

2021
LANDSCAPE SPECIFICATIONS

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SECTION 1.00 - DESCRIPTION

This work consists of furnishing and planting trees, shrubs, vines, and perennials of the species, variety, grade, size, or age, and root category specified, complete in place at the locations designated in the plan or as directed by the Engineer. It may also consist of planting or transplanting plants furnished by the Owner. This work shall be performed in accordance with the most current MnDOT Specification 2571 or as modified in the following.

SECTION 2.00 - MATERIALS (2571.2)

2.01 NURSERY PLANT STOCK (ANSI Z60.1; MNDOT – 3861)

Nursery plant stock shall follow the current MnDOT Specification 3861 or as modified below. Plants of the species specified shall be furnished in the variety, grade, and size, or age indicated.

A. Supply of Planting Stock

By submitting a Proposal and accepting award of the contract, the Contractor acknowledges investigation of the supply of planting stock, obtaining of firm commitments from suppliers, and assurance of delivery of the specified plant stock as required for completion of the contract. The Contractor shall present a list of suppliers and the materials to be furnished by each of them at or prior to the preconstruction conference.

B. Plant Stock Documentation

As a condition for delivery and approval of the plant stock, the Contractor shall furnish the Engineer with:

1. Copies of a valid nursery stock (dealer or grower) certificate registered with the Minnesota Department of Agriculture.
2. A Certificate of Compliance.
3. A Certificate of Nursery Inspection from a state or provincial department of agriculture.
4. The Contractor shall verify whether or not nursery vendors are under a Gypsy Moth Compliance Agreement between the Minnesota Department of Agriculture (MDA) and the U.S. Department of Agriculture or under MDA Japanese Beetle or MDA Emerald Ash Borer Quarantines. All plant material shipped from nursery vendors subject to quarantines must be accompanied by a current Certificate of Compliance for gypsy moth, Japanese beetle and Emerald Ash Borer. To determine if vendors are subject to quarantines, contact the MDA.
5. Invoices.
6. Bills of lading for all plant stock delivered to the project.

These certificates shall state that the plants are in conformance with the requirements and were consistently grown and cultivated within the boundaries shown on the Plant Hardiness Zone map included in the plan. The Certificate of Compliance shall state

the species, sizes, quantities furnished, and name and location of the original source (nursery growing operation), in accordance with Section 6.00 of the General Provisions.

The Contractor shall not start planting operations until the Engineer has reviewed and accepted the required documentation. Work performed with plants that are misrepresented on the certificates will be considered as unauthorized work. The Certificate of Compliance shall be submitted to the Engineer no later than 1 week prior to the proposed beginning of planting.

C. Substitutions

Substitutions may be allowed in accordance with Section 6.01 of the General Provisions. However, the Contractor shall provide written documentation that the specified plant is not available, from the partial list of nursery stock suppliers provided by the Engineer, and that the substitute plant meets the contract requirements. The Engineer may either approve the substitute plant or extend the contract time to ensure availability of the specified plant.

D. Plant Stock Specifications

1. All plant stock shall conform to American Standard for Nursery Stock.
2. A minimum of three structural roots reasonably distributed around the trunk shall be found in each plant. Plants with structural roots on only one side of the trunk (J roots) shall be rejected.
3. The root crown must not be more than 2” below the soil line. The top two structural roots shall be no more than 3” below the soil line when measured 4” radial to the trunk. The top of the other structural root shall be no greater than 5” below the soil line when measured 4” radial to the trunk. The grower may request a modification to this requirement for species with roots that rapidly descend, provided that the grower removes all circling roots above the structural roots across the top of the structural roots.
4. The root system shall be reasonably free of root defects including potentially stem-girdling roots above the root collar and main structural roots, vertical roots, and/or kinked roots from nursery production practices, including roots on the interior of the root ball.
5. Container-grown plants, in addition to the above requirement, should comply with the following:
 - a) Container-grown plants may be permitted only when indicated on the drawing or this specification.

- b) Container-grown stock shall have been grown in a container long enough for the root system to have developed sufficiently to hold its potting medium together but not so long as to have developed roots that are matted or circling around the edge or interior of the main root mass. Plants shall have been root pruned at each change in container size.
- c) Plants that fail to meet any of the above requirements shall be modified to correct deficiencies if approved by the Engineer. Modification shall include the following:
 - d) Shaving all circling roots on the exterior of the root mass deep enough so that all cut roots' ends are roughly radial to the trunk.
 - e) Removal of all roots above the top of the main structural roots and trunk flare including any roots that are imprints from previous smaller containers.
 - f) The above modifications shall not be cause to alter the warranty provisions of this specification.
- 6. The center of the trunk(s) or stem(s) of the plant shall be in the center of the root ball. A tolerance of 10% of the diameter of the root ball is the maximum deviation allowable. For example: For a plant with a 30" root ball, the center of the plant at ground level shall be within a 3" circle 13½" from the outer edge of the ball.
- 7. Measurement:
 - a) Depth of the root ball is measured from the top of the ball, which in all cases shall begin at the root flare. Soil above the root flare, from being deeply planted in the nursery as a young plant, as a result of maintenance practices in the nursery, or added during harvest, shall not be included in ball depth measurement, and should be removed.
 - b) Ball depths will carry the following ratios:
 - c) Root balls with diameters less than 20": Depth not less than 65% of the diameter of the ball.
 - d) Root balls with diameters of 20" and up: Depth not less than 60% of the diameter of the ball.
- 8. Plants shall be true to species and variety specified and nursery grown in accordance with good horticultural practices under climatic conditions similar to those in the locality of the project for at least two years. They shall have been freshly dug (during the most recent favorable harvest season).

9. Plants shall be so trained in development and appearance as to be unquestionably superior in form, compactness, and symmetry. They shall be sound, healthy, vigorous, well branched and densely foliated when in leaf, and free of disease and insect adults, eggs, pupae or larvae. They shall have healthy, well-developed root systems and shall be free from physical damage or other conditions that would prevent thriving growth.
10. Trees with multiple leaders, unless specified, will be rejected. Trees with a damaged, cut, or crooked leader, included bark, abrasion of bark, sunscald, disfiguring knots, insect damage, mold, prematurely opened buds, or cuts of limbs over 3/4" diameter that are not completely callused are cause for rejection.
11. Balled and burlapped plants shall be dug with solid balls of standard size, the balls securely wrapped with non-synthetic, untreated, biodegradable burlap, and tightly bound with non-synthetic, biodegradable rope or twine. Alternatively they may be placed in a wire basket lined with non-synthetic, untreated, biodegradable burlap and tightly bound with non-synthetic, biodegradable rope or twine. Root collar shall be apparent at surface of ball. Bare root plants shall have a healthy, well branched root system characteristic of the species and with adequate spread.
12. Plants shall conform to the measurements specified, except that plants larger than those specified may be used if approved by the purchaser. Use of larger plants shall not increase the contract price nor allow the contractor to use smaller than specified material on other plants. If larger plants are approved, the root ball, root spread, or container shall be increased in proportion to the size of the plant.
13. Caliper measurements shall be taken on the trunk 6" above the root collar for trees up to 4" in caliper, and 12" above the root collar for trees over 4" in caliper. Height and spread dimensions specified refer to the main body of the plant and not from branch tip to branch tip. Plants shall be measured when branches are in their normal position. If a range of size is given, no plant shall be less than the minimum size, and no less than 50% of the plants shall be as large as the maximum size specified. Plants that meet measurements but do not possess a normal balance between height and spread shall be rejected.

E. Owner Furnished Stock and Transplant Stock

Owner furnished stock and transplant stock shall be obtained from sources designated in the plan or Special Provisions.

2.02 INCIDENTAL MATERIALS

A. Soil Amendments

The Contractor may use soil amendments to modify the physical or chemical properties of the soil to enhance plant growth whether specified or not. The Owner will not pay for

these soil amendments unless the Contractor can demonstrate that unspecified amendments are absolutely necessary to ensure plant growth and survival. The Contractor shall submit soil tests, analysis, and recommendations that support the need for the amendments and for compensation based upon the submitted information.

1. Select Topsoil BorrowMnDOT - 3877
2. Fertilizer.....MnDOT - 3881
3. CompostMnDOT – 3890
4. Soil & Root Additives.....MnDOT – 3896
5. Iron Sulfate
 - a) Iron sulfate, used to lower pH, shall be ferric sulfate or ferrous sulfate in pellet or granular form containing not less than 18.5% iron expressed as metallic iron. Acceptance will be on the basis of information contained on the product label.
6. Activated Charcoal
 - a) When activated charcoal is used to neutralize or deactivate residual organic pesticide or chemical contaminants in the soil, the Contractor shall use ordinary charcoal, finely ground to increase absorptive surfaces, and electrically charged to attract the molecules or organic chemicals. The Engineer will accept the charcoal on the basis of information provided by the product label and manufacturer’s recommendations.
7. Porous ceramics and hydrophilic absorbing polymers, used to modify the physical characteristics of poor soils by balancing or managing water and oxygen in the soil will be accepted based on the information provided by the product label and the manufacturer’s recommendations.

B. Water

Water shall be free of oil, acids, alkalis, salts, and other substances harmful to plants. Water suitable for human consumption will be acceptable without testing. Water from streams and lakes shall not be used without the Engineer’s approval. When the Engineer requires testing, an approved testing laboratory shall perform the tests at no expense to the Owner.

C. Mulch

- Type 6MnDOT - 3882

D. Rodent Protection

Rodent protection consists of .25” grid welded and galvanized wire mesh (hardware cloth) formed in a double layered 15” diameter cylinder. The Contractor shall place and

secure the rodent protection with a 1 by 1” heartwood white oak stake to the height shown in the plan.

E. Wound Dressing

Wound Dressing material consists of latex base paint or other acceptable material suitable for application by brushing on bruised or cut surfaces of plants, only when directed by the Engineer. All elms and oaks wounded during April-June will require immediate wound dressing.

F. Tree Painting

Tree paint consists of undiluted exterior grade white latex base paint, as approved by the Engineer, for use as a protective coating to prevent winter injury on tree trunks.

G. Staking and Guying

Staking and guying shall be as shown in the plan. Posts and straps shall be uniform in style and color. The guying straps shall be non-abrasive to the tree and provide equal tension through the length and width of the straps.

H. Seedling Tree Shelters

Shelters for seedling trees shall be from the approved list that is on file with the MnDOT Landscape Unit. The shelter shall be a seamless, extruded, twin-wall, rigid copolymer polypropylene tube. The shelter material shall be beige in color and 30% to 40% translucent while being resistant to decomposition from sunlight for a minimum of 5 years. The shelter shall have a flared top rim, formed state recess, photo degradable mesh sleeve covering, and height and diameter as shown in the plan. The Contractor shall install the shelters with 1 by 1” heartwood white oak stakes as shown in the plan.

I. Replacements

Replacements consist of plants or incidental materials required to replace dead, defective or missing plants and incidental materials. Quality of replacements shall be equal to or better than the initially specified material.

J. Miscellaneous Materials and Equipment

Miscellaneous materials and equipment consists of preparatory work, staking items, herbicides, insecticides, fungicides, and equipment necessary to install plants as specified and maintain plants in healthy and vigorous conditions, free from weed encroachment.

SECTION 3.00 - CONSTRUCTION REQUIREMENTS (2571.3)

3.01 GENERAL

The Contractor shall conduct temporary vegetation protection measures in accordance with Section 4.12 of the Street Specifications as incidental work. However, the Owner will make payment for protection of specimen, high value, threatened, or endangered vegetation when a bid item is indicated in the plan.

The Contractor shall conduct temporary erosion control measures in accordance with Section 4.13 of the Street Specifications as incidental work. The Contractor will not receive compensation for restoring areas damaged by erosion, sedimentation, and other causes when the damage results from the Contractor's operations, neglect, or failure to implement adequate temporary erosion control measures. However, the Owner will make payment for prevention of serious erosion and sedimentation when a bid item is indicated in the plan or when the damage is not the result of Contractor's neglect or operations.

A certified Landscape Specialist shall perform or directly supervise the installation and establishment of plants, together with all other incidental work. The specialist shall have at least 2 years of landscaping experience. The Contractor shall provide experienced crews working under the direct supervision of the certified specialist. The certification is obtained by completing a 1-day MnDOT Landscape Project Installation, Inspection, and Administration training class provided by the MnDOT Landscape Unit. The certification is valid for 3 years.

3.02 DEFINITIONS

A. Preparatory Work

Preparatory work involves:

1. Securing commitments for the required materials and equipment.
2. Developing a progress schedule and obtaining the Engineer's approval.
3. Mobilizing for plant installation, including the moving of equipment and supplies to the project site.
4. Protecting or staying away from existing plants in accordance with Section 7.13 of the General Provisions and Section 4.12 of the Street Specifications during mobilization.
 - a. The Contractor shall obtain the Engineer's approval before moving supplies to the project site for later planting operations including mulch and other incidental items.

B. Preparation of Planting Holes and Beds

The preparation of planting holes and beds involves:

1. Layout staking of planting beds and isolated plant locations.
2. Applying herbicide and/or conducting other weed control procedures.
3. Cultivating the soil and incorporating amendments or materials to improve soil properties and drainage.
4. Providing temporary erosion control measures.

C. Initial Planting Operations

The initial planting operations involve acceptably:

1. Digging planting holes.
2. Installing plants.
3. Conducting initial watering.
4. Mulching.
5. Protecting plants: including placing rodent guards, staking and guying plants, painting trees, installing seedling tree shelters, and conducting continuous weed control.
6. Cleaning up the planting site.
7. Conducting repair of the planting site.

The plant establishment period does not begin until all of the initial planting operations are completed and approved by the Engineer.

D. Plant Establishment Period

The plant establishment period is two calendar years from the date all of the initial planting operations on the Project are completed and approved, unless specified otherwise. The work during this period of time involves watering, weed control, turf maintenance, replacement of unacceptable material and plants, and other incidental plant care necessary to protect and establish plants. Turf maintenance includes the

prevention or repair of rutting and other damage that may lead to soil erosion and weed infestation.

3.03 PLANT LAYOUT

The planting locations and layouts shown in the plan are approximate. The Contractor shall stake the exact locations and layout for approval by the Engineer. In order to remedy localized problems and seasonal conditions that may hinder the establishment of plants according to the species and locations specified, the Contractor may request approval to relocate plantings, to make plant substitutions, or to modify soil or drainage characteristics.

The Contractor shall locate tree plantings:

- a) - Thirty feet (30') from any other tree for shade trees, twenty-five (25) feet from any other tree for ornamentals.
 - One foot (1') from property line or right-of-way line.
 - Fifteen feet (15') from driveways or approach sidewalks.
 - Not in conflict with underground utilities.
 - An ornamental if overhead power lines are present.
- b) So that a minimum sight distance of 1,200 feet exists in front of all traffic signs and extends 50 feet beyond the sign.
- c) Outside of the clear zones and sight lines shown in the plan.

The Contractor shall not locate tree plantings:

- a) Between a sidewalk or trail and a public street unless directed to do so by the Engineer.

3.04 QUALITY AND SIZE

All single stem trees shall be balled and burlapped stock, and of average specified caliper. Multiple stem plants shall have at least three stems/plants and of average specified height.

3.05 START OF OPERATIONS

The Contractor shall not start planting hole or bed preparations, planting operations, or delivery of planting stock to the project site until the Engineer determines that weather and soil conditions are suitable for such work and are in accordance with the dates shown in the contract.

The Contractor shall not start planting operations until the documentation requirements of Section 2.00 (2571.2) have been met.

3.06 NOTICES BY CONTRACTOR

The Contractor shall notify the Engineer at least three days prior to the planned delivery date of planting stock and replacement planting stock to the project to allow for proper inspection.

The Contractor shall notify the Engineer at least 24 hours in advance of beginning and of changing planting hole and bed preparations, plant installation, and establishment operations, including layout staking, clearing, weed spraying, material deliveries, soil cultivation, planting, watering, mulching, plant protection, dead plant removal, weeding, cleanup, and restoration work.

The Contractor shall give the notice in writing unless otherwise designated by the Engineer.

3.07 UNAUTHORIZED WORK

The Engineer will consider work performed with uncertified plant stock, without plant stock documentation, without landscape specialist certification, without notification, or in conflict with the working hours of Section 7.02 of the General Provisions as unauthorized work.

3.08 EQUIPMENT REQUIRED

The Contractor shall have on the project at all times at least:

- a) One portable compaction tester capable of measuring compaction in the soil to a minimum depth of 1 foot.
- b) One soil recovery probe.
- c) Three calipers with measurement readings in inches.
- d) One portable soil moisture meter or tensiometer capable of measuring soil moisture in root zones to a minimum depth of 1 foot.
- e) One rain gauge per mile of project.

3.09 PREPARING PLANTING HOLES AND PLANTING BEDS

The Contractor shall conform to Section 5.12 of the General Provisions before cultivating soil or excavating holes on the project.

A. Weed Control

The Contractor shall control undesirable turf and weed growth by one or both of the following methods or by alternative methods approved by the Engineer.

1. Herbicide Application Method

Before cultivating isolated plant locations and plant beds, the Contractor may kill turf and weed growth within the areas that will receive mulch by using a non-selective, non-residual post emergence herbicide containing 41% glyphosate as the active ingredient. The Contractor shall submit labels of intended herbicides to the Engineer for review and approval at least 3 days prior the date of application. The application shall be performed in accordance with manufacturer's recommendations by crews experienced and licensed in the use of chemical pesticides by the Minnesota Department of Agriculture. After evidence of vegetation kill, the Contractor shall mow the dead vegetation to a maximum height of 2". Post emergence herbicide shall be applied to actively growing, dry vegetation. The application shall be made in August or September preceding fall or spring planting, or in May if August or September application is not possible. If measurable precipitation should occur within 6 hours after spraying, the Contractor shall re-spray the affected areas.

2. Cultivate - Fallow - Disk Method

After mowing the planting area to a maximum height of 2", the Contractor may:

- a) Deep cultivate the planting areas to a minimum depth of 10" in late summer or early fall.
- b) Disk or till the planting areas to a depth of 3" or less in the spring.

B. Planting Hole and Bed Cultivation

1. Loosening and Tilling Soil

After the finished grading has been completed, the Contractor shall:

- a) Prepare planting holes by digging the holes 2-3 times as wide as the root ball or container.
- b) Cultivate planting holes and beds by thoroughly loosening and tilling the soil to a minimum depth of 10", as measured from the finished grade elevation of the soil.
- c) Thoroughly incorporate and mix the required soil amendments into the top 10" depth of soil.
- d) Loosen planting areas until compaction tester readings are less than 200 pounds per square inch.

2. Planting Soil

Planting soil for planting holes and beds shall consist of 2” of Grade 2 compost placed and thoroughly mixed with the existing soils to obtain a uniform planting soil mixture for at least a depth of 10”. This mixture shall be excavated when planting holes are dug and then replaced as backfill for all planting holes.

3. Competence Test

The Contractor shall demonstrate competence to the Engineer by completing the cultivation and incorporation of soil amendments in one planting bed and in one isolated tree planting location. After obtaining approval by the Engineer that the equipment and methods are sufficient to perform the work, the Contractor may continue the planting hole and bed cultivation operations.

4. Wet Soils, Rock, and Debris

If excessively wet soils, bedrock, or excessive quantities of boulders and construction debris are encountered, the Contractor shall reconfigure, relocate, or delete the affected planting areas as approved by the Engineer.

5. Temporary Erosion Control

The Contractor shall employ temporary erosion prevention methods in cultivated planting hole and bed areas when necessary and to the satisfaction of the Engineer.

6. General

If hardpan layers or compacted soil layers are exposed below the normal planting depth, the Engineer may require an additional deep ripping or other measures to ensure proper root development and drainage. Such approved work will be paid for as Extra Work.

If it becomes evident that the Contractor’s operation is causing compaction of the planting soil, the Engineer will require additional cultivation or rototilling to re-aerate and loosen the affected planting soil.

Planting hole cultivation will not be required for machine (hydraulic spade) transplanted stock.

The Contractor shall not stockpile soil, compost, or other materials on the project until approval is given by the Engineer.

If the Contractor wishes to place woodchip mulch in prepared planting areas as temporary erosion control prior to planting and the Engineer approves of the proposed work; the woodchip mulch must be raked off all prepared planting areas prior to digging planting holes. Woodchip mulch that is contaminated with soil must be removed from the project. Planting holes contaminated with woodchip mulch will not be accepted.

3.10 DELIVERY AND STORAGE OF PLANTS

Plant stock shall be installed on the day of delivery to the project site unless properly stored. Plants may be stored on the project site in a refrigerated storage truck or by other storage methods approved by the Engineer that prevent damage to plants from exposure to drying winds, sun, heat, low humidity, or freezing. After being dug and until planted, the roots of all plants shall be kept covered with a suitable moisture-holding material such as straw, saw dust, moss, or soil, and this material shall be kept continuously moist except during freezing weather. Prior to planting, plants shall be stored out of the direct sunlight and with adequate ventilation. Plants shall be protected from drying winds and freezing until planted.

Those plants that cannot be planted on the day of delivery shall be temporarily stored by "heeling-in" or by placing them in a well ventilated, cool, moist storage place.

When heeling-in bare root plants, the roots shall be buried in moist soil in such a manner that the roots will be completely covered, leaving no air space. Heeled-in plants, whether bare root, balled and burlapped, or container grown, shall be properly cared for at all times and shall not remain so stored from one planting season to the next.

Roots of all plants must be protected from freezing at all times prior to planting. If roots become frozen, the plant will be rejected.

3.11 HARDINESS

All plant materials shall be sufficiently hardy to survive winters in plant hardiness Zone 4 and shall have been propagated from seed or rootstock originating in plant hardiness Zone 3 or 4 as depicted on the Plant Hardiness Zone Map of the U.S. Department of Agriculture.

All stock shall have been grown under climatic conditions approximating those in Zone 4 for a minimum of two years. The name of the supplier or wholesale nursery supplying the plant materials to the contractor shall be submitted to the City prior to delivery of all nursery stock. The City reserves the right to reject any plant material not considered to be sufficiently hardy.

3.12 PRUNING - TOP GROWTH AND ROOTS

Immediately before planting, the contract shall prune, as necessary, the roots of all bare root plants and the top growth of all deciduous plants to the satisfaction of the Engineer. Broken or badly bruised roots and dry root tips shall be cut back to sound, healthy tissue. Pruning on bare root (BR) plants and balled and burlapped (B & B) plants shall be limited to the removal of dead, damaged, or diseased branches and unwanted suckers.

Pruning cuts on all trees shall leave a branch collar (Shigo method) but in no case shall a stub remain. Pruning shall produce a clean cut in live wood without bruising or tearing the bark. Where branches are cut back, the cut shall be made at a point beyond the lateral shoot or bud a distance not less than one-half of the diameter of the supporting branch. All cuts shall be

made on an angle sloping in the direction of the lateral shoot and in no case shall stubs be left.

In the case of trees with multiple stem leaders rather than a dominant central leader, the leader that will best promote the symmetry of the tree shall be preserved and the remainder shall be removed or cut back so they will not compete with the selected leader. Surrounding top branches shall be cut back in conformance with the leader trimming to suppress competition with the selected leader. Deciduous shrubs shall be pruned to form a loose outline conforming to normal shape, with entire canes being removed where they are too thick.

All pruning of the plants shall be done at the project site prior to planting. The use of hedge shears, pole shears, or anvil action pruners for pruning plants will not be permitted. Pruning saws or bypass scissors type pruners shall be used for all pruning.

Between April 15 and July 1, all cut surfaces on oak, elm, crabapple, and hawthorn trees shall be immediately treated with latex paint to minimize the potential for entry of insect and disease organisms. It is recommended that pruning for these species be done outside of the aforementioned time period.

Evergreen trees and shrubs shall be pruned only to the extent of removing damaged growth or a competing leader, except where clipping of hedges is required.

3.13 INSTALLATION OF PLANTS

A. General

The Contractor:

1. Shall dig planting holes to the configuration and minimum dimensions shown in the plan.
2. Shall obtain the Engineer's approval of the planting holes before plants are installed.
3. Shall provide adequate drainage where planting holes and beds are dug in heavy clay or impervious soils and a percolation rate of at least .5" per hour is not observed after partially filling presaturated test holes with water.
4. May:
 - a) Raise the level of the planting area,
 - b) Install a granular filter arrangement,

- c) Install a tile drainage system, or
- d) Construct a combination of these features as shown on the plan and approved by the Engineer.

Plants shall be installed plumb and shall be so set that, after installation and backfill consolidation, the beginning taper of the root flare of bare root or container grown plants will be at or above the approximate level of the finished soil elevation. Due to landscape industry practices, the beginning taper of the root flare of balled and burlapped plants may be found below the soil grade but in no case will balled and burlapped plants be accepted if more than 4 inches of soil is found above the root taper in the ball. All excess soil above the root flare must be removed so that the root flare is visible after planting. Care shall be taken to ensure that roots are not damaged while placing and compacting the backfill.

The backfilling operations shall be accomplished in more than one stage in accordance with the plan. Sufficient planting soil shall be placed prior to the initial watering in order to cover the root system completely and provide firm support for the plant in the hole. The remaining backfill shall be placed within 5 days after the initial watering following water permeation and soil treatment.

The Contractor shall complete one individual test planting for each root category or method of planting of evergreen tree, evergreen shrub, deciduous tree, deciduous shrub, seedling, vine and perennial, as it applies, to obtain approval by the Engineer that the Contractor's methods are sufficient to perform the work as specified with initial watering, guying, painting, protective devices, and mulching. No other planting will be allowed until the test planting approval is provided by the Engineer.

B. Balled and Burlapped Stock

Balled and burlapped plants may be installed without removing the burlap covering or wire baskets entirely. Before completing the backfilling of planting holes, the top loops of wire baskets shall be removed and the burlap shall be loosened at the top and pulled back to expose the entire top third of the ball. All twine and rope material shall be removed from the ball and the planting site. If directed by the Engineer, biodegradable twine may be left on B & B plants for stem/root ball support until the end of the contract. Prior to final acceptance all twine, that has not decomposed, must be cut and removed from plant stems to prevent girdling injury. Treated burlap will be allowed on the root balls but vertical slits must be cut through the burlap at the time of installation. The vertical slits shall be at 4" intervals around the circumference of the root ball and from the top downward in a manner that does not damage the root system.

C. Container Stock

Plants supplied in containers shall be installed immediately upon being removed from the containers. Removal of plants from containers shall be in a manner that will not disturb the root system or the soil in which they were planted. Under no conditions shall the plant be removed from the container by pulling on the main stem or plant growth. The outside of the root ball shall be scored or pruned in order to redirect circling roots.

D. Bare Root Stock

Before installing bare root trees and shrubs, planting soil shall be placed and compacted to a depth of approximately 6" in the bottom of the plant hole. The plants shall be installed with the roots evenly distributed and spread in their natural position, with the growing medium being carefully placed and compacted around the roots.

E. Machine Transplant Stock

The Contractor shall transplant trees as designated in the contract by hydraulic spade-type mechanized digging equipment.

The Contractor shall not transplant trees until the Department of Agriculture has inspected and found the trees to be free from plant pests.

The Contractor is responsible for all appropriate permits and certifications required for plants moved off of the Owner's Right of Way.

The Contractor does not need to provide replacement trees when transplanted trees are furnished by the Owner and die or are defective. However, the Contractor shall remove the dead or defective tree at no expense to the Owner and as directed by the Engineer.

The Contractor shall:

- a) Apply water to thoroughly hydrate the tree and hold the root package together during digging operations and transport.
- b) Cover the spade portion of the digger with a tight hood to prevent soil sifting from the root ball.
- c) Cover trees with a tarp when trees are transported during the growing rather than dormant season if the transport distance exceeds 5 miles.
- d) Ensure that soil in the ball does not sift out of the digger while in transit.
- e) Support the tree in a manner that will prevent shifting and damaging of the root ball.

- f) Fill holes created by the removal of trees from public property within 24 hours. Fill holes so that after settling, the fill will be the same as the surrounding ground surface.
- g) Reset trees that are not plumb with a spade of the same size or larger. Pull away mulch from the tree so that the spades will slip into the original cut. Plumbing trees by tightening guy wires will not be permitted.
- h) Trees shall be moved and planted within 24 hours of harvesting and shall remain in spade until planted.
- i) Remove double leaders and broken, dead, diseased, or crossed branches. Immediately treat cut surfaces on oak species with a suitable tree wound dressing.
- j) Protect all plants from injury during digging, lifting, storing, transportation, delivery, transplanting, and planting.
- k) No plant shall be so bound with rope or wire at any time to damage the bark, break branches, or destroy its natural shape.

F. Seedling Stock

The Contractor shall only plant evergreen and deciduous seedlings during the optimum spring planting dates for evergreens as shown in the plan. The Contractor shall not plant seedlings in water filled depressions.

The Contractor shall not damage the fine root hairs on seedlings during storage, handling, or planting. The Contractor shall not prune roots of seedlings unless approved by the Engineer.

The Contractor shall:

- a) Place seedlings in the ground so that the seedling assumes a position within 20 degrees of vertical.
- b) Prevent tangled or turned up root ends (J-root).
- c) Set the root collar of each seedling within .5" of the elevation of the finished soil surface.
- d) Plant and tamp the ground, around seedling roots, firmly without excessive compaction. Air pockets or voids around the roots will not be permitted. The Engineer will determine acceptable planting by a tug test and by inspecting for air pockets and excessive compaction in the root zone. The tug test is satisfied if gentle pulling of the seedling at its base does not pull the roots out of the ground or loosen the soil in the root area.

- e) Protect deciduous seedlings with seedling tree shelters according to the plan, when so designated in the contract.

3.14 FOLLOWING PLANT INSTALLATION

A. Watering and Backfill

Within 2 hours after being installed, each plant shall be watered to thoroughly saturate the backfill soil and provide for settlement and filling of voids in the backfill. Consecutive watering and addition of planting soil may be necessary for thorough backfilling and saturation of the soil.

Within five days after installation, the Contractor shall add sufficient planting soil around each plant to bring the soil to the specified level shown in the plan. Plants shall be thoroughly watered unless soil moisture is at optimum or excessive levels. Plants that are improperly positioned with respect to depth and plumbness shall be reset or replaced as necessary. Reset and replaced plants shall be watered within 2 hours to thoroughly saturate the backfill soil.

The Contractor shall have available on the project, at all time, sufficient watering equipment and forces to carry out a complete watering of all plants once each week, if necessary, from April 1 until ground freeze, or as otherwise directed by the Engineer, until the initial plant installation operations have been accepted. Watering intervals shall be varied in consideration of prevailing soil moisture and weather conditions.

B. Mulch Placement

Planting bed soil shall be fine-graded and leveled with hand tools prior to placing mulch to avoid impeding or puddling surface drainage and to prevent mulch depth irregularities. Mulch material shall be placed within 48 hours after the second watering, unless further delay is authorized by the Engineer in cases where soil moisture is excessive and additional time is required to allow excess soil moisture to evaporate. Mulch placement is shown in the plan.

3.15 PROTECTION OF PLANTS

The Contractor shall take precautionary and protective measures to ensure healthy growth and survival of all plants.

A. Guying and Staking

The Contractor shall:

- a) Guy and stake trees in accordance with the details shown in the plan (Standard Detail Plate Nos. 5310 and 5312).

- b) Guy and stake trees only when necessary to maintain the plant in a plumb condition where excess soil moisture, steep slopes, high wind, or vandalism is a problem. When the estimated quantity of staking and guying is not shown as incidental work in the plan, staking and guying approved by the Engineer, as necessary to maintain trees in a plumb condition, will be paid for as Extra Work.
- c) Remove the staking and guying after 1 year of plant establishment or as soon as is practicable during the plant establishment period.

B. Rodent Protection

The Contractor shall place rodent protection around all deciduous and pine trees in accordance with the details in the plan unless specified otherwise.

C. Tree Painting

The Contractor shall paint trees in accordance with the species, notes, and details shown in the Plan. The Engineer may require additional applications when paint is applied to wet bark or under other adverse conditions.

3.16 DISPOSAL OF EXCAVATED MATERIALS

Excess and unwanted excavated materials shall be removed from the planting areas and disposed of to the Engineer's satisfaction within 3 days after the excavation.

3.17 CLEANUP AND RESTORATION WORK

Cleanup and restoration work shall be accomplished as the final step of the initial planting operations and throughout the plant establishment period, to the satisfaction of the Engineer.

3.18 PLANT ESTABLISHMENT PERIOD

A. Establishment Period

The Contractor shall maintain the work and care for the installed plants from completion of the initial planting operations until final acceptance at the end of the Plant Establishment Period.

B. Establishment Work

The Contractor shall keep all plants in a healthy growing condition, using good horticultural practices performed on a day by day basis during the growing season and as necessary during the remainder of the year, with necessary replacements being made as required.

If, at any time, inspection shows that the care and replacement operations have been inadequate, untimely, or unsatisfactory, the Engineer will notify the contractor in writing of such default and the Contractor shall promptly comply with the instructions. The Contractor shall replace plant stock as required in the contract but only within the optimum planting dates specified, extended, or shown in the plan or as required by the Engineer. If the Contractor does not proceed satisfactorily within 3 working days after receiving the written notice from the Engineer, a daily charge of \$200 will be assessed against the Contractor until compliance with the notice is noted by the Engineer.

1. All Plants Except Seedlings

In plant establishment work except for seedlings, the Contractor shall:

- a) Maintain adequate (but not excessive) soil moisture in conformance with Section 3.00H (2571.3H) and watering guidelines provided in the plan. The Contractor shall use the soil moisture meter and provide soil moisture readings when requested by the Engineer.
- b) Repair, adjust, or replace, as necessary, the staking and guying, mulch material, planting soil, rodent protection, seedling tree shelters, tree painting, and other incidental items.
- c) Apply insecticides, fungicides, and other cultural procedures, as necessary, to maintain healthy, vigorous plants free from harmful insects, fungus and disease.
- d) Furnish and install replacement plants and remove dead plants, as needed, with new mulch, planting soil, and other incidental items.
- e) Maintain the plants in a plumb condition at the appropriate planting depth.
- f) Maintain all planting areas in a weed-free condition by continuously removing all weed growth in the mulched planting areas as necessary.
 1. Remove all weed growth in the mulched areas.

2. Spray application of chemicals for weed control in the mulched planting areas will not be permitted during the plant establishment period unless the Engineer authorizes otherwise. A non-selective, non-residual post emergence herbicide containing 41% glyphosate as the active ingredient may be applied, with a surfactant, on a spot treatment basis only, with a brush or wick applicator, if authorized by the Engineer. A broad-spectrum dichlobenil based granular herbicide may be applied in conformance with product labeling and manufacturer's recommendations for residual weed control, if authorized by the Engineer.

3. Disposing of weeds in a satisfactory manner.

g) Perform other plant establishment operations consistent with proper care of the plants.

2. Seedlings

In plant establishment work for seedlings, the Contractor shall:

a) Repair, adjust, or replace seedling tree shelters as necessary.

b) Furnish and install replacement seedlings (one time only after 1 year as necessary with one initial watering).

c) Maintain all mulched planting areas in a weed-free condition until final acceptance at the end of the plant establishment period.

3. Supplemental Watering

The Contractor is not required to provide supplemental watering of seedlings during the plant establishment period.

C. Replacement Requirements

The Contractor shall:

1. Replace all dead, defective, or missing plants and incidental materials as required in the contract or when ordered by the Engineer and within 2 weeks of notification by the Engineer, unless a longer period of time is acceptable to the Engineer.

2. Replace all installed plants that are lost due to accidents, vandalism, theft, rodent damage, and other causes.

3. Repair or replace all damage caused by the Contractor's operations.

The requirements for replacement plantings shall be the same as for initial planting.

Within the 2-year plant establishment period, the Contractor is also responsible for determining which plants need to be replaced based upon the Contractor's assessment of their condition and present or probable compliance with the project requirements.

For plant replacement when less than a full year remains in the original plant establishment period, the Contractor will be required to provide a 1-year plant establishment period for the replaced plant.

After the first replacement, except in the case of seedlings, the Engineer will decide if the plant will be replaced again at the Contractor's expense, or deleted from the plan.

3.19 ACCEPTANCE OF WORK

For acceptance at full payment, plants shall meet all requirements including the criteria listed in the current edition of "Inspection and Contraction Administration Guidelines for MnDOT Landscape Projects," published by the MnDOT Landscape Unit. The plants shall be healthy, vigorous, and structurally sound.

A. Acceptance of Preparatory Work

The Engineer will accept the preparatory work after the Contractor has satisfactorily moved equipment and supplies to the project site, provided for protection of existing plants, and obtained the Engineer's approval of the progress schedule.

B. Acceptance of Preparation of Planting Holes and Beds

The Engineer will accept the preparation of planting holes and beds after the Contractor has satisfactorily completed staking, initial weed control, soil cultivation with incorporation of amendments, and temporary erosion prevention measures.

C. Acceptance of Initial Planting Operation

Initial acceptance will be made upon satisfactory completion of the initial planting operation for the individual plant.

1. Preliminary Inspection

One year into the plant establishment period, the Engineer will make an inspection of the project and notify the Contractor of any dead, defective, or missing plants and work that must be performed to comply with specifications. Dead or defective plants shall be removed and replaced where so ordered.

D. Final Acceptance

Final acceptance will be made after final inspection of the completed project at the end of the plant establishment period.

1. Final Inspection

On or about the date on which the plant establishment period expires, the Engineer will make an inspection of the project and notify the Contractor of any dead, defective, or missing plants and work that must be performed prior to acceptance. Dead or defective plants shall be removed where so ordered.

As a condition for acceptance of the work, plant maintenance operations shall not be past due at the time of the final inspection. Every plant shall have received a thorough watering within the preceding 10 days before inspection unless soil moisture is at sufficient levels. The mulched planting areas shall be weed free. All work shall be in good order as would reflect recent care and require no further attention until the next growing season.

The Engineer will make a determination as to which plants will be accepted for payment at the contract unit prices, at a reduced payment, or at no payment. The Engineer may consider as unacceptable the machine transplanted trees that are mechanically damaged and trees with vigor and growth reduction from improper transplanting operations. The Engineer may accept these trees at a reduced payment or at no payment.

Upon final acceptance, the Contractor will not be required to provide any further care for the plantings. However, final acceptance of the work will not be made until cleanup and restoration work are completed to the Engineer's satisfaction.

E. Uninspected, Non-conforming, and Unauthorized Work

Acceptance of uninspected, non-conforming, or unauthorized work will be made to the extent the Engineer determines the work to be acceptable.

SECTION 4.00 - METHOD OF MEASUREMENT (2571.4)

4.01 PLANTS FURNISHED AND PLANTED

Trees, shrubs, vines and perennials of each species, variety, size, or age, and root category furnished, planted, and maintained by the Contractor will be measured separately by the number of acceptable plants.

4.02 PLANTS PLANTED

Trees, shrubs, vines and perennials of each species, variety, size, or age, and root category furnished by the Owner and planted and maintained by the Contractor will be measured separately by the number of acceptable plants.

4.03 PLANTS TRANSPLANTED

Trees, shrubs, vines, and perennials of each size and type furnished by the Owner and transplanted will be measured separately by the number of plants moved and maintained in an acceptable manner.

SECTION 5.00 - BASIS OF PAYMENT

Payment for plant installation at a percentage of the contract price per unit of measure will be compensation in full for all costs relating to furnishing, installing, and maintaining, or installing and maintaining, the required plants and materials specified.

If the Engineer requires additional materials and work beyond that specified or shown in the contract, the Contractor will receive compensation for the additional materials and work as Extra Work.

5.01 INITIAL PAYMENT

Initial payment of up to but not exceeding 80% of the contract unit price will be paid in partial payment amounts for satisfactory completion of the following work:

A. Preparatory Work

Up to but not exceeding 10% of the contract amount for the plants to be planted.

B. Preparation of Planting Holes and Beds

Up to but not exceeding 20% of the contract amount for the plants to be planted in each project area.

C. Initial Planting Operation

Up to but not exceeding 50% of the contract amount for the plants planted.

5.02 MAXIMUM PAYMENT

The Engineer may authorize an interim partial payment of up to but not exceeding 80% of the contract amount for the plants planted, at the end of the first calendar year of the plant establishment period when required plant establishment operations on the entire project have been acceptable generally and continuously throughout this period as determined by the initial acceptance and the preliminary inspection. The Engineer will not authorize this payment if these conditions are not met.

5.03 FINAL PAYMENT

Final payment will be made upon final acceptance of the completed project at the end of the plant establishment period. Final payment may involve full payment, reduced payment, or no payment for the individual plants.

Payment will be made for only one plant at one location, not for each initial and each replacement plant.

When an initial payment is made for an individual plant and the final payment is at full, reduced, or no payment, the amount of the initial payment will be deducted from the final payment to the Contractor. Payment to the Owner shall be required when the remaining balance of payments is insufficient to compensate for unacceptable work.

A. Full Payment

Full payment at 100% of the contract unit price will be made for the individual plant that is acceptable at the final inspection if the Contractor has met the following requirements:

1. Acceptance of the preparatory work.
2. Acceptance of the preparation of the planting hole or bed.
3. Acceptance of the initial planting operations.
4. Compliance with all plant establishment work requirements at the time of inspection and the plant has had the minimum two growing seasons or, in the case of a replacement plant, the plant has had a minimum of one growing season.

Replacement plants that have received 1 full year of plant establishment care, within the plant establishment period or an extended plant establishment period, and that are otherwise acceptable, will receive full payment.

B. Reduced Payment and No Payment

1. Reduced Payment - Owner Option

The Contractor may not elect to receive reduced payment in lieu of performing the work in conformance with the contract documents. At the Owner’s option, reduced payment at a percentage of the contract unit price for the individual plant not in full compliance with specifications at final inspection may be made in accordance with the following schedule:

REDUCED PAYMENT SCHEDULE	
Condition of Acceptance	Total Payment Percentage
The plant is acceptable at final inspection but existing vegetation was not protected.	Payment to the extent the Engineer determines acceptable to compensate for damages.
The plant is acceptable at final inspection but the preparation of the planting hole or bed or the initial planting operation was unacceptable.	50%

The plant is acceptable at final inspection but the Contractor is not currently in compliance with all plant establishment work requirements or the plant has not received the minimum of 1 year for replacements only	50%
The Owner-furnished plant or machine transplant is not acceptable at final inspection but the protection of existing vegetation, the preparation of the planting hole or bed, the initial planting operation and the continuous plant establishment operations have all been acceptable.	50%
The plant is not acceptable at final inspection but the protection of existing vegetation, the preparation of the planting hole or bed, and the initial planting operation were acceptable and the Contractor has been in general compliance continuously with the plant establishment requirements for the minimum 2 years required for the initial plant or the minimum 1 year required for the replacement plant.	35%
The plant is not acceptable at final inspection and the Contractor has not been in general compliance continuously with the plant establishment requirements.	0%

2. No Payment

No payment will be made for an unacceptable plant with unacceptable establishment care or for a plant when payment is made for the replacement plant.