

## **Section 2610. Furnish and Install Shrubs, Trees, and Vines**

### **2610.01 DESCRIPTION.**

Furnish and install plants and planting material of the type, class, species, grade, and size specified in the contract documents.

### **2610.02 MATERIALS.**

Furnish plants and planting materials for installation and incidental materials required for proper placement meeting the requirements of [Section 4170](#). Substitutions will be permitted according to [Article 4170.02, B, 6](#).

### **2610.03 INSTALLATION.**

#### **A. Handling and Temporary Storage.**

1. Maintain plants in good condition during handling at point of delivery and in transportation from temporary storage. Protect all roots with moist straw, moss, or other suitable material.
2. When being transported in an open vehicle, further protect all plants with a tarpaulin.

#### **B. Location of Plantings.**

1. The Engineer will stake the location of planting of each type of material specified. Locations of trees will be staked individually before excavation for planting.
2. The outline and number of plants for shrub beds will be indicated without staking the location of individual plants.
3. Do not set plants in rows or straight lines, unless required.

#### **C. Pruning.**

1. **General.**
  - a. Complete pruning prior to wrapping.
  - b. Perform all pruning to retain the natural shape of the plant. Unless removing dead or damaged material, do not top plants. Prune back broken and damaged branches to the closest outward growing bud on healthy sound wood. Remove rubbing branches and suckers. Remove all stubs. Remove all debris resulting from pruning from the right-of-way according to [Article 1104.08](#).
2. **Deciduous Trees.**
  - a. Remove all broken, damaged, or otherwise defective branches, as well as all branches which may not develop properly. In addition, eliminate narrow crotches or competing leaders.
  - b. Prune trees to develop an upright leader which will best promote the symmetry of the tree. Prune flowering or specimen trees to develop their natural form.
3. **Evergreen Trees and Shrubs.**

Remove dead and broken branches.
4. **Deciduous Shrubs.**

Remove dead or irregular branches.
5. **Vines and Ground Cover.**

Remove broken, damaged, or dead portions from vines and ground cover plants.

#### **D. Wrapping.**

1. Complete wrapping in the Fall prior to the final watering in the year the plant is planted.
2. Wrap deciduous trees (except Hawthorn, Russian Olive, and other multi-stemmed varieties) from the ground line up to and including the crotch formed by the first major branch. Self tie or secure wrapping with paper tape.

3. Remove identification ties and tags on plant material at the end of the contract period.

**E. Planting.**

Spring planting dates for evergreens are between March 1 and April 30, and for deciduous plants are between March 1 and May 15. Fall planting dates for evergreens are between September 1 and September 30, and for deciduous plants are between October 1 and November 30. Complete any plantings not completed by the completion date specified in the contract documents during the next planting period, unless otherwise directed by the Engineer. Plant the plant materials according to the following:

**1. Area Preparation and Excavation of Planting Wells.**

- a. Prior to excavation, till entire area to be mulched with a rotary tiller or other method the Engineer approves. Ensure existing vegetation and its root system is obliterated to a minimum depth of 4 inches (100 mm). Several passes may be required based on equipment and soil conditions. Obtain Engineer's approval for tilling prior to excavating planting wells.
- b. Unless shown otherwise in the contract documents, perform the excavation according to Table 2610.03-1:

**Table 2610.02: Planting Well Excavation**

ENGLISH UNITS		
Type of plant material	Diameter	Excavation depth
Bare root trees:		
Less than 1/2 in.	Root spread +12 in.	1 1/2 ft.
1/2 in. to 1 3/4 in.	3 ft.	2 ft.
1 3/4 in. to 3 in.	4 ft.	2 ft.
3 in. to 4 in.	5 ft.	3 ft.
4 in. to 6 in.	6 ft.	3 ft.
6 in. and over	As specified	As specified
B & B trees & shrubs	Ball diameter + 16 in.	Ball height + 8 in.
Shrubs	24 in.	18 in.
Dwarf shrubs, vines, & ground cover	Root spread +12 in.	18 in.
Container grown	Cont. diameter + 16 in.	Cont. height + 8 in.
Seedlings <sup>(a)</sup>	Root spread +12 in.	12 in.
METRIC UNITS		
Type of plant material	Diameter	Excavation depth
Bare root trees:		
Less than 15 mm	Root spread +0.3 m	0.5 m
15 mm to 45 mm	1.0 m	0.6 m
45 mm to 80 mm	1.3 m	0.6 m
80 mm to 100 mm	1.5 m	1.0 m
100 mm to 150 mm	2.0 m	1.0 m
150 mm and over	As specified	As specified
B & B trees & shrubs	Ball diameter + 0.4 m	Ball height + 0.2 m
Shrubs	0.6 m	0.45 m
Dwarf shrubs, vines, & ground cover	Root spread +0.3 m	0.45 m
Container grown	Cont. diameter + 0.4 m	Cont. height + 0.2 m
Seedlings <sup>(a)</sup>	Root spread + 0.3 m	0.3 m
<sup>(a)</sup> Does not apply if a seedling planter is used.		

- c. On slopes, measure the depth at the low point on outer edge of the planting well.
- d. During excavation, further loosen the soil in the bottom of the planting well to a depth of 6 inches (150 mm). If an auger is used to excavate the planting well, use a spade or other approved method to remove the compacted, smooth surface on the sides of the well.
- e. If the excavation is in an impervious soil, the planting may be relocated with the Engineer's approval.
- f. For seedlings, a seedling planter may be used.

- 2. Backfill Material and Fertilizer.**
  - a. Acquire backfill material for plantings from soil salvaged from the excavation of the planting well. Ensure backfill material has a uniform appearance and is loose, friable, and free of hard clods and rock 2 inches (50 mm) in diameter or larger.
  - b. For initial plantings and first year replacements, fertilize using 0-46-0 fertilizer thoroughly mixed with the backfill material at the following rates:
    - 1 1/2 pounds (0.7 kg) of fertilizer per tree.
    - 1/4 pound (0.1 kg) of fertilizer per shrub, seedling or vine.
  - c. Prior to the final watering, spread 20-10-10 chemically combined commercial fertilizer uniformly over the mulched area of each plant at the following rates:
    - 1 pound (0.5 kg) per tree.
    - 1/4 pound (0.1 kg) per shrub, seedling or vine.
- 3. Placing Backfill Material for Bare Root Plant Material.**
  - a. Prior to planting, prune all broken or cut roots back to sound wood with a clean cut. Prune approximately 1/2 inch (15 mm) off all roots 1/2 inch (15 mm) diameter and larger.
  - b. Place the plant at the same grade line as it grew in the nursery. Backfill material may be firmed by tamping, but vigorous tamping will not be permitted.
  - c. Exercise care during backfill material placement to avoid damage to the roots.
  - d. At this point, water the plant as specified in Paragraph 6 of this article.
- 4. Placing Backfill Material for Balled and Burlapped Plant Material.**
  - a. Before placing the plant, place and tightly firm the backfill material until the planting well is deep enough to set the top of the ball at the existing grade line. Place the plant and firmly pack the backfill material around the base of the ball to hold the plant in an upright position.
  - b. Ensure soil in the plant ball is moist at the time of planting. Remove any wire, twine, burlap, and so forth tied or wrapped around the stem of the plant.
  - c. Complete all of these processes with minimum disturbance of the soil ball:
    - 1) After placement, remove the upper half of any wire mesh.
    - 2) Cut and fold the remaining mesh into the bottom of the well.
    - 3) Push the burlap from the top and sides of the ball to the bottom of the planting well.
    - 4) Continue placing backfill material to the finished grade line.
    - 5) After placement, remove the sides of all wooden baskets.
  - d. At this point, water the plant as specified in [Article 2610.03, E, 6](#).
- 5. Placing Backfill Material for Container Grown Plant Material.**
  - a. Thoroughly water container plants the day prior to planting.
  - b. Before placing the plant, firm the backfill material until the planting well is deep enough to allow the top of the soil in the container to match the existing grade line.
  - c. Carefully remove the plant from the container and place the plant in the planting well with minimum disturbance to the soil ball.
  - d. Firmly pack the backfill material around the base of the roots to hold the plant in an upright position. Continue placing backfill material to the finished grade line.
  - e. Carefully remove plants from all containers (plantable and non-plantable) in a manner that does not disturb the potted soil or the roots.
- 6. Watering and Final Shaping.**
  - a. Water plants initially within 4 hours of planting unless otherwise directed by the Engineer.
  - b. Perform the initial watering by inserting a pipe to the bottom of the planting well and filling the well with water. At all times, perform watering at an extremely low pressure to prevent washing.
  - c. Reposition the plant as necessary to allow proper planting depth. Take necessary precautions to minimize root damage.
  - d. At this time, additional backfill material may be required to compensate for any settlement. Shape the final backfill material of the planting to form a 2 inch (50 mm) deep basin at the base of the plant.
  - e. After allowing the water to drain into the soil, the above procedure is repeated until the required amount of water necessary to thoroughly soak the backfill material with no further settlement has been applied.
  - f. Perform subsequent waterings as follows:
    - 1) Fill each plant basin completely and allow the water to drain into the soil.

- 2) Refill the plant basin with water. Repeat this process until the required amount of water has been applied.
  - 3) Penetration of the backfill material with a pipe or other means will not be allowed. Adjust water pressure to ensure no damage to the plant or displacement of soil or mulch.
- g. Watering schedule is as follows:

Initial Watering	within 4 hours of planting
Second Watering	7 calendar days after the initial watering
Third Watering	14 calendar days after the second watering
Fourth and subsequent Waterings	21 calendar days apart until November 1.

Second Growing Season (As applicable):  
Water plants monthly from May through November.

- h. Ensure replacements receive the first three waterings as listed above, and then are watered monthly with the rest of the project.
- i. Notify the Engineer prior to watering. If the Contractor requests, and the Engineer concurs, deviation from the watering schedule may be allowed. Weather and soil conditions that result in adequate water being available to the plant at the time of a scheduled watering may delay, delete, or reduce that watering as directed by the Engineer. The Engineer may request additional watering when dry soil conditions exist.

**F. Staking and Guying.**

1. Complete staking by the end of each day for all plant material planted during the day, unless otherwise approved by the Engineer. Use two stakes placed on opposite sides of the tree to stake all deciduous trees 1 inch to 2 1/2 inches (25 mm to 60 mm) in diameter, except multi-stemmed varieties of Hawthorn, Amur Maple, Serviceberry, and Russian Olive and all upright evergreens from 4 feet to 8 feet (1.2 m to 2.5 m) in height. Place one of the stakes on the southwest side of the tree or as directed by the Engineer. Extend the stakes to approximately 50% of the height of the tree or a maximum of 7 feet (2 m) from the ground after being driven until firm. Drive the stakes parallel to the trunk of the tree and in unexcavated soil.
2. Using ties approved by the Engineer, firmly tie between the two stakes all upright evergreens from 4 feet to 8 feet (1.2 m to 2.5 m) and all deciduous trees 1 inch to 2 1/2 inches (25 mm to 60 mm) in diameter, except multi-stemmed varieties of Hawthorn, Amur Maple, Serviceberry, and Russian Olive. Fasten ties to the stakes 6 inches (150 mm) from the top.
3. Guy deciduous trees over 2 1/2 inches (60 mm) in diameter and all evergreens over 8 feet (2.5 m) in height using three guys equally spaced about the perimeter of the tree. Use a collar encased with material specified in Article 4170.09, D, to attach guys to the tree. Attach at a point approximately one-half to two-thirds of the distance from the ground to the top. Firmly attach the guys to anchors embedded in the ground.
4. Use anchors of the sizes in Table 2610.03-2:

**Table 2610.03-2: Anchor Sizes**

Tree Diameter	Anchor Shank		Anchor Minimum Disk Diameter
	Min. Dia.	Min. Length	
2 1/2 to 4 in. (60 to 100 mm)	1/2 in. (13 mm)	24 in. (0.6 m)	4 in. (100 mm)
over 4 in. (over 100 mm)	3/4 in. (20 mm)	36 in. (1.0 m)	5 in. (125 mm)

5. Place anchors at a distance from the trunk of the tree which is approximately 50% the distance from the ground to the point where the collar is attached. Use the anchors specified in the contract documents or approved equal.
6. Approximately 1 foot (0.3 m) from the trunk of each tree not specified to be tied or guyed, drive one 5 foot (1.5 m) witness stake until firm. At shrub groups, drive a 5 foot (1.5 m) stake, until firm, 2 feet (0.6 m) outside the outermost shrubs at a frequency that defines the shape of the

area. On living snow fence and seedlings, place one stake 2 feet (0.6 m) outside every tenth shrub or seedling along sides exposed to areas being mowed.

7. Use staking and guying material specified in [Article 4170.09, D](#).

#### **G. Mulching.**

1. Furnish and place material as specified around trees, shrubs, vines, and seedlings according to the contract documents. Install mulch around the plant material within 4 calendar days after planting. Clear the following areas of all foreign material and vegetation and mulch:
  - An area 6 feet by 6 feet (1.8 m by 1.8 m) around all trees,
  - The entire area of shrub groups including 2 feet (0.6 m) outside the outermost shrubs, and
  - A 9 inch (225 mm) radius around seedlings.
2. Use a temporary 6 foot x 6 foot x 4 inch (1800 mm x 1800 mm x 100 mm) form to facilitate placement of the mulch around the trees.
3. Repair mulch displaced or disturbed at no additional cost to the Contracting Authority.

#### **H. Cleanup.**

1. Remove excess soil and rocks from excavations, according to [Article 1104.08](#), as directed by the Engineer.
2. Remove packing materials, burlap, brush, limbs and other trimmings, according to [Article 1104.08](#).
3. Prepare disturbed areas and seed as specified in [Article 2601.03, B](#).
4. Cleanup work will be considered incidental to construction work, and no extra compensation will be allowed.

#### **I. Plant Establishment Period and Replacement.**

1. The establishment period of one or two growing seasons as specified in the contract documents begins at the time the last plant is planted and incidental work related to the plantings is complete. If an establishment period is not specified in the contract documents, the establishment period is 1 year.
2. During the period of the contract, properly care for all plants. Water and weed them, spray with insecticides, cultivate, adjust stakes, wraps, and ties, and perform other work which is necessary to keep the plants in a live, healthy, and growing condition. Water plants as specified or as required by the Engineer.
3. Ensure the entire mulched area is free of vegetation. Vegetation in the mulch may be removed by pulling or cutting at ground level. In the 2 foot (0.6 m) area adjacent to the mulch, maintain vegetation to a height between 6 inches to 9 inches (150 mm to 225 mm). Replace plants damaged due to Contractor's carelessness at no additional cost to the Contracting Authority.
4. Obtain the Engineer's approval for pesticide use for competing vegetation, insect, or disease control prior to application. Apply pesticides according to product label directions and current state laws and regulations.
5. Replace plants (except seedlings) that are not in a live, healthy, growing condition at the end of each growing season. Install replacement plants during the planting periods mentioned in [Article 2610.03, E](#). If the contract is for one growing season, plant replacement plants in the fall of that year.
6. If the contract is for two growing seasons, plant replacement plants for the first growing season the following spring. Plant replacement plants for the second growing season in the fall of that year.

7. Evergreens will be checked at approximately August 15 and deciduous plants will be checked at approximately September 1. The Engineer will furnish a replacement list.
8. Supply replacement plants of the variety and size originally specified. Install as specified in [Article 2610.03, E](#), including fertilizing and watering. The original mulch may be reused for replacement plants. An additional care period will not be required for second year replacement plants.

#### **2610.04 METHOD OF MEASUREMENT.**

Measurement for materials, satisfactorily installed will be measured as follows:

- A. Plants.**  
By count for shrubs, trees, or vines in place.
- B. Mulch.**  
Computed in cubic yards (cubic meters) in place by adding the volumes of each mulch area. The volume of each mulch area will be determined from the length and width measured to the nearest 0.1 foot (0.1 m) and depth to the nearest 0.05 feet (10 mm).
- C. Fertilizer.**  
By count and weight (mass) of packages in pounds (kilograms) or by measurement at the time it is applied.
- D. Water.**  
By units of 1000 gallons (kiloliter) at the time it is applied.
- E. Tillage**  
Lump sum.

#### **2610.05 BASIS OF PAYMENT.**

- A.** Payment will be contract unit price as follows:
  - 1. Plants.**  
Each for the number of shrubs, trees, or vines in place.
  - 2. Mulch.**  
Per cubic yard (cubic meter).
  - 3. Fertilizer.**  
Per pound (kilogram).
  - 4. Watering.**  
Per 1000 gallon unit (kiloliter unit).
  - 5. Tillage.**  
Lump sum.
- B.** Payments are full compensation for furnishing all materials, equipment and labor, and for performing all work necessary according to the contract documents including:
  - Excavation and placing backfill,
  - Wrapping, staking, tying, guying and pruning of trees,
  - Maintenance during the establishment period, and
  - Replacements.
- C.** When excavation is made in impervious soils or the excavation of a new planting well is directed by the Engineer, payment for the work will be as extra work according to [Article 1109.03, B](#).
- D.** When substitution of a plant or planting material becomes necessary, payment will be made at the contract unit price for the substitute.