstream structural BMP should be sized for:

- SD-A: Trees
- SD-E Rain barrels

B.2.2.1 Trees

Applicants are allowed to take credit for installing new trees using Table B.2-2 or Equation B.2-1 as applicable, when trees are implemented in accordance with SD-A fact sheet and meet the following criteria:

- Total tree credit volume is less than or equal to 0.25 DCV of the project footprint and
- Single tree credit volume is less than or equal to 400 ft^3.

Credit for trees that do not meet the above criteria shall be based on the criteria for sizing the tree as a storm water pollutant control BMP in SD-A fact sheet. These credit calculations are based on an assumption that each tree and associated trench or box is considered a single BMP, with calculations based on the media storage volume and contributing area.

Table B.2-2 was developed assuming that the entire tributary area is impervious (use Equation B.2-1 if there are different types of surfaces in the contributing area) and an 85^{th} percentile 24-hour rainfall depth of 0.5 inches. The procedure for estimating the tree credit volume using Table B.2-2:

- Delineate the tributary area to the tree and use this tributary area to determine the tree credit volume using Table B.2-2. Use linear interpolation if the tributary area is in between the areas listed in Table B.2-2. When the contributing area is greater than 10,667 ft^2 this simplified method is not allowed.
- Using the amount of soil volume installed to determine the credit using Table B.2-2. Use linear interpolation if the soil volume is in between the values listed in Table B.2-2. When the soil volume is greater than 1,333 ft^3 this simplified method is not allowed.
- Use the smaller tree credit volume of the two estimates.

Table B.2-2: Allowable Reduction in DCV

Tree Credit Volume (ft^3/tree)[1]	Contributing Area (ft^2)	Soil Volume (ft^3)
10	267	33
50	1,333	167
100	2,667	333
150	4,000	500
200	5,333	667
300	8,000	1,000
400	10,667	1,333

Note: [1]If an underdrain is installed only 1/3rd of the tree credit volume shown in Table B.2-2 is allowed.

Applicant can also estimate the tree credit volume using Equation B.2-1.

Equation B.2-1: Tree Credit Volume

$$TCV = Minimum(SV \times 0.3,\ 3,630 \times d \times C \times A)$$; With no underdrains installed

$$TCV = Minimum(SV \times 0.1,\ 3,630 \times d \times C \times A)$$; When an underdrain is installed

where:

TCV	=	Tree credit volume (ft^3); maximum of 400 ft^3 for one tree and not more than 0.25*DCV from the project footprint for all trees proposed as site design BMPs
SV	=	Soil volume installed with the tree (ft^3)
d	=	85th percentile 24-hr storm depth (inches) from Figure B.1-1
C	=	Area weighted runoff factor (calculate using Appendix B.1.1 and B.2.1)
A	=	Area tributary to the tree (acres)

B.2.2.2 Rain Barrels

Rain barrels are containers that can capture rooftop runoff and store it for future use. Credit can be taken for the full rain barrel volume when each barrel volume is smaller than 100 gallons, implemented per SD-E fact sheet and meet the following criteria:

- Total rain barrel volume is less than 0.25 DCV **and**
- Landscape areas are greater than 30 percent of the project footprint.

Credit for harvest and use systems that do not meet the above criteria must be based on the criteria in **Appendix B.3** and HU-1 fact sheet in **Appendix E**.