

## Section 627 Mulching

### 627.1 Description

- (1) This section describes furnishing, placing, and anchoring a mulch cover, usually in connection with seeding the surfaces of the roadway.

### 627.2 Materials

- (1) Mulching material consists of straw or hay in an air-dry condition, wood excelsior fiber, wood chips, or other suitable material of a similar nature that the engineer approves, and is substantially free of noxious weed seeds and objectionable foreign matter.
- (2) If using tackifier, the department will prequalify it before use. Select tackifiers from the department's erosion control product acceptability list (PAL). The contractor may obtain a copy of the PAL and the prequalification procedure for products not on the PAL from the department.

### 627.3 Construction

#### 627.3.1 General

- (1) Unless directed otherwise, place the mulch on the specified area within 2 days after completing the seeding.
- (2) The contractor shall not perform mulching during periods of excessively high winds that might preclude proper mulch placement.
- (3) Place the mulch loosely or open enough to allow some sunlight to penetrate and air to slowly circulate, but thick enough to shade the ground, conserve soil moisture, and prevent or reduce erosion.
- (4) Maintain the mulched areas and repair all areas damaged by wind, erosion, traffic, fire or other causes before final or partial acceptance of the work.

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#### 627.3.2 Placing

- (1) The contractor may perform the work as specified in one of the following ways: Method A, Method B, or Method C, or a combination of the 3, unless a specific method is specified in the contract.

##### 627.3.2.1 Method A, Netting

- (1) Uniformly spread the mulching material over the designated areas to a loose depth of 1/2 to 1 1/2 inches. Use a specific rate of application; dependent on the character of the material, that results in a cover conforming to the requirements specified above in 627.3.1. Loosen or make fluffy the mulch material from compacted bales before spreading in place. Unless directed otherwise, begin mulching at the top of the slopes and proceed downward.
- (2) Securely anchor straw or hay mulch by using engineer-approved netting anchored to the ground with pegs or staples to prevent it from floating as the vegetation grows. Instead of this anchorage, the contractor may secure mulch by heavy biodegradable twine fastened by pegs or staples to form a grid with 6 to 10 feet spacing.
- (3) The contractor may use department-approved erosion control mats, listed in the PAL, instead of separately applying mulch and netting.

##### 627.3.2.2 Method B, Tackifier

- (1) Treat straw or hay with a tackifier, blow from a machine, and uniformly deposit over designated areas in one operation. Place straw or hay uniformly over the area 1/2 to 1 inch deep, using 1/2 to 3 tons of mulch per acre. Mix and place tackifier according to the PAL. Within the above limits, the engineer will determine, on the job, the application rate of the mulch and the tackifier, and the engineer may vary the rates during mulching to produce the desired results. Use an engineer-approved machine to place the mulch that blows or ejects by constant air stream a controlled amount of mulch and applies a spray of tackifier to partially coat the straw or hay, sufficient to hold together and keep in place the deposited straw or hay. The contractor may apply the tackifier as an overspray in a separate operation after placing the straw or hay.
- (2) Apply wood fiber, wood chips, or similar material with engineer-approved blowing machines, or other engineer-approved methods, that place a controlled amount of mulch uniformly over the area 1/2 to 1 1/2 inches deep. Treat areas receiving wood chip mulch, with one pound of available nitrogen per 1000 square feet before or after applying the chips.

- (3) Throughout the process, feed the mulch material into the blowing machine to produce a constant and uniform ejection from the discharge spout, and operate in a position to produce mulch of uniform depth and coverage.

**627.3.2.3 Method C, Crimping**

- (1) Spread the straw or hay mulch uniformly over the designated areas to a loose depth of 1/2 to 1 1/2 inches, using 1/2 to 3 tons of mulch per acre, by blowing from a machine, as specified in Method B, or by other engineer-approved methods.
- (2) Immediately after spreading, anchor the mulch in the soil by using a mulch crimper consisting of a series of dull, flat discs with notched edges. Space the 20 inch diameter discs at about 8 inch centers. Equip the crimper with a ballast compartment to allow adjusting the weight for depth control.
- (3) Impress the mulch into the soil 1 1/2 to 2 1/2 inches deep in one pass of the crimper. The department will not allow mulch crimpers to operate on slopes so steep that damage to the mulch, seedbed, or soil occurs. Anchor the mulch on these areas by one of the following methods: Method A or Method B. Equip and operate tractors to minimize disturbing or displacing the soil. This process may require more than one pass of the crimper to ensure adequate anchoring of the mulch.
- (4) The contractor shall not use Method C if it cannot impress the mulch to a minimum of 1 1/2 inch.

**627.4 Measurement**

- (1) The department will measure Mulching acceptably completed by the square yard or by the ton, whichever the contract specifies.
- (2) If measured by the square yard, the measured quantity equals the number of square yards of surface area that the contractor applied the mulch.
- (3) If measured by the ton, the measured quantity equals the number of tons of mulch provided, placed, and acceptably completed.
- (4) Tackifiers or nitrogen used for treating mulch are incidental to the cost of the work.

**627.5 Payment**

- (1) The department will pay for measured quantities at the contract unit price under the following bid items:

<u>ITEM NUMBER</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
627.0200	Mulching	SY
627.0205	Mulching	TON

- (2) Payment for Mulching is full compensation for providing all materials, including tackifiers or nitrogen; for all hauling, treating, placing, spreading, and anchoring of the mulch material; and for maintaining the work and repairing all damaged areas.
- (3) If the contractor opts to use department-approved erosion control mats instead of separately applying mulch and netting, the department will pay for it at the contract unit price for Mulching only.

## Section 630 Seeding

### 630.1 Description

- (1) This section describes preparing seed beds and furnishing and sowing the required seed on slopes, appurtenances, and other areas, and on borrow pits and material disposal sites.
- (2) This section also describes furnishing and sowing temporary seed mixture on the slopes and appurtenances of temporary embankments and roadways.

### 630.2 Materials

#### 630.2.1 Seed

##### 630.2.1.1 General Requirements

- (1) Conform to the Wisconsin statutes and Wisconsin administrative code chapter ATCP 20 regarding noxious weed seed content and labeling.
- (2) Use seed within one year of the test date appearing on the label.
- (3) Seed mixtures 70, 70A, 75, and 80 contain wild type forbs and grasses. Wild type is defined as seed that is derived directly from native, wild stock, including seed that was wild collected and placed into production or has been harvested directly from native stands.

##### 630.2.1.2 Purity and Germination

- (1) Test seed according to the methods and procedures used for sampling and analyzing seed for purity, germination, and noxious weed seed content specified in the current edition of Rules for Testing Seed, published by the Association of Official Seed Analysts.

##### 630.2.1.3 Inoculation

- (1) Inoculate legume seed (white clover, red clover, ladino clover, alsike clover, alfalfa, partridge pea, purple prairie clover, Canada tick-trefoil, and lupine) unless it has been pre-inoculated by the vendor. Follow the inoculation instructions that come with the culture purchases. If applying the seed according to method B, 630.3.3.2, treat seeds requiring inoculation with 5 times the amount of inoculant recommended in the instructions.
- (2) Avoid exposure of the culture or inoculated seed to the sunlight, and in no case shall any exposure exceed 1/2 hour.

##### 630.2.1.4 Storing Seed

- (1) Store any seed delivered before use in a way that protects it from damage by heat, moisture, rodents, or other causes. Discard and replace any previously tested and accepted seed that becomes damaged.

##### 630.2.1.5 Seed Mixtures

###### 630.2.1.5.1 Right of Way

###### 630.2.1.5.1.1 Permanent

###### 630.2.1.5.1.1.1 Composition

- (1) Seed mixtures for use on the right of way and easements shall, unless specified otherwise, be composed of seeds of the purity, germination, and proportions, by weight, as given in the Table of Highway Seed Mixtures and the Table of Native Seed Mixtures.
- (2) Use seed of the species and varieties listed below. If no variety is listed, there will be no restriction on the variety furnished, except as follows:

1. Species composed of pure live seed (PLS) shall contain no named or improved varieties. PLS shall be grown in Wisconsin or northern Illinois, northeastern Iowa, or eastern Minnesota. Seed produced out-of-state must be grown in one of the following counties:

###### 1.1 From northern Illinois:

Boone	Bureau	Carroll	Cook	De Kalb	Du Page	Grundy
Henry	Jo Daviess	Kane	Kendall	Lake	La Salle	Lee
McHenry	Ogle	Putnam	Rock Island	Stevenson	Whiteside	Will
Winnebago						

###### 1.2 From northeastern Iowa:

Allamakee	Benton	Black Hawk	Bremer	Buchanan	Cedar	Chickasaw
Clayton	Clinton	Delaware	Dubuque	Fayette	Floyd	Howard

Jackson Johnson Jones Linn Mitchell Muscatine Scott  
Winneshiek

1.3 From eastern Minnesota:

Aitkin Anoka Carlton Carver Chisago Dakota Dodge  
Fillmore Goodhue Hennepin Houston Isanti Kanabec La Sueur  
Mille Lacs Mower Olmsted Pine Ramsey Rice Scott  
Sherburne Steele Wabasha Washington Winona Wright

2. PLS for seed mixtures 70, 70A, 75, and 80 shall be packaged separately by species and clearly labeled with the vendor's name, species common and botanical names, gross weight, percent PLS, year of harvest and any specialized treatments that have been applied to ensure or enhance germination. If PLS is not listed, determine PLS by multiplying the percent germination times the percent purity.

3. Minimum percent purity for native for species is 90 percent. If a listed species is not available, substitutions may be made with engineer's approval and must be documented.

(3) Mix native species at the project site. Clean and debarbed seeds having awns or excessive hairs before mixing.

SPECIES COMMON NAME	SPECIES BOTANICAL NAME	ACCEPTABLE VARIETIES
Kentucky Bluegrass	<i>Poa pratensis</i>	Low Maintenance
Red Fescue	<i>Festuca rubra</i>	Creeping
Hard Fescue	<i>Festuca ovina</i> var. <i>duriuscula</i>	Improved
Tall Fescue	<i>Festuca arundinacea</i>	Improved turf type
Salt Grass	<i>Puccinella distans</i> <i>Puccinella distans</i>	Fult's Salty
Redtop	<i>Agrostis alba</i>	
Timothy	<i>Phleum pratense</i>	
Canada Wild Rye <sup>[1]</sup>	<i>Elymus canadensis</i>	
Perennial Ryegrass	<i>Lolium perenne</i>	
Perennial Ryegrass	<i>Lolium perenne</i>	Improved Fine
Annual Ryegrass	<i>Lolium multiflorum</i>	
Alsike Clover	<i>Trifolium hybridum</i>	
Red Clover	<i>Trifolium pratense</i>	
White Clover	<i>Trifolium repens</i>	
Japanese Millet	<i>Echinochola crusgalli</i> var. <i>frumentacea</i>	
Annual Oats	<i>Avena sativa</i>	
Alfalfa	<i>Medicago sativa</i>	
Bromegrass	<i>Bromus inermis</i>	
Orchardgrass	<i>Dactylis glomerata</i>	
Ladino Clover	<i>Trifolium repens</i> var. <i>latum</i>	Ladino
Agricultural Rye	<i>Secale cereale</i>	
Winter Wheat	<i>Triticum aestivum</i>	

<sup>[1]</sup> Pure live seed

TABLE 630-2 NATIVE SEED MIXTURES

	SPECIES	SPECIES BOTANICAL NAME	PURITY & GERMINATION minimum %	MIXTURE PROPORTIONS in percent			
				NO. 70	NO. 70A	NO. 75	NO. 80
FORBES	Canada Anemone	<i>Anemone canadensis</i>	PLS	2			
	Butterflyweed	<i>Asclepias tuberosa</i>	PLS		2		
	New England Aster	<i>Aster novae-angliae</i>	PLS	2	2		
	Partridge-pea	<i>Chamaecrista (Cassia) fasciculata</i>	PLS		2		
	Purple Prairie Clover	<i>Dalea (Petalostemum) purpurea</i>	PLS	2	2	4	
	Canada Tick-trefoil	<i>Desmodium canadense</i>	PLS	2			
	Flowering Spurge	<i>Euphorbia corollata</i>	PLS		2		
	Wild Geranium	<i>Geranium maculatum</i>	PLS	2			
	Western Sunflower	<i>Helianthus occidentaalis</i>	PLS	3	2		
	Rough Blazingstar	<i>Liatris aspera</i>	PLS		2		
	Prairie Blazingstar	<i>Liatris pycnostachya</i>	PLS	2			
	Lupine	<i>Lupinus perennis</i>	PLS		3		
	Wild Bergamot	<i>Monarda fistulosa</i>	PLS	2			
	Horse Mint	<i>Monarda punctata</i>	PLS		2		
	Yellow Coneflower	<i>Ratibida pinnata</i>	PLS	2	2		
	Blackeyed Susan	<i>Rudbeckia hirta</i>	PLS			1	
	Showy Goldenrod	<i>Solidago speciosa</i>	PLS	2	2		
	Spiderwort	<i>Tradescantia ohioensis</i>	PLS	2	2		
Golden Alexanders	<i>Zizia aurea</i>	PLS	2				
GRASSES	Big Bluestem	<i>Andropogon gerardi</i>	PLS	15	15	10	
	Sideoats Grama	<i>Bouteloua curtipendula</i>	PLS	15	20	20	25
	Canada Wildrye	<i>Elymus Canadensis</i>	PLS	15	15	35	23
	Slender Wheatgrass	<i>Elymus trachycaulus</i>	PLS				20
	Junegrass	<i>Koeleria macrantha</i>	PLS		5		
	Annual Ryegrass	<i>Lolium multiflorum</i>	[1]			10	10
	Switchgrass	<i>Panicum virgatum</i>	PLS				10
	Salt Grass	<i>Puccinella distans</i>	[1]				2
	Little Bluestem	<i>Schizachyrium (Andropogon) scoparium</i>	PLS	15	20	10	10
	Indiangrass	<i>Sorghastrum nutans</i>	PLS	15		10	
ALTERNATE FORBES	Sky Blue Aster	<i>Aster azureus</i>	PLS	[2]	[2]		
	White Wild Indigo	<i>Baptisia leucantha</i>	PLS	[2]	[2]		
	Pale Purple Coneflower	<i>Echinacea pallida</i>	PLS	[2]	[2]		
	White Prairie Clover	<i>Petalostemum candidum</i>	PLS	[2]	[2]		
	Stiff Goldenrod	<i>Solidago rigida</i>	PLS	[2]	[2]		
	Hoary Vervain	<i>Verbena stricta</i>	PLS	[2]	[2]		

[1] Provide the minimum purity and germination specified in 630.2.1.5.1.1(3) in the table of highway seed mixtures.

<sup>[2]</sup> The contractor may, if the engineer approves, substitute an alternate forb for a required forb that is not available using the same percentage as specified for the required forb. Use a different alternate forb for each unavailable required forb. Provide documentation showing that a required forb is not available before using an alternate.

**630.2.1.5.1.1.2 Mixture**

- (1) The contractor shall select a seed mixture or mixtures that meet with the engineer's approval, and unless specified otherwise in the contract, shall conform to the following:
  1. Use seed mixture No. 10 where average loam, heavy clay, or moist soils predominate.
  2. Use seed mixture No. 20 where light, dry, well-drained, sandy, or gravelly soils predominate and for all high cut and fill slopes generally exceeding 6 to 8 feet, except where using No. 70.
  3. Use seed mixture No. 10 or No. 20 on all ditches, inslopes, median areas, and low fills, except where using No. 30 or No. 70.
  4. Use seed mixture No. 30 for medians and on slopes or ditches generally within 15 feet of the shoulder where a salt-tolerant turf is preferred.
  5. Use seed mixture No. 40 in urban or other areas where a lawn type turf is preferred.
  6. Use seed mixture No. 60 only on areas, the contract designates or the engineer specifies. Use it as a cover seeding for newly graded wet areas or as a nurse crop for specified wetland seed mixtures. The contractor shall not apply it to flooded areas.
  7. Use seed mixture Nos. 70 and 70A on slopes and upland areas the contract designates or the engineer specifies. Use seed mixture No. 70 on loamy soils and seed mixture No. 70A on sandy soils.
  8. Use seed mixture No. 75 where native grasses are desired for erosion control.
  9. Use seed mixture No. 80 on inslopes where a salt tolerant seed mix containing native grasses is desired.

**630.2.1.5.1.2 Temporary**

- (1) Under the Seeding Temporary bid item, use a temporary seed mixture conforming to 630.2.1.5.1.4. Use oats in spring and summer plantings. Use winter wheat or rye for fall plantings started after September 1.

**630.2.1.5.1.3 Nurse Crop**

- (1) If seeding bare soil with either mixture 70, 70A, 75, or 80, include the Seeding Nurse Crop bid item.

**630.2.1.5.1.4 Borrow Pits and Material Disposal Sites**

- (1) For seeding borrow pits and material disposal sites beyond the right of way, use seed mixtures conforming to seed mixture 10, 20, 70, 70A, or 75 of 630.2.1.5.1.1 or a borrow pit mixture composed of seeds of the species, purity, germination and proportions, by weight as given below:

<b>PERMANENT</b>		
SPECIES	% MINIMUM PURITY	% MINIMUM GERMINATION
Alfalfa	98	90
Bromegrass	85	85
Orchardgrass	80	85
Timothy	98	90
Red Clover	98	90
Alsike Clover	97	90
Ladino Clover	95	90
Kentucky Bluegrass	98	85
<b>TEMPORARY</b>		
SPECIES	% MINIMUM PURITY	% MINIMUM GERMINATION
Annual Oats	98	90
Agricultural Rye	97	85
Winter Wheat	95	90
<b>NURSE CROP</b>		
SPECIES	% MINIMUM PURITY	% MINIMUM GERMINATION
Annual Oats	98	90
Annual Ryegrass	97	90
Winter Wheat	95	90

- (2) For the borrow pit mixture use, by weight, 60 percent temporary species seeds and 40 percent permanent species seeds.
- (3) For the temporary component, use any combination of temporary seeds listed in the table above.
- (4) For the permanent component, use seeds from not more than 4 of the permanent species listed in the table above in any combination.
- (5) When nurse crop is required for spring seeding before June 15, use annual oats. For fall seeding after October 15, use winter wheat, or annual ryegrass.

### **630.3 Construction**

#### **630.3.1 General**

- (1) If not protecting with a mulch cover, perform seeding, except Nos. 60, 70 and 70A mixtures at times of the year when temperature and moisture conditions are suitable for seeding, except during midsummer.
- (2) Perform seeding, except Nos. 60, 70 and 70A mixtures, in conjunction with mulching as specified in section 627 at any time the engineer allows.
- (3) The contractor may perform seeding of Nos. 60, 70 and 70A mixtures at any time soil conditions are suitable, except between June 15 and October 15, unless the engineer allows otherwise.
- (4) Perform seeding with the selected seed mixture, sown at the specified rate.

#### **630.3.2 Preparation of Seed Bed**

- (1) Complete grading, shouldering, topsoiling, and fertilizing, if part of the work under contract, before permanent seeding, except the contractor may place the fertilizer and seed mixture in one operation if using equipment designed for the purpose.
- (2) Just before seeding, work the area being seeded with discs, harrows, or other appropriate equipment to obtain a reasonably even and loose seedbed. Place topsoil as specified in 625.3.3.

#### **630.3.3 Sowing**

- (1) Select the method of sowing from either method A, method B, method C, or an appropriate combination of methods A, B, and C. Obtain the engineer's approval for the sowing method and specific procedures used for each seed mixture used before sowing that mixture.

##### **630.3.3.1 Method A**

- (1) Sow the selected seed mixture using equipment adapted to the purpose, or by scattering it uniformly over the areas to be seeded. Lightly rake or drag to cover the seed with approximately 1/4 inch of soil. After seeding, lightly roll or compact the areas using suitable equipment, preferably the cultipacker type, when the engineer judges the seedbed too loose, or if the seedbed contains clods that might reduce seed germination. The contractor shall not roll slopes steeper than 1:3.
- (2) If scattering seed by hand, perform this work with satisfactory hand seeders and only when the air is calm enough to prevent seeds from blowing away.

##### **630.3.3.2 Method B**

- (1) Sow or spread the seed upon the prepared bed using a stream or spray of water under pressure and operated from an engineer-approved machine designed for that purpose. Place the selected seed mixture and water into a tank, provided within the machine, in sufficient quantities that when spraying the seed on a given area it is uniformly spread at the required application rate. During this process, keep the tank contents stirred or agitated to provide uniform distribution. Spread the tank contents within one hour after adding the seed to the tank. The engineer will reject seed that remains mixed with the water for longer than one hour. The engineer will not require dragging or rolling.

##### **630.3.3.3 Method C**

- (1) For spring seeding of seed mixtures 70 and 70A into existing ground cover, mow existing vegetation to 4 inches or less in height 2 to 4 weeks before seeding. Ten to 14 days after mowing, spray with vegetation control herbicide conforming to 632.2.12.
- (2) For fall seeding of seed mixtures 70 and 70A into existing ground cover, mow existing vegetation to 4 inches or less in height 4 to 6 weeks before seeding. Ten to 14 days after mowing, spray with vegetation control herbicide conforming to 632.2.12. Retreat with vegetation control herbicide 10 to 14 days after initial application if live vegetation persists.

- (3) Seed with a rangeland type drill with one or more seed boxes that can be calibrated independently to deliver different sized seeds uniformly at the required rate and equipped with a rear-mounted press wheel for each seed drop tube. If seeding into existing vegetation or thatch, use a rangeland type drill equipped with a no-till attachment that can cut through the vegetation or thatch in front of the V disc and seed drop tube. If the configuration of the area to be seeded allows, apply seed at 1/2 the specified seed rate and apply the second 1/2 in a perpendicular direction.

#### **630.3.3.4 Borrow Pits and Material Disposal Sites**

- (1) Seed borrow pits, and material disposal sites off the right of way, with the selected seed mixture specified in 630.2.1.5.1.4. Consult with the landowner or the landowner's agent when selecting the seed mixture.

#### **630.3.3.5 Seeding Rates**

##### **630.3.3.5.1 Right of Way**

- (1) Use the following sowing rate for seeds in pounds per 1000 square feet:

- Seed mixture No. 10 at 1.5 pounds
- Seed mixture No. 20 at 3 pounds
- Seed mixture No. 30 at 2 pounds
- Seed mixture No. 40 at 2 pounds
- Seed mixture No. 60 at an equivalent seeding rate of 1.5 pounds<sup>[1]</sup>
- Seed mixture No. 70 or 70A at 0.4 pounds
- Seed mixture No. 75 at an equivalent seeding rate of 0.7 pounds<sup>[1]</sup>
- Seed mixture No. 80 at an equivalent seeding rate of 0.8 pounds<sup>[1]</sup>
- Temporary seeding at 3 pounds
- Nurse crop seeding at 0.8 pounds

<sup>[1]</sup> Determine the actual seeding rate by multiplying the equivalent seeding rate by the sum of the unadjusted and adjusted percentages of the various species in the seed mixtures as sown.

- (2) The unadjusted percentage equals the minimum percent of purity and germination specified in the table of seed mixtures contained in 630.2.1.5.1.1.1 for the applicable species.
- (3) Obtain the adjusted percentage for each of the PLS species by dividing the specified percentage of the species by the product of the percent of purity and the percent of germination for each of the PLS species as delivered.

##### **630.3.3.5.2 Borrow Pits and Material Disposal Areas**

- (1) For seeding borrow pits and material disposal off the right of way, sow the seed mixtures specified in 630.2.1.5.1.4 at the following rates per pound per 1000 square feet:

- Seed mixture No. 10 at 0.75 pound
- Seed mixture No. 20 at 1 pound
- Seed mixture No. 70 or 70A at 0.4 pounds
- Seed mixture No 75 at 0.7 pounds
- Borrow pit mixture at 1.5 pounds

##### **630.3.3.6 Establishment Period for Native Seeding**

- (1) During the growing season after planting seed mixture 70 or 70A, mow all seeded areas twice as the engineer directs. Mow vegetation back to 6 inches when it has reached a height of at least 12 inches.
- (2) During the growing season after planting seed mixture 70 or 70A, eradicate the following species from the seeded areas as soon as they become evident:

SPECIES COMMON NAME	SPECIES BOTANICAL NAME
Musk thistle	Carduus nutans
Spotted knapweed	Centaurea maculosa
Canada thistle	Cirsium arvense
Bull thistle	Cirsium vulgare
Field bindweed	Convolvulus arvensis
Leafy spurge	Euphorbia esula
Sweetclover	Melilotus species
Wild parsnip	Pastinaca sativa

- (3) Eradicate by hand pulling or by applying a vegetation control herbicide conforming to 632.2.12 to individual plants.

**630.4 Measurement**

- (1) The department will measure the Seeding bid items by the pound acceptably completed.
- (2) The department will measure quantities based on net weights of seed shipments, or on quantities weighed on department-approved scales the contractor furnishes.
- (3) The department will make deductions for all quantities wasted or not actually incorporated in the work according to the contract.
- (4) The department will determine the equivalent pounds of seed furnished and applied by dividing the actual pounds of seed applied by the sum of the unadjusted and adjusted percentages of the various species in the seed mixture sown.
- (5) The department will use the unadjusted and adjusted percentages determined in 630.3.3.5.1.

**630.5 Payment**

- (1) The department will pay for measured quantities at the contract unit price under the following bid items:

<u>ITEM NUMBER</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
630.0100 - 0199	Seeding (mixture)	LB
630.0200	Seeding Temporary	LB
630.0300	Seeding Borrow Pit	LB
630.0400	Seeding Nurse Crop	LB

- (2) Payment for the Seeding bid items is full compensation for providing, handling, and storing all seed; for providing the required culture and inoculating seed as specified; and for preparing the seed bed, sowing, covering and firming the seed. If the landowner does not want the pit or material disposal site seeded, or seeded with any of the mixtures allowed, the department will not pay for fertilization or seeding of those areas.

**6-40.6 Trees, Shrubs and Vines**

WisDOT Bureau of Highway Operations has a staff of landscape architects who have expertise in all areas of vegetation management. They should be invited to participate in the preconstruction conference for projects that have a significant amount of planting involved. They are also available to answer questions and assist with field checking of staking, inspections of plants and planting operations, advising on care requirements during the plant establishment period, determining plant survival, etc.

**6-40.6.1 Materials**

Planting of trees, shrubs, and vines under the contract will be made with plant stock grown by and furnished from nurseries, unless the contract provides for the use of collected or plantation-grown stock.

The plant material to be used in the planting project is perishable and therefore requires special care and handling. Acceptable plant material as described in standard spec 632 has been grown, dug, stored, packaged, and transported in a manner designed to keep it alive and in good condition. The intent of the specifications is that all reasonable means should be used during the term of the contract to keep the plant material in good condition.

It is recommended the engineer have available a copy of the American Standards for Nursery Stock; a Plant Hardiness Zones map, published by the U. S. Department of Agriculture, and the latest AASHTO Inspection Guide for Landscape Planting. The AASHTO guide is not a contract document, but can provide helpful information. These standards, maps, and guides are available in the region and from the Bureau of Highway Operations landscape architects.

The contractor is to furnish a list of sources for all plant material at least 15 days before the delivery of the material. The addresses on this list should be checked against the Plant Hardiness Zone map to make sure that all plants come from within the specified acceptable area.

Nursery-grown, plantation-grown, or "collected" stock, are three levels of plant culture. Nursery-grown stock has generally been better managed, grown under more controlled conditions, and received more care than plantation or collected stock. Plantation-grown stock has been systematically planted in friable soils free of stones, but has received only a minimum of aftercare. The most common examples of plantation-grown stock are evergreens grown for Christmas trees. Collected stock has been taken from wild or native stands and generally is subject to greater shock when transplanted than the same kind when nursery-grown.

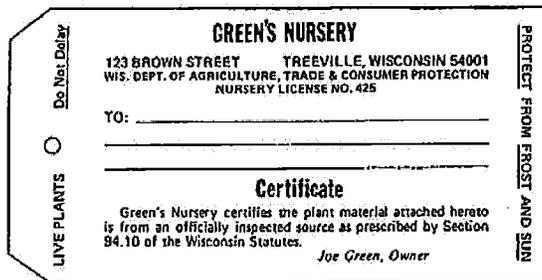
**6-40.6.2 Certification for Nursery Stock**

A Certificate of Compliance should accompany each shipment of nursery-grown planting material received on the project, and is to be filed with the engineer.

Wisconsin Statutes Section 94.10(5) sets out the requirements for labeling nursery stock. Shipments of nursery stock must be labeled with the name and address of the person selling or distributing the shipment. Nursery stock sold at retail must bear a tag or label giving the common or botanical name of the plants.

Each nursery or dealer is responsible for obtaining their own tags. An example of an approved label-type certificate is shown in Figure 1.

**Figure 1 Example Certification for Nursery Stock**



**6-40.6.3 Inspection**

Usually, a general inspection of the plant stock is made at the nursery or source of supply or a central collection area by a plant specialist. If the specialist has not inspected the project plant stock, the engineer or inspector may use the checklist shown in Figure 2 as a guide to acceptance or rejection. When inspection is made at the source, approved stock is usually tagged. An approval tag may be attached to each large size tree; however, small size trees and shrubs may have only representative samples of each species and size tagged.

Regardless of any prior approval, the inspector will examine each shipment of plant stock upon its arrival at the

job site, noting the condition of plants and compliance with contract requirements, and obtaining accompanying certificates of inspection relative to injurious insects and diseases. Plants that are not satisfactory upon arrival should be rejected.

**Figure 2 Checklist for Inspection of Trees, Shrubs and Vines**

If a plant specialist has not inspected the stock before its delivery to the project site, the engineer or inspector should check each plant at the time of delivery for the following desirable characteristics:

- \_\_\_ 1. Size and quantity meet contract requirements for the species
- \_\_\_ 2. Natural, uniform leaf or needle color.
- \_\_\_ 3. Well-developed, firm, moist buds uniformly spaced out to the end of branches on dormant stock. The cambium layer just under the bark should be green and moist.
- \_\_\_ 4. No visible decay in the roots, trunk, or branches.
- \_\_\_ 5. No sun scald, as shown by lighter-colored areas of bark. The cambium layer just under the light-colored bark will be dry and brown if the plant has been sun scalded.
- \_\_\_ 6. A good root system. Roots should not be on or close to the surface, crowded, twisted, or encircling the plant.
- \_\_\_ 7. No frost cracks. These are long, vertical splits in the bark that will allow insects and fungi to enter the plant.
- \_\_\_ 8. No signs of injury; such as abrasions, cuts, or breaks.
- \_\_\_ 9. Correct pruning, with no protruding stubs, cutting of the bark, or decay at the cut.
- \_\_\_ 10. No diseases. These may appear as discharges of sap; discolored leaves, needles, or bark; abnormal growth of branches, etc.
- \_\_\_ 11. No insects. Evidence of insects may be clusters of eggs, feeding patterns on bark and leaves, and holes drilled into the bark.
- \_\_\_ 12. Proper habit of growth.
  - a. Shade trees and flowering trees should be balanced, symmetrical, with a single leader. Side branches should be well developed.
  - b. Evergreens should have full foliage with uniform density.
  - c. Shrubs should have at least the minimum number of branches for the species and be uniformly branched.
- \_\_\_ 13. Trees with wrapped trunks should be unwrapped at time of delivery and immediately checked for defects under the wrap. If unwrapping is not allowed, the trees should be rejected.
- \_\_\_ 14. A firm, intact ball on balled and burlapped stock. The trunk should not be free to move inside the ball.
- \_\_\_ 15. Necessary certificates should accompany the shipment.

Failure of plant stock to pass this checklist is cause for rejection. Rejected plant stock should be immediately reloaded onto the delivery vehicle and not allowed to remain on the project.

The following items and procedures should be considered or employed when accepting plant material on arrival:

- A nursery inspection tag should accompany each shipment.
- The stock should be protected from the wind, sun, and other detrimental climatic effects during transit. According to standard spec 632.2.2.9, all stock must be dug, handled, packed, transported, and planted in the appropriate manner as applicable to BR, B&B, B&P, CG, or MT stock. These acronyms are defined below:

**BR** Bare root stock

**B&B** Balled and burlapped stock

**B&P** Balled and potted stock

**CG** Container grown stock

**MT** Machine transplanted stock

- The earth ball of B&B material should be firm and unbroken. Remove burlap from a random plant. If cut ends of several large fleshy roots appear on the surface of the earth ball, break the ball and examine the root system. If there are very few fibrous roots, chances of plant survival are reduced, especially in evergreens.

- B&B plant material should always be handled by the ball with no exceptions.
- Dormant deciduous plant material should have green tissue just under bark on all parts of the plant top. Check by cutting a small secondary branch and laying back a small piece of bark.
- Roots of bare root material should be of an average minimum spread as described in the American Standards for Nursery Stock.
- Permission to substitute plants should be extended only after consultation with the landscape architect to ensure the substituted plants are suitable for the purpose intended.

#### 6-40.6.4 Measurement

The information in [Table 4](#) below is derived from the American Standard for Nursery Stock.

**Table 4 Method of Measurement for Various Tree Types**

Tree Type	Method of Measurement
Shade and flowering trees (caliper measurement)	Take caliper measurement of trunk at 6 in above ground level <sup>[1]</sup> if diameter is 4 in or less. If greater than 4 in, take trunk caliper measurement at 12 in above ground level.
Shade and flowering trees (height measurement)	Measure height vertically from ground level to top of tallest trunk.
Deciduous shrubs	Measure height vertically from ground level to top of tallest branch.
Coniferous evergreens (upright growth)	Measure height vertically from top of ball to top middle of leader.
Coniferous evergreens (creeping or low spreading growth)	Measure horizontally the widest spread of the branches from one side to the other, measure the least spread, and average the results.
Vines	Measure from top of root to end of stem.

<sup>[1]</sup> Ground level refers to the top of the ball for B&B plants or the plant root collar for bare root and containerized plants.

#### 6-40.6.5 Storage

All plant stock not planted on the day of delivery to the job site is required to be properly stored and protected from the sun and wind in the manner specified for temporary storage in [standard spec 632.3.2](#). Special care should be taken so that roots of bare root plants are covered at all times except at planting time when brief exposure is necessary. Do not allow several bare-root plants to be distributed to their individual planting locations and left with their roots unprotected before they are planted. The fine hair roots will dry out very quickly when exposed to sun and wind.

Earth balls of B&B stock should be completely covered with approved moist mulch material. Evergreens being stored for more than a week should be spaced and have tops untied to prevent yellowing which occurs when they are stored too close together. Potted plants should be spaced to provide air circulation, have the top spread, be protected from the wind if possible, and watered when necessary. It is important that stored plants receive proper care until all are planted.

#### 6-40.6.6 Location Staking

The location of trees and shrubs shown on the plans will be staked or otherwise indicated in the field by the engineer, and the contractor's planting will be inspected for compliance. The plan location should be accurately staked in the field using a base line or other methods for large areas.

Trees should not be planted at locations that would be hazardous to occupants of vehicles leaving the roadway. Generally, newly planted trees with an ultimate trunk diameter of more than 4 in should have a minimum setback of 36 ft from the edge of the traffic lane - 50 to 60 ft is desirable. If the trees are located behind walls, abutments, or other obstructions that separate the roadway from the trees, they may be planted closer.

The staking of plant locations should be done early so that staking is completed or nearly so before planting operations begin. The plant locations should be scaled off the plan. A full size plan rather than a "D" size plan will work better for this. If plant locations conflict with some existing feature such as power lines or if the plant would be in an undesirable location, for example, in a ditch that did not appear on the plan, or would be located within the minimum setback, the necessary adjustment in location should be made. These adjustments should be noted on the plan and brought to the attention of the engineer before planting begins.

#### 6-40.6.7 Planting

During planting operations, the inspector should determine that the performance of the work complies with the

specified requirements. Specific attention should be paid to the following:

- Proper size of excavated plant holes
- Correct placing of plants
- Backfill of plant holes with specified materials
- Correct manner of placing backfill material around plants
- Proper application of fertilizer
- Adequate watering
- Any required pruning, mulching, wrapping, staking, or guying of plants

As a general rule, planting should be done in a manner that storage time is reduced to a minimum. Where many plants are involved and the planting time is drawn out, it is usually best to concentrate on getting the material planted, leaving guying, wrapping, and mulching for later. An exception to this may be evergreens, which offer much wind resistance and which should be braced or guyed as required at or soon after planting time. Constant wind action usually breaks small roots, keeping the tree from becoming established, defeating the purpose of the earth ball.

Usually, machine transplanting should be done as early in the spring as possible.

Evergreens desirably should be planted either in the spring before the buds open, or in September. Deciduous trees desirably should be planted before the buds have opened in the spring or after the leaves have dropped naturally in the fall. Project conditions may require adjustments to these ideal planting times.

Potted plants are usually planted last because an adequate root system is contained in the pot, and with proper care they can be held for some time without ill effect. In some cases, potted shrubs have been potted by the contractor and should be held for a specified period to ensure a live, healthy plant at the time of planting.

Care should be taken to set the plant at its proper elevation. This should be as close as possible to that at which it was previously growing. If the hole is too deep, backfill it until the plant will rest at its proper height. The depth of the hole should be carefully measured for large B&B stock to eliminate unnecessary handling that loosens the roots from the ball. It is better for a plant, especially a tree, to be planted slightly too high than for it to be planted too low. Soil under large balled and burlapped trees should be firm; otherwise, loose soil will turn to mud after watering and the tree will settle into the hole.

Backfilling of bare root plants should be done carefully so that the soil fills in between small roots. The plant should be worked around slightly to cause soil to filter down between the roots. Firming by stamping with a boot should be avoided because this breaks many small roots. The required watering will also compact the soil and assist in eliminating air pockets.

Standard spec 632.3.7 requires that backfill material for plant holes must be a combination of six parts native topsoil and one part compost. Holes for MT plants must be filled half-full with a slurry of one part water and one part compost just before placing the tree.

In planting potted plants, the elevation should be based on the plant root crown rather than the pot. Plantable fiber pots should be planted intact, with several gashes made in the pot to speed up deterioration. If the top of the pot will not be covered by the mulch material, the top portion should be cut off after planting, but before mulching. If plastic or metal pots, which do not readily decompose, are used, the pot should be removed from each plant as it is planted.

The contractor, upon completion of the planting, must remove and dispose of all excess excavation, waste materials, or other debris resulting from the planting.

#### **6-40.6.8 Pruning**

The philosophy for pruning at planting time has changed dramatically in recent years. It is now not acceptable to prune up to half of the growth from a plant to compensate for root loss incurred during the digging operation at the nursery. Research has shown that leaving as much leaf surface as possible on the newly planted plant increases its photosynthesis capability that allows it to overcome the shock of transplanting much more quickly. The only recommended pruning operation at planting time is the removal of broken, dead or rubbing branches.

Pruning to improve the structure of the plant should wait at least one growing season or to the end of the final year of a multi-year plant establishment period. Plants should be pruned so that after pruning the plant still retains the character and appearance typical of the species. The thinning of small branches of some species of low growing trees may be warranted at this time. For instance, lower branches of crab apple trees may need to be removed to accommodate rodent control material, and the interior branches of hawthorns may need to be thinned to allow air and light to penetrate.

The following procedures should be employed when pruning:

- Evergreens normally should not be pruned; however, all dead or broken branches and all leaders, except one, should be removed.
- All broken, dead, or rubbing limbs of deciduous trees should be removed.
- Cuts should be made as close as possible to the branch collar at the base of the limb without injuring the collar.
- Painting of pruning cuts is no longer required, except on oaks to prevent oak wilt.
- Pruning tools should be suitable for the purpose and sharp enough to make a clean, smooth cut.

#### **6-40.6.9 Anti-Desiccant**

If specified, an emulsion formulated to reduce water loss by transpiration should be sprayed on the needles of evergreens at or before the time of planting, on the roots of BR stock before shipment, and on MT stock before transplanting unless deciduous trees are dormant. When dry, the anti-desiccant will leave an odorless, colorless, thin film of wax on the roots, needles, and branches. Comparison with unsprayed plants and experience with the process are the best ways the inspector has to detect if anti-desiccant has been applied.

#### **6-40.6.10 Landscape Planting Surveillance and Care**

The contractor is obligated to care for plantings, and must be made aware of the responsibilities as described in standard spec section 632, especially standard spec 632.3.19. This subsection pertains to watering, weeding, spraying, etc., after the initial planting. This work is an important part of the planting project that ensures the survival of the plants and protects the taxpayer's investment.

Mulching, watering, wrapping, guying, bracing, and application of rodent protection and anti-desiccant materials, when required, are a definite part of the bid item for which the contractor is remunerated. The contractor's obligation to perform this work is as clear cut and binding as that of furnishing and planting the plant material.

Ties used to secure wrappings should not be of nylon, plastic, or other materials that do not degrade rapidly.

Payment for the care of the plant material after planting is not included in the bid price for the plants. It is paid for under a separate bid item entitled Landscape Planting Surveillance and Care (see standard spec 632.3.19). The care cycles described should occur every 10 to 14 days. For estimating purposes, the number of cycles is typically figured on the basis of 1 cycle in late May, 2 cycles each month from June through September and 1 cycle in early October. The actual number of cycles may vary depending on whether adequate rainfall or drought occurs.

If the contractor fails to adequately perform landscape surveillance and care as described in standard spec 632.3.19, the engineer should assess daily damages using the administrative item 806.0632 Failing to Perform Landscape Surveillance. The daily damages are intended to offset the cost of hiring an outside source to perform the work. The dollar value to be used is provided in the contract special provisions. Daily damages specified in the special provision should be dependent upon the value of planting items in the contract, as shown in FDM 27-25-10.

Replacement of dead plants during the appropriate planting season is still incidental to the bid item for furnishing and planting that species and size.

#### **6-40.6.11 Establishment Period and Payment**

The contractor will be responsible for care of plants and necessary replacements for a 2-year establishment period, unless a 1-year period is specified in the contract.

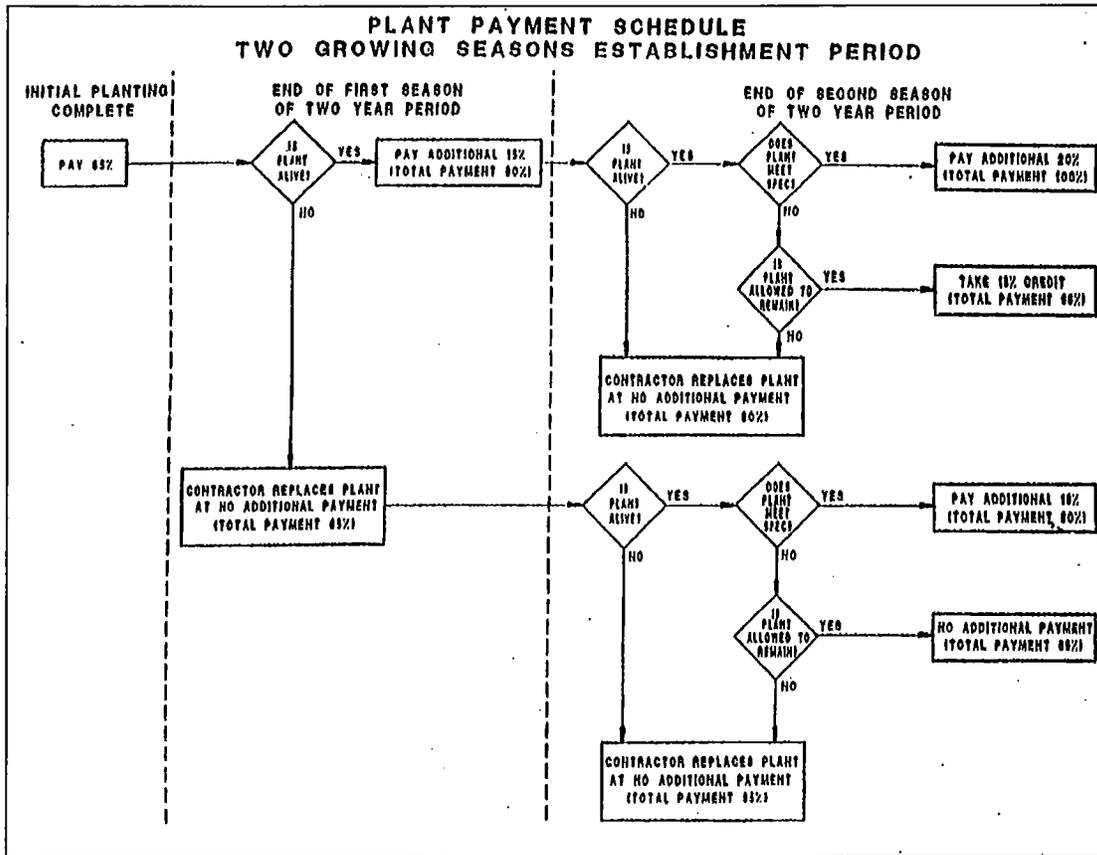
The 2-year establishment period must extend until October 15 of the second full growing season. The 1-year establishment period must extend until October 15 of the first growing season, if planting is done in the spring; the period must extend until October 15 of the succeeding year, if the planting is done in the fall.

When a 2-year plant establishment period has been specified, care and general condition of plantings should be monitored at least every month from the time the plants leaf out in the spring, until they lose their leaves in the fall. A comprehensive inspection should be conducted in late August or early September following the first growing season. Any dead plants should be tagged or marked. These are to be replaced by the contractor during that fall planting season. Another inspection should be conducted the following spring in case any plants die during the winter, with replacements again being made at that time.

The contractor must complete all replacements by June 1 of the year the final inspection is made so that all plants are top quality and in prime condition as of the inspection date. The final inspection is normally conducted late in August or early in September of the final year of the plant establishment period using the criteria set forth in standard spec 632.3.20 for determining plant acceptability and qualification for payment. Partial and final payments will be in accord with standard spec 632.5.

A diagrammatic flow chart in Figure 3 shows the payment schedule for plants installed under a two-year growing season establishment period. Future payments made under the plant payment schedule in the standard specifications for a two growing season establishment period should follow this chart.

Figure 3 Plant Payment Schedule



**TABLE 630-1 HIGHWAY SEED MIXTURES**

SPECIES	PURITY minimum %	GERMINATION minimum %	MIXTURE PROPORTIONS in percent				
			NO.10	NO.20	NO.30	NO.40	NO.60
Kentucky Bluegrass	98	85	40	6	10	35	
Red Fescue	97	85	25		30	20	
Hard Fescue	97	85		24	25	20	
Tall Fescue	98	85		40			
Salt Grass	98	85			15		
Redtop	92	85	5				
Timothy	98	90					12
Canada Wild Rye		PLS <sup>[1]</sup>					10
Perennial Ryegrass	97	90	20	30			
Improved Fine Perennial Ryegrass	96	85			20	25	
Annual Ryegrass	97	90					30
Alsike Clover	97	90					4
Red Clover	98	90					4
White Clover	95	90	10				
Japanese Millet	97	85					20
Annual Oats	98	90 <sup>[1]</sup>					20

<sup>[1]</sup> Substitute winter wheat for annual oats in fall plantings started after September 1.