# PLANT MATERIAL AND PLANTING

## PART 1 - GENERAL

### 1.01 SECTION INCLUDES

A. Plant Material and Planting

B. Tree Drainage Wells

C. Warranty for Plant Material

### 1.02 DESCRIPTION OF WORK

A. Furnishing and installing plant material.

B. Constructing tree drainage wells.

C. Maintaining and replacing plants for completed planting work.

### 1.03 SUBMITTALS

Comply with Division 1 - General Provisions and Covenants, as well as the following:

A. Submit copy of current certification that the Supplier is an Iowa Department of Agriculture and Land Stewardship Certified Nursery Dealer or Grower prior to starting work.

B. Prior to final acceptance, submit written maintenance instructions recommending procedures for maintenance of all plant material types, including watering, insect and disease control, fertilizing, pruning, tree wrapping, and staking.

C. When requested, provide certification stating container-grown material has been grown in the container for no less than 1 year.

D. Provide a sample of the proposed mulch for approval by the Engineer.

E. When requested, submit a schedule of unit prices for each size and variety of tree, shrub, and ground cover plant specified in the contract documents.

### 1.04 SUBSTITUTIONS

Comply with Division 1 - General Provisions and Covenants, as well as the following:

Where evidence is submitted that a specified plant cannot be obtained, substitution may be made upon approval of the Engineer.

### 1.05 DELIVERY, STORAGE, AND HANDLING

Comply with Division 1 - General Provisions and Covenants, as well as the following:

A. Protect plant root systems during transportation and storage, as necessary, with wet straw, moss, or other suitable material that will ensure root systems are maintained in a moist, healthy condition.

B. Protect all plants with a tarpaulin when being transported in an open vehicle.

C. When approved by the Engineer, temporary storage of plants on the project site may be allowed. When temporary on-site storage is not approved, provide such facilities and location at no additional cost to the Contracting Authority.

**1.05 DELIVERY, STORAGE, AND HANDLING (Continued)**

D. During temporary storage, heel-in plants and maintain them by providing moist straw, moss, or other suitable material to protect root systems; watering; and protecting from excessive sun, wind, and inclement weather conditions. This will provide a healthy, vigorous plant when planted.

**1.06 SCHEDULING AND CONFLICTS**

Comply with Division 1 - General Provisions and Covenants, as well as the following:

Comply with the optimum planting dates specified in Section 9030, 3.01.

**1.07 SPECIAL REQUIREMENTS**

None.

**1.08 MEASUREMENT AND PAYMENT**

**A. Plants, By Count:**

1. **Measurement:** Each tree, shrub, or ground cover plant accepted in place will be counted.

2. **Payment:** Payment will be at the unit price for each tree, shrub, or ground cover plant. Payment will be made in increments according to the following schedule:
   a. 70% of unit price at acceptance.
   b. 30% of unit price at end of establishment period, upon installation of replacements.

3. **Includes:** Unit price includes, but is not limited to, delivery, excavation, installation, watering, placing backfill material, mulching, wrapping, staking or guying, herbicide, maintenance during the establishment period, and replacements.

**B. Plants, By Count, With Warranty:**

1. **Measurement:** Each tree, shrub, or ground cover plant accepted in place will be counted.

2. **Payment:** Payment will be at the unit price for each tree, shrub, or ground cover plant. Payment will be made in increments according to the following schedule:
   a. 70% of unit price at acceptance.
   b. 15% of unit price at end of 1 year establishment period, upon installation of replacements.
   c. 15% of unit price at end of 2 year warranty period, upon installation of replacements.

3. **Includes:** Unit price includes, but is not limited to, delivery, excavation, installation, watering, placing backfill material, mulching, wrapping, staking or guying, herbicide, maintenance during the establishment and warranty periods, and replacements.

**C. Plants, Lump Sum:**

1. **Measurement:** Lump sum item; no measurement will be made.

2. **Payment:** Payment will be at the lump sum price for plants. Payment will be made in increments according to the following schedule:
   a. 70% of lump sum price at acceptance.
   b. 30% of lump sum price at end of establishment period, upon installation of replacements.

**1.08 MEASUREMENT AND PAYMENT (Continued)**

**3. Includes:** Unit price includes, but is not limited to, delivery, excavation, installation, watering, placing backfill material, mulching, wrapping, staking or guying, herbicide, maintenance during the establishment period, and replacements.

**D. Plants, Lump Sum, With Warranty:**

**1. Measurement:** Lump sum item; no measurement will be made.

**2. Payment:** Payment will be at the lump sum price for plants. Payment will be made in increments according to the following schedule:

a. 70% of lump sum price at acceptance.
b. 15% of lump sum price at end of 1 year establishment period, upon installation of replacements.
c. 15% of lump sum price at end of 2 year warranty period, upon installation of replacements.

**3. Includes:** Unit price includes, but is not limited to, delivery, excavation, installation, watering, placing backfill material, mulching, wrapping, staking or guying, herbicide, maintenance during the establishment and warranty period, and replacements.

**E. Tree Drainage Wells:**

**1. Measurement:** Each tree drainage well will be counted.

**2. Payment:** Payment will be at the unit price for each tree drainage well.

**3. Includes:** Unit price includes, but is not limited to, excavation, furnishing and placing rock, engineering fabric, and placing backfill material.

## PART 2 - PRODUCTS

### 2.01 PLANT MATERIALS

**A. General:**

1. Ensure plant material meets the minimum requirements of size and grade as stated in the latest edition of American Standard for Nursery Stock, ANSI Z60.1.

2. Provide all plants true to name and tagged legibly as to name according to nursery standards of practice as recommended by the American Nursery and Landscape Association. Plant names indicated comply with the latest edition of "Standardized Plant Names" as adopted by the American Joint Committee of Horticultural Nomenclature.

3. Plants larger than those specified in the plant list with corresponding root system may be used upon approval of the Engineer.

4. Match plants planted in rows in form and size, unless otherwise specified in the contract documents.

**B. Plant Material Quality:**

1. Provide nursery grown plants grown in the same climatic zone as the project.

2. One-sided branching plants from tightly planted nursery rows will be rejected.

3. Provide healthy specimens without objectionable deformities, voids, and open spaces, with well-developed branch and root systems. Ensure specimens are true to height, shape, and character of growth of the species or varieties. Provide plants showing appearance of good health and vigor.

4. Provide plants free of the following:
   a. Harmful insects, insect eggs, borers, and all forms of infestation
   b. Plant diseases and moldy or dried roots
   c. Damage to trunk, bark, branches, leaders, root systems, or cut-leaders
   d. Defects, disfiguring knots, sunscald injuries, and frost cracks
   e. Rodent damage to bark and buds

5. Plants with broken or cut back terminal leaders may be rejected.

**C. Balled and Burlapped Plants:**

1. Provide firm, moist, unbroken root balls of the specified size.

2. Broken or loose root balls will be rejected.

3. No manufactured or artificially produced or mudded-in root balls will be accepted.

4. A container grown plant, in lieu of a balled and burlapped root ball, will be accepted provided it meets the specified size, complies with American Standard for Nursery Stock (ANSI Z60.1), and meets criteria for container grown plants.

**D. Container Grown Plants:**

1. Grow plants in sufficiently sized container for a minimum of 1 year, with a root system developed to hold its soil together, firm, whole, and moist when taken from the container.

**2.01 PLANT MATERIALS (Continued)**

2. No loose root systems in the container, root-bound, or circling of the root system will be accepted.

**E. Bare Root Plants (BR):**

1. Only use where specified in the contract documents or as approved by Engineer.

2. Ensure plants have substantially all of the root system intact, with clean cuts on roots. Root system is to be packed in moisture-retaining material and bagged to protect the root system from drying out.

3. Prior to planting, properly prune and sweat according to the nursery source instructions.

4. Ensure plants are dormant or breaking bud if sweated at the time of planting.

5. Do not plant later than May 15.

**2.02 MULCH**

Provide hardwood or softwood mulch complying with the following:

A. Shredded bark and shredded wood mixture containing no more than 50% wood chips.

B. Produced by a mechanical debarker and chipping machine.

C. Reasonably free from leaves, twigs, dust, toxic substances, and any other foreign material.

D. Not in an excessively wet or decomposed condition.

**2.03 BACKFILL MATERIAL**

A. Acquire backfill material for plantings from soil excavated from the planting pit.

B. Ensure backfill material is loose, friable, and free of clods and rocks 2 inches in diameter or larger. Do not use frozen or muddy soil as backfill material.

**2.04 STAKING MATERIAL**

**A. Stakes:** Comply with Iowa DOT Article 4154.09. Minimum length of 6 feet.

**B. Hose:**

1. Reinforced garden hose no less than 1/2 inch inside diameter or fabric straps or other material approved by the Engineer.

2. Provide hose of adequate length to prevent contact of staking or guying wire with tree trunk.

**C. Wire:** Provide wire of sufficient gauge to resist breaking during high winds.

**D. Manufactured Staking System:** Upon approval of the Engineer, manufactured staking systems may be used in lieu of stakes, wire, and hose.

## 2.05 GUYING MATERIAL

**A. Earth Anchors:**

1. Steel auger type with looped end; minimum 3/4 inch diameter, 36 inch long anchor shank, with 5 inch minimum diameter anchor disk.

2. Driven style earth anchors with a minimum 1,000 pound capacity in normal soils.

**B. Hose:** Comply with Section 9030, 2.04, B.

**C. Cable:** 1/8 inch galvanized wire rope or equivalent cable with a minimum 1,500 pound capacity. Provide cable with ends clean and unfrayed.

**D. Cable Clamps:** Match size and strength of cable. Provide two for each end of cable.

**E. Flagging Material:** Brightly colored, minimum 12 square inches.

## 2.06 TREE WRAPPING MATERIAL FOR WINTER PROTECTION

4 inch wide bituminous impregnated tape, corrugated or crepe paper, specifically manufactured for tree trunk wrapping, having qualities to resist insect infestation, or similar material approved by the Engineer.

## 2.07 WATER

Provide water and watering equipment such as hoses and sprinklers. Provide water free of substances harmful to plant growth.

## 2.08 TREE DRAINAGE WELLS

**A. Porous Backfill Material:** Comply with Iowa DOT Section 4131.

**B. Engineering Fabric:** Comply with Iowa DOT Article 4196.01.

## 2.09 HERBICIDE

Provide a granular pre-emergent herbicide as approved by the Engineer.

## PART 3 - EXECUTION

### 3.01 ALLOWABLE PLANTING DATES

Install plant material during the following times:

**A. Evergreen Plants:** September 1 to October 15 and prior to June 1, but not after candles exceed 1 inch.

**B. Deciduous Plants (Balled and Burlapped and Container):** August 15 to November 15 and in the spring prior to June 1.

**C. Deciduous Plants (Bare Root):** In the spring prior to May 15.

**D. Weather Restrictions:** Planting may be conducted under unseasonable conditions, except in weather below 32°F or above 90°F. No variance from plant warranty or other requirements will be given for plants installed outside the specified periods.

### 3.02 PREPARATION

A. Provide notice to the Engineer 3 days prior to planting.

B. All plants will be inspected by the Engineer prior to planting. Plants may be inspected and approved at the place of growth by the Engineer for compliance with the specifications for quality, size, and variety. Such approval does not waive the right to reject any plant material after it has been delivered to the site and/or installed.

C. Provide barriers or fencing as approved by Engineer to protect the public from injury when planting installation is within the right-of-way.

### 3.03 LOCATION OF PLANTS

A. Mark the location of all plants with flags or lathe according to the contract documents. Mark trees individually. Stake the outline of bedded plants or shrub groups for the quantity on the plans without marking individual plants. The Engineer will approve the locations marked prior to excavation of planting pits and tree drainage wells.

B. Make field adjustments in plant locations where underground or overhead obstruction is encountered, or where changes have been made as approved by the Engineer.

### 3.04 EXCAVATION OF PLANTING PIT

A. Excavate the plant pit, centered at the location marks, cylindrical in shape with a diameter 1 1/2 to 2 times larger than ball or root condition, with vertical sides and flat or saucer-shaped bottom. Excavate plant pit to a depth to match the nursery grade of the root crown for all balled and container root systems. Excavate plant pit to a depth 6 inches deeper for bare-rooted systems.

B. Scarify sides of excavated pit.

C. Following excavation of planting pit for all trees, fill the pit full of water; allow to stand (without adding water) for an 18 hour period to determine porosity of the soil.

D. If the Engineer determines the soils are too impervious, provide a planting well.

## 3.05 TREE DRAINAGE WELLS

Install drainage wells when specified in the contract documents or when directed by the Engineer due to the presence of impervious soils.

A. Locate the drainage well at the edge of the excavated planting pit.

B. Auger an 8 inch to 12 inch diameter hole to existing pervious soil or to a maximum depth of 10 feet. If pervious soil is encountered, extend hole a minimum of 12 inches into the pervious layer.

C. Fill the excavated hole with porous backfill material and cover the aggregate with engineering fabric.

D. Following completion of drainage well, fill the pit full of water; allow to stand for an 18 hour period to verify sufficient drainage exists. The Engineer will determine if the drainage is sufficient.

## 3.06 PLANTING

### A. Bare Root Plants:

1. Remove all ties, ribbons, wrap, and other items except plant identification from the branch system.

2. Remove all root packing and prune broken roots to sound wood with clean cuts.

3. Place a minimum of 6 inches of backfill material in the bottom of the planting pit.

4. Place the plant centered, upright, plumb, and with desired orientation in the planting pit, with the root crown matching existing grade.

5. Spread and arrange roots in their natural position. Do not mat roots together.

6. Carefully place and compact backfill material in layers, filling all voids and avoiding injury to the root system until two thirds of the planting pit is complete; fill the pit with water and allow the soil to settle.

7. Continue placing backfill material and form a 3 inch deep saucer around the plant.

8. Water the plant and surrounding area until thoroughly moist.

### B. Balled and Burlapped and Container Plants:

1. Ensure root systems are moist at the time of planting.

2. Remove all ties and wrap from branch system, except plant identification.

3. Container Plants:
   a. Remove plant root system carefully from container prior to planting without disturbance to root systems.
   b. Inspect root system and cut any circled (girdled) roots.
   c. Place plants centered, upright, plumb, and with desired orientation in planting pit with the root crown matching existing grade.

4. Balled and Burlapped Plants:
   a. Place plants centered, upright, plumb, and with desired orientation in planting pit with the root crown matching existing grade.
   b. After plant placement, cut and remove burlap from root ball.

**3.06 PLANTING (Continued)**

5. Carefully place and compact backfill material in layers, filling all voids until two thirds of plant pit is complete; fill pit with water and allow soil to settle.

6. Lightly compact the settled topsoil.

7. Continue placing backfill material and form a 3 inch deep saucer around plant.

8. Water plant and surrounding area until thoroughly moist.

**C. Planting on Slopes:**

1. Place the top of the root crown at or slightly above the finished grade at the center of the planting pit.

2. For all plants planted on significant slope, form a saucer as a dam or shoulder on the downhill side to catch and hold water and to discourage erosion.

**3.07 MULCHING**

A. Dig edges of mulched areas to ensure the top of the mulch at the edge of the planting area matches the existing ground surface.

B. Place mulch 3 inches deep in the planting saucer within 2 calendar days of planting.

C. Mulch an 18 inch radius area around tree trunks and shrub branch lines.

D. Provide a continuous mulch area around plant groupings.

E. Following mulch placement, pull mulch back 1 to 2 inches from the base of all trees and shrubs to allow air circulation.

F. Thoroughly water mulched areas. Rake to a smooth finished surface.

**3.08 WRAPPING**

A. When specified in the contract documents, or when directed by the Engineer, wrap the trunk of deciduous trees in the fall of the year in which the tree is planted.

B. Inspect the trunk for injuries and evidence of insect infestation prior to wrapping.

C. Wrap trunks spirally from ground line by overlapping one-half of the tree wrapping material and completely cover trunk to the height of the first branch.

D. If necessary, secure wrapping material with twine or paper tape wound spirally downward in opposite direction, with ties around tree in at least three places in addition to top and bottom.

E. Remove wrapping material by April 1 of the next spring.

**3.09 STAKING AND GUYING**

**A. General:**

1. Maintain all plants in an upright and plumb condition.

2. Complete staking or guying by the end of the day in which they were installed for all single stem plants over 1 inch diameter.

**3.09 STAKING AND GUYING (Continued)**

3. Do not stake clump form plants and plants in paved pedestrian areas unless approved by the Engineer.

**B. Staking:**

1. Provide two stakes for each tree for trees 2 1/2 inches in diameter and smaller. Place one of the stakes on the southwest side of the tree, or as directed by the Engineer, and place the second stake directly opposite the first.

2. Provide three stakes for each tree for trees 2 1/2 to 4 inches in diameter. Locate one stake on the southwest side of the tree with remaining stakes equally spaced around the tree.

3. Locate stakes uniformly from the trunk of the tree at a distance equal to 1/4 to 1/3 of the height of the tree, or 2 feet minimum.

4 Set posts vertically into unexcavated soil at a minimum 2 foot depth or until firm, providing a required post height above grade.

5. Attach wire to with hose protector to trunk at a minimum of 4 feet above grade or between one half and two thirds distance from finished grade to the top of the tree with slight slack in wire to allow for tree movement.

6. Secure wire to stakes at 6 inches from the top of the stake; mark all wire with flagging material.

7. Install manufactured staking system according to manufacturer's published recommendations.

**C. Guying:**

1. Provide three earth anchors and cables for evergreen trees 10 feet and taller and deciduous trees over 4 inches in diameter. Locate one anchor on the southwest side of the tree with remaining anchors equally spaced.

2. Locate the anchor a distance from the trunk equal to 1/3 of the tree height.

3. Attach the cable with a hose protector to the trunk between 1/3 and 1/2 of the tree height, or near the lowest main branches for deciduous trees.

4. Screw an auger style anchor into unexcavated soil until only the looped top is exposed. Install driven style anchors a minimum of 2 1/2 feet into the soil.

5. Secure cable to anchor with slight slack in cable; mark all anchor cables with flagging material.

6. Install manufactured staking system according to the manufacturer's published recommendations.

**D. Removal:** Remove all staking and anchoring materials from all plants at the end of the establishment period and remove from site.

## 3.10 PRUNING

**A. General:**

1. Provide proper and sharp pruning tools to provide a clean cut without injuring the branch collar.

2. Prune in such a manner as to retain the natural shape of the plant. Do not prune the terminal leader of a plant. Leave no protruding stubs, and prune to the closest outward growing bud.

3. Plant materials incorrectly pruned will be rejected.

**B. Deciduous Trees:**

1. Prune broken, damaged, or otherwise defective branches. Remove all branches that may not develop properly. Also, eliminate narrow crotches or competing leaders.

2. Prune to develop an upright leader that will promote the symmetry of the tree. Prune flowering or specimen trees to develop their natural form.

3. Prune all trees in Class A sidewalks or other paved pedestrian areas to provide a 7 foot height clearance, unless otherwise directed by the Engineer.

**C. Evergreen Trees and Shrubs:** Remove dead and broken branches.

**D. Deciduous Shrubs:** Remove dead or irregular branches.

## 3.11 CLEAN UP

A. Perform cleaning during installation and upon completion of work.

B. Remove all excess materials, trimmings, branches, soils, debris, and equipment from the site.

C. Repair any damage resulting from planting operations.

D. Clean all paved areas with a broom.

E. Remove all tags and labels from plants following acceptance by the Engineer.

## 3.12 ESTABLISHMENT AND WARRANTY PERIODS AND ACCEPTANCE

**A. Establishment Period:** The plant establishment period is 1 year after the installation is accepted by the Engineer. A plant inspection will be made by the Engineer prior to the expiration of the establishment period.

**B. Warranty Period:** If a plant warranty is specified in the contract documents, the 1 year warranty period begins immediately after the expiration of the 1 year establishment period. Inspection of plants will be made by Engineer at the end of the 1 year establishment period and again prior to the expiration of the warranty period.

**C. Maintenance:** Care for all plants during the establishment or warranty period as required to keep plants in a live, healthy growing condition.

1. Prune plants to maintain a desirable shape.

2. Remove weeds and grasses from planting beds and mulch areas. Apply herbicide to control weed growth when directed by the Engineer.

**3.12 ESTABLISHMENT AND WARRANTY PERIODS AND ACCEPTANCE (Continued)**

3. Water as required to enhance early root growth and maintain a moist soil.

4. Adjust stakes and ties to maintain plant in an upright and plumb condition.

5. Re-set settled plants to proper grades and position. Restore planting saucer and mulch; add backfill material and mulch as may be required.

6. Apply appropriate insecticides and fungicides necessary to maintain plants free of insects and disease.

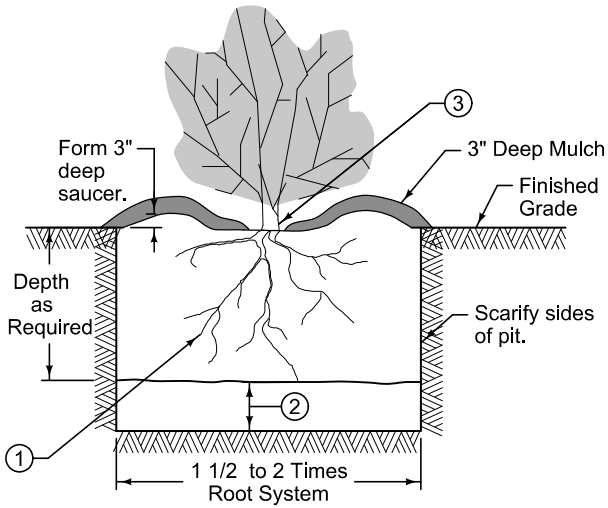
**D. Plant Condition:** Ensure all plants are in a live, healthy, and growing condition both at the date of acceptance of the installation by the Engineer, at the end of the plant establishment period, and at the end of the warranty period.

**E. Replacement:** Replace all plants not found to be in a live, healthy, and growing condition during inspection at the 1 year establishment period and again at the warranty period (if specified) at no additional cost to the Contracting Authority.

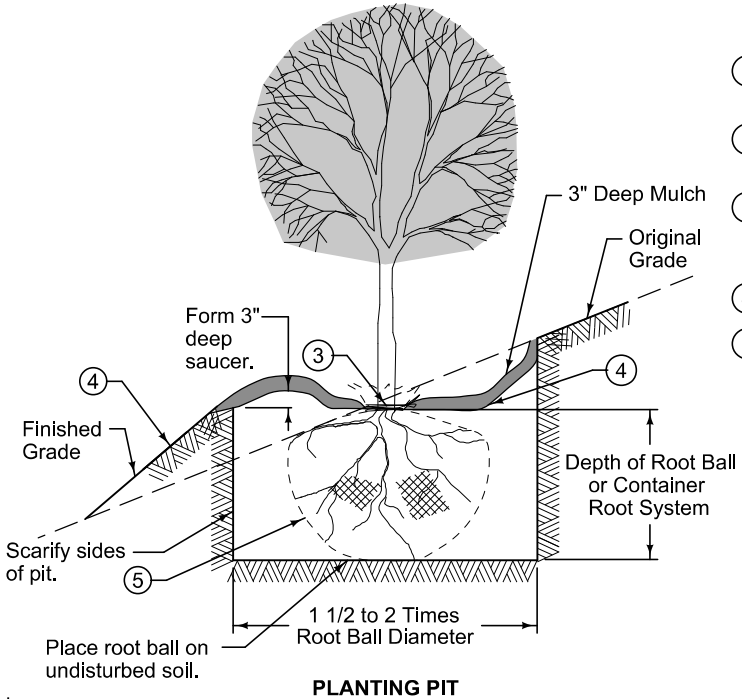
1. Upon notice from Engineer, remove rejected plants from the site and replace with plant material of the same species and size as originally specified. Install replacement plants complying with the contract documents.

2. Plants damaged due to fire or flooding beyond the contractors control or ice storms, hail, tornados, or acts of vandalism do not require replacement.

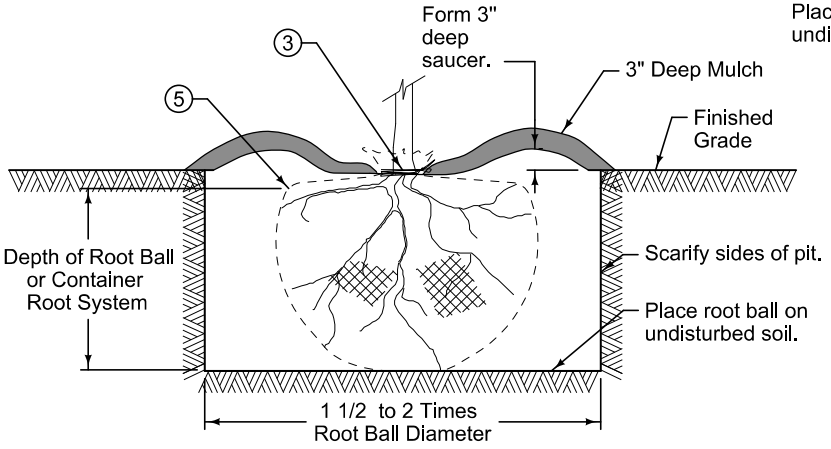
END OF SECTION




**PLANTING PIT**
(Bare Root Plants)




**PLANTING PIT**
(On Slopes)




**PLANTING PIT**
(Balled and Burlapped Plants)

1. Spread root system in natural position with soil excavated from pit.
2. Over-excavate 6 inches. Place 6 inches of loose soil in pit prior to planting.
3. Install with root collar at or slightly above grade. Do not place mulch within 2 inches of trunk.
4. Begin transition at edge of root ball.
5. Cut and completely remove all twine, burlap, and wire baskets from root ball prior to placing backfill material.

FIGURE 9030.101

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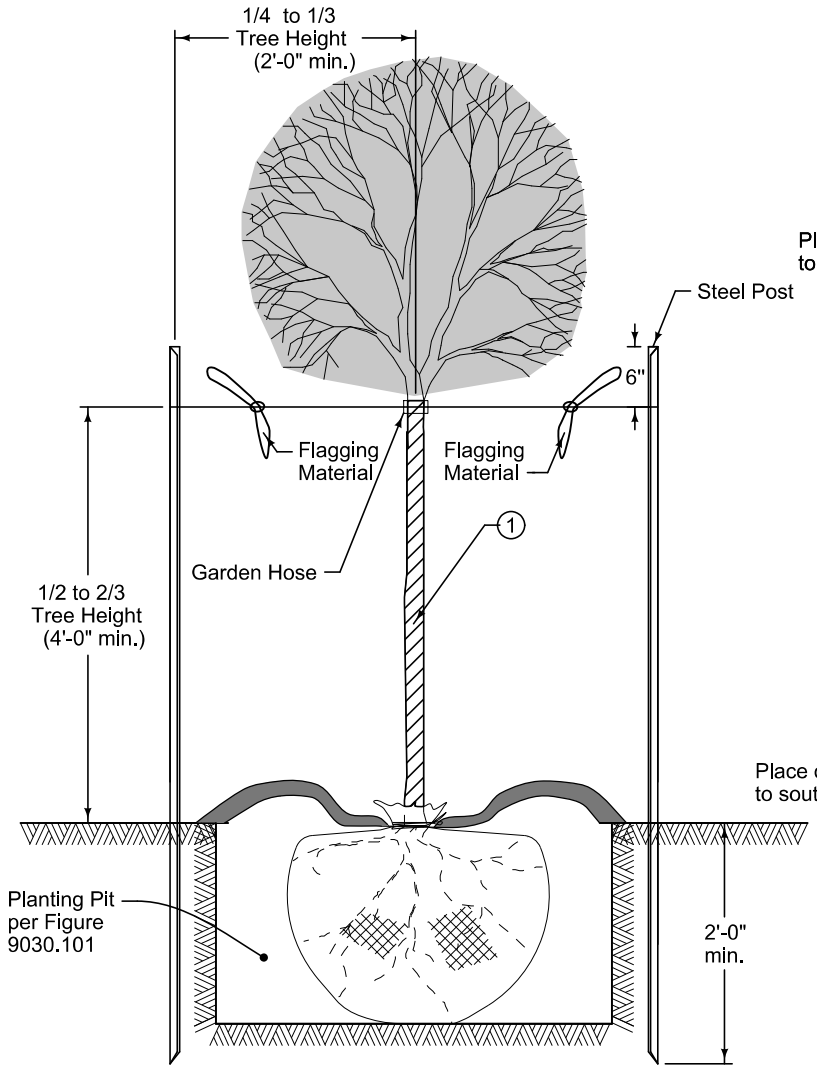
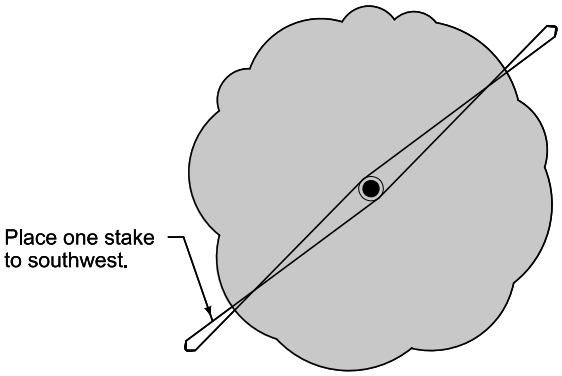
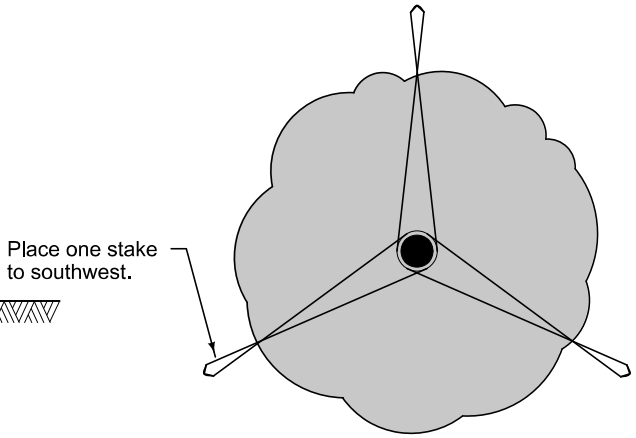
PLANTING PIT




**STAKING**




**STAKING PLAN**
(Trees 2 1/2 inch diameter or smaller)




**STAKING PLAN**
(Trees larger than 2 1/2 inch diameter)

(1) Wrap trunk from ground line to first branch when specified in the contract documents.

FIGURE 9030.102

SHEET 1 OF 2

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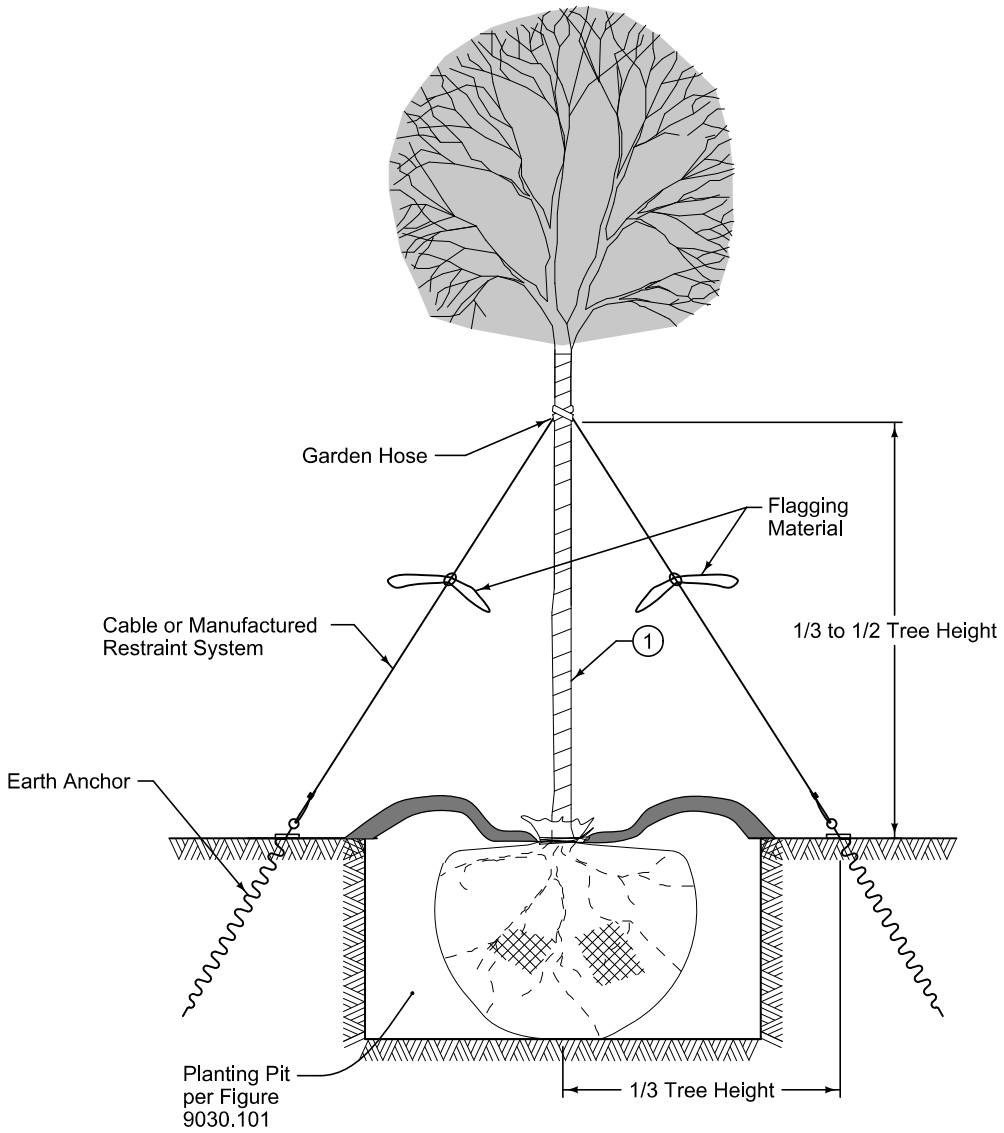
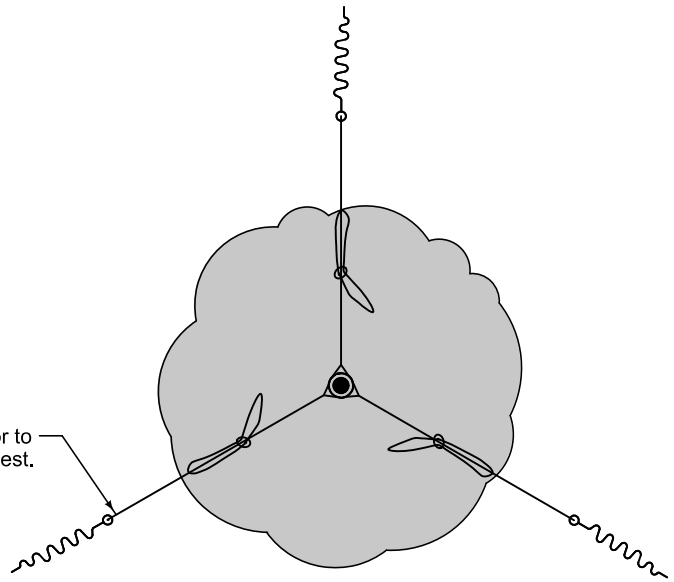
SUDAS Standard Specifications

TREE STAKING, GUYING, AND WRAPPING




**GUYING**

1 Wrap trunk from ground line to first branch when specified in the contract documents.




**GUYING PLAN**

FIGURE 9030.102

SHEET 2 OF 2

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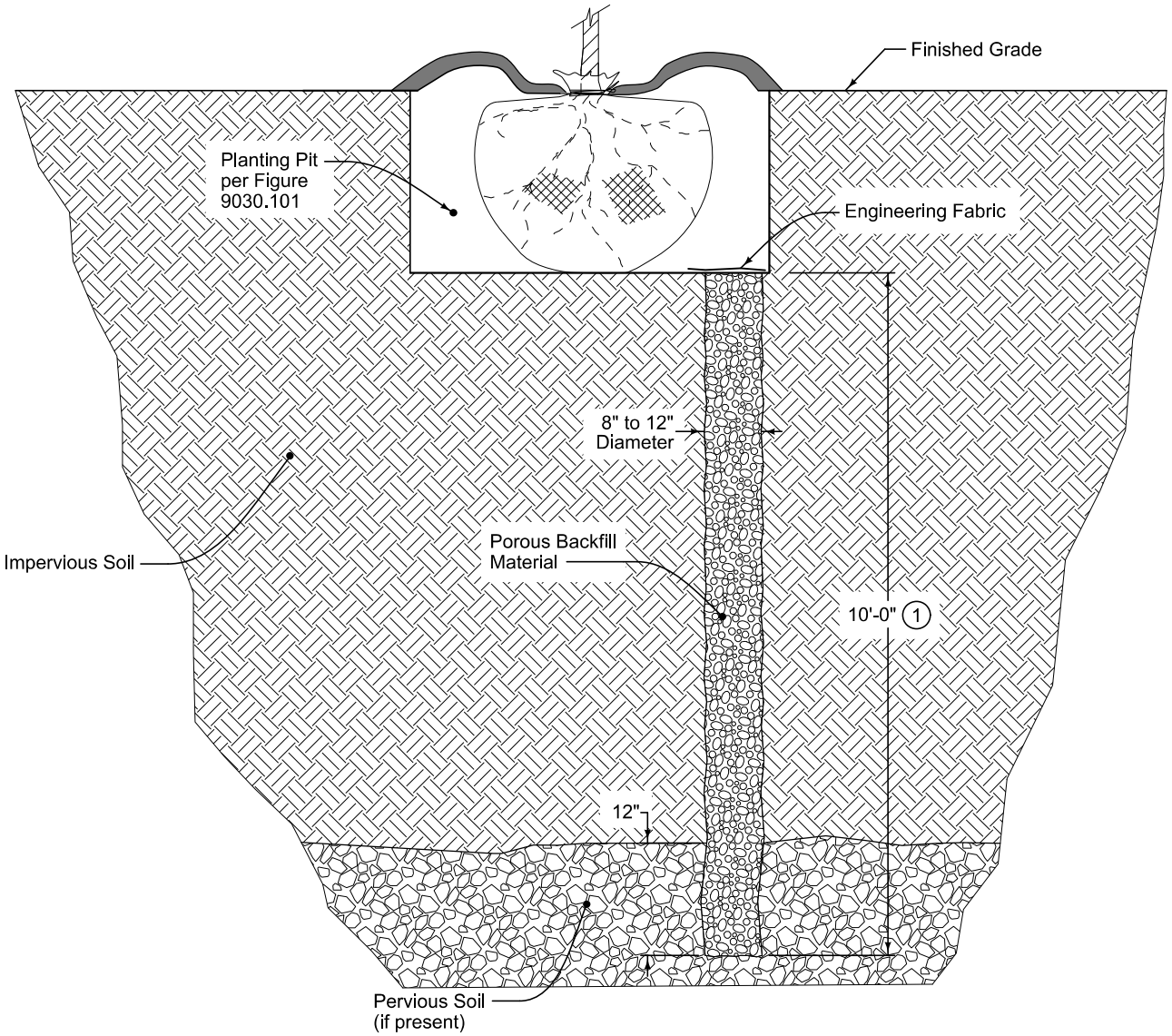
TREE STAKING, GUYING, AND WRAPPING




(1) If pervious soil is encountered at a depth less than 10 feet, the drainage well may be termineated when the well extends a minimum of 12 inches into the pervious soil layer.

FIGURE 9030.103

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TREE DRAINAGE WELL