MnDOT Seeding Manual

2023 Edition

10/06/2023

Introduction

What is Roadside Vegetation For?

Roadside vegetation is a critical component of the transportation infrastructure. Whether woody or herbaceous, vegetation can improve safety by providing designed sight lines, traffic calming, clear zones, and stormwater treatment. Vegetation protects roads, bridges and pipes by allowing stormwater to infiltrate and drain away quickly while also holding the soil in place. Establishment of permanent vegetation is a requirement of the MPCA Construction Stormwater Permit. Roadside vegetation is also important for traffic calming, water quality, weed control, aesthetics, habitat, and quality of life. See the MnDOT Roadside Vegetation Management website for more information on the functions and benefits of roadside vegetation.

Why we Plant Native Vegetation

Vegetation performs these infrastructure functions best when it is well-adapted to its growing conditions and resilient to weather extremes. These characteristics of local adaptation and resilience are best accomplished through the use of diverse native plants and seed mixes. MnDOT seeding standards emphasize native vegetation in all areas that do not need to be mowed more than once per year. Turfgrass (grasses that get mowed like a lawn) or other non-native seed mixes are used in areas that require more frequent mowing. For more information, see page 18 in the Seed Mixtures section.

About this Manual

This seeding manual provides information on topsoil, seed mixtures, planting and establishment. Each topic includes information for design and construction, with construction covering installation and establishment. The design information for some topics is located in Chapter 13 of the MnDOT Facility Design Guide (FDG), and in those cases cross-references are provided.

Information previously located in the MnDOT District Vegetation Establishment Recommendations (also known as Turf Letters) is now incorporated into this manual and the FDG. Information on seed mixes, topsoil, soil amendments, and establishment maintenance is in this manual. Design information on erosion control is in the FDG.

This manual contains standards for the design, installation, and establishment of seed and related work. These standards are to be followed unless site-specific conditions justify variation from those standards. This manual is maintained by the MnDOT Office of Environmental Stewardship Erosion and Stormwater Management Unit. Updates to the manual will be made available for review by the MnDOT Office of Environmental Stewardship, District Environmental Coordinators, Materials Engineers, Design Engineers, Hydraulics Engineers, Resident Engineers, and erosion control industry representatives. Comments from the review will be addressed and changes will be considered before the final draft is posted. The revision will be effective starting when it has been posted on the MnDOT Erosion Control website.

Quick References

Typical Seed Mix Layouts – See Figures 9 through 14

Pay Items related to vegetation establishment – see Appendix C

Planting Dates and relating them to current conditions

Vegetation types – a visual guide for what to expect

Topsoil and Soil Amendments

Design

See Chapter 13, Sections I and J of the FDG for information about specifying topsoil types and quantities. See Chapter 13, Section J.5.9 of the FDG for information about specifying soil amendments.

Construction

The foundation of a healthy stand of vegetation is quality topsoil and the preparation of the soil to receive seed. All topsoil should be salvaged and retained on site for use in vegetation establishment. The Specifications call for different topsoil materials that are required for vegetation establishment which may consist of simply re-using on site topsoil, amending existing topsoil which is of poor or marginal quality or importing topsoil or topsoil blends from off site. The type of topsoil used on the site will vary depending on the conditions of the site as well as where the topsoil will be placed, and the type of vegetation proposed to be established. For example, in a filtration/infiltration basin, a Filter Topsoil Borrow will be required that meets the project specifications and will perform as needed in a storm water basin system and also support vegetation. Boulevard topsoil borrow is a blend of loam soil, sand and compost intended to provide a high-quality landscape media which meets the performance needs of urban landscapes.

Topsoil Testing

The importance of topsoil testing has been emphasized in this manual for determining the need for soil amendments and fertilizer and determining the application rates. The quality of the topsoil testing results depends largely on the quality of the sample and to make sure the sample is representative of the topsoil on the site. It is important not to take a “grab” sample from one location but to take a composite sample from a number of locations to get better representation of the topsoil on the site. The best way to do this is to take a number of subsamples consisting of a small scoop of soil and combining these in a clean container. If samples are taken from a stockpile, make sure to take samples from numerous locations in the stockpile and from both upper, middle and lower sections to get good representation. If sampling from the ground before topsoil is removed, take samples from the upper 6 inches or less if the topsoil thickness is less and take subsamples from a random meandering pattern of the area where topsoil is to be used on the site. Once the subsamples are all taken, thoroughly mix the samples to make a good representative composite sample. The composite sample size to be submitted to the testing lab should consist of 2 to 3 cups of topsoil. MnDOT routinely uses the University of Minnesota Soil Testing Lab for topsoil testing. Their contact info is shown below:

University of Minnesota

Soil Testing and Research Analytical Laboratory

135 Crops Research Building

1902 Dudley Avenue

St. Paul, MN 55108

(612) 625-3101

soiltest@umn.edu

When submitting the topsoil sample fill out the "Soil Analysis Request Sheet for Lawn, Garden and Landscape" and include this with your soil sample. Request the "Regular Test" analysis which includes percent organic matter, phosphorus, potassium, pH (lime requirement), estimated soil texture and fertilizer recommendations. There are also additional tests that can be requested including micronutrients and soluble salts which can be important if you suspect the topsoil may have been exposed to road salts. Testing is usually completed within 7 to 14 days. A sample Soil Test Report is shown below.

Figure 1: Example soil test report

University of Minnesota
Soil Testing Laboratory

SOIL TEST REPORT
Lawn and Garden

Client Copy
Department of Soil, Water, and Climate
Minnesota Extension Service
Agricultural Experiment Station

MN DOT DISTRICT 3
WARREN TUEL
395 JOHN IRELAND BLVD
ST PAUL MN 55155

Page 1
Report No. 83551
Laboratory No. 164942
Date Received 09/16/22
Date Reported 09/30/22

Sample/Field Number: NTS1

SOIL TEST RESULTS

Estimated Soil Texture	Organic Matter %	Soluble Salts mmhos/cm	pH	Buffer Index	Nitrate NO3-N ppm	Olsen Phosphorus ppm P	Bray 1 Phosphorus ppm P	Potassium ppm K	Sulfur SO4 -S ppm	Zinc ppm	Iron ppm	Manganese ppm	Copper ppm	Boron ppm	Calcium ppm	Magnesium ppm	Lead ppm
Coarse	2.0		8.1			19	29	126									

INTERPRETATION OF SOIL TEST RESULTS

Phosphorus (P) PPPPPPPPPPPPPPPPPPPPP
5 Low 10 15 Medium 20 High 25 V. High

Potassium (K) KKKKKKKKKKKKKKK
25 Low 75 125 Medium 175 High 225 V. High

pH ***********
3.0 4.0 5.0 Acid 6.0 7.0 Optimum 8.0 9.0 Alkaline

Soluble Salts
0 1.0 2.0 Satisfactory 3.0 4.0 Possible Problem 5.0 6.0 7.0 8.0 9.0 10.0 Excessive Salts

RECOMMENDATIONS FOR: Before seeding or sodding

LIME RECOMMENDATION: 0 LBS/1,000 SQ.FT.
Grass not watered Clippings not removed
TOTAL AMOUNT OF EACH NUTRIENT TO APPLY PER YEAR:*

NITROGEN	PHOSPHATE	POTASH
1 LBS/1,000 SQ.FT.	1 LBS/1,000 SQ.FT.	2 LBS/1,000 SQ.FT.
44 LBS/ACRE	45 LBS/ACRE	90 LBS/ACRE

THE APPROXIMATE RATIO OR PROPORTION OF THESE NUTRIENTS IS: 10-10-20

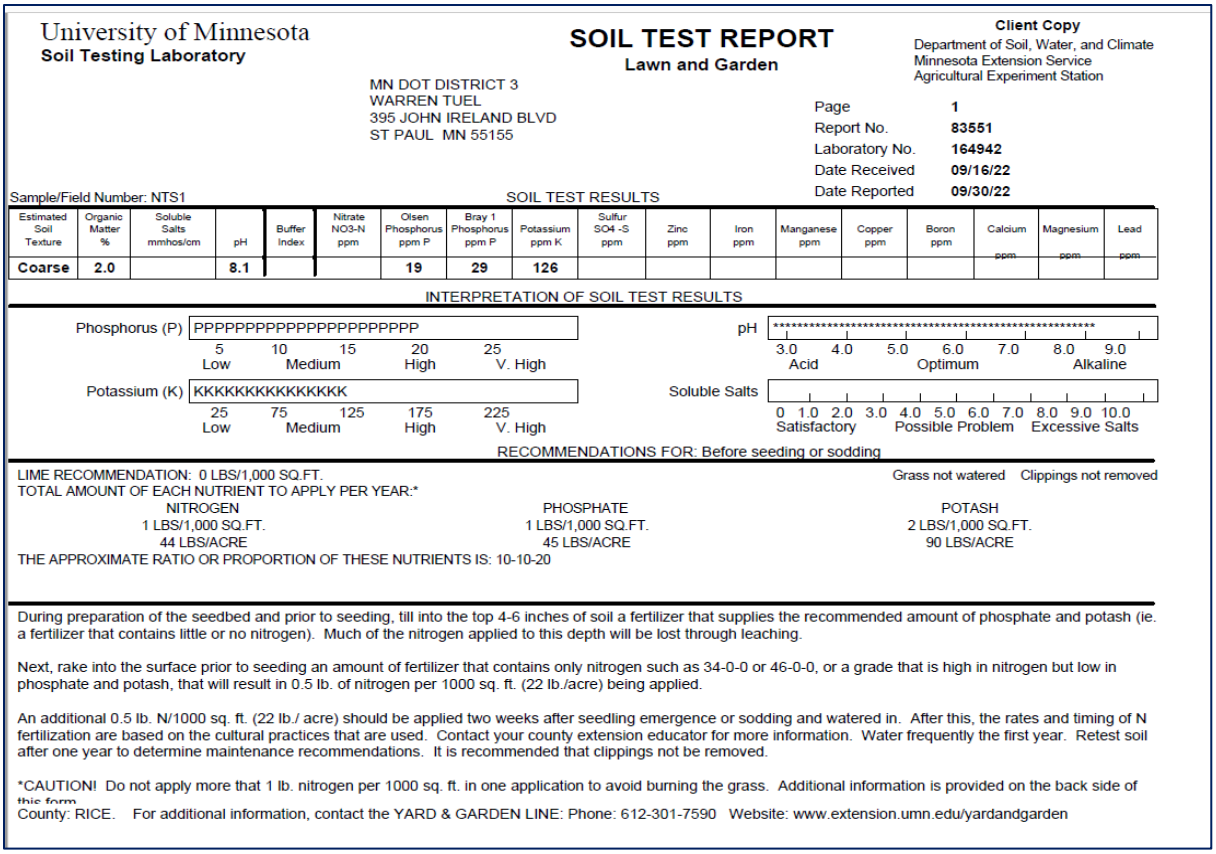
During preparation of the seedbed and prior to seeding, till into the top 4-6 inches of soil a fertilizer that supplies the recommended amount of phosphate and potash (ie. a fertilizer that contains little or no nitrogen). Much of the nitrogen applied to this depth will be lost through leaching.

Next, rake into the surface prior to seeding an amount of fertilizer that contains only nitrogen such as 34-0-0 or 46-0-0, or a grade that is high in nitrogen but low in phosphate and potash, that will result in 0.5 lb. of nitrogen per 1000 sq. ft. (22 lb./acre) being applied.

An additional 0.5 lb. N/1000 sq. ft. (22 lb./ acre) should be applied two weeks after seedling emergence or sodding and watered in. After this, the rates and timing of N fertilization are based on the cultural practices that are used. Contact your county extension educator for more information. Water frequently the first year. Retest soil after one year to determine maintenance recommendations. It is recommended that clippings not be removed.

*CAUTION! Do not apply more that 1 lb. nitrogen per 1000 sq. ft. in one application to avoid burning the grass. Additional information is provided on the back side of this form.

County: RICE. For additional information, contact the YARD & GARDEN LINE: Phone: 612-301-7590 Website: www.extension.umn.edu/yardandgarden



University of Minnesota
Soil Testing Laboratory

SOIL TEST REPORT
Lawn and Garden

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Department of Soil, Water, and Climate
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Soil Amendments

Amendments may be used to supplement deficiencies in the soil or planting medium. It is recommended to sample topsoil or growth medium to determine organic matter content and any lacking macro or micronutrients. The University of Minnesota Soil Testing Lab provides soil testing services that includes percent organic matter, pH, nutrient content and soluble salts, which is very useful for selecting appropriate species for seed mixes. Agronomic labs throughout Minnesota are also a good option to test the quality of topsoil. Soil test results will also include fertilizer recommendations to determine rates and formulations of fertilizer to use during vegetation establishment. Disturbed and imported topsoil along MnDOT corridors are most typically lacking in the organic matter % and bulk density (overcompaction) portion of the soil health spectrum. MnDOT seed mixes typically respond well to healthy soil with adequate organic matter (greater than 3%), carbon content (23:1 C:N ratio) and healthy soil microorganisms (high mycorrhyzae counts preferred over high bacteria counts) that provide an environment where healthy vegetation stands a better chance of competing with weeds. A number of soil amendments are available in the marketplace which focus' on the organic matter/texture, living organisms, bulk density portion of soil health. Examples include bio stimulants and plant growth supplements comprised of compost and other organic soil building byproducts, mycorrhizae and soil bacteria to restore a healthy soil microbiome, biochar to provide habitat for soil microorganisms as well as a variety of organic, slow-release fertilizer products.

Soil amendments are typically added to the soil during seed bed preparation. It is important to till the soil amendment into the soil surface to avoid fertilizer runoff as well as to place the material into the root zone. The use of soil amendments promotes soil health at the time of planting and is beneficial to promoting a healthy soil

ecosystem which greatly promotes a more vigorous stand of vegetation over time. Soil amendments such as compost or organic fiber matrix may be top-dressed onto the surface where vegetation has already been planted but is not doing well due to poor organic matter content.

Compost and Other Organic Soil Amendments

Topsoil that is considered to be of low quality (organic matter less than 3 percent) may be amended as part of the topsoil preparation process. Topsoil may be amended with compost or other organic materials to improve the soil organic matter content. Other soil amendments such as biochar or other proprietary soil amendments intended to increase soil organic matter and/or enhance soil biological activity may be added to topsoil prior to installing seed. Topsoil blending or adding of amendments is typically accomplished by adding the soil amendment to the surface of the installed topsoil and shallow disking this material into the topsoil at a depth of typically less than 6 inches.

There are currently 3 types of compost allowed on MnDOT projects in accordance with Specification Section 3890. Grade 1 compost is a product that is derived from animal material and animal byproducts. Grade 2 compost is derived from the decomposition of leaves, yard waste and source separated organic material (SSOM) food waste. Grade 3 compost is a blend of Grades 1 and 2 with no more than 10 percent consisting of Grade 1 compost.

Lime

Topsoil may also need to have soil amendments added to promote vegetative growth. Lime (Specification 3879) is helpful in establishing vegetation in acidic soils. Lime recommendations are typically based on the results of soil test pH results. Soils that have a pH less than 6.3 may require lime application to increase the potential for nutrient availability and plant growth. A typical application rate is 2 tons per acre of agricultural lime. Provide a lime application pay item for all areas where plans call for permanent vegetation establishment and where lime is specified as a soil amendment. The pay item for lime application is by the weight (Ton).

Fertilizer

Type

Verify the fertilizer type for the project per 3881:

Type 1 – Commercial Fertilizer

- Consists of dry granulated nutrients produced by mining and manufacturing processes and commonly used in the agricultural or lawn care industries.
- Don’t accept Type 1 fertilizer when Types 3 or 4 are required. Type 1 is cheaper and easier to find but may cause harm to surface waters in some situations.

Figure 2: Fertilizer label for product containing 20% nitrogen, 10% phosphorous, and 20% potassium. This is a Type 1 fertilizer (commercial).

Type 1 Fertilizer **20-10-20**	
GUARANTEED ANALYSIS	
Total Nitrogen (N)*.	20 %
7.7% ammoniacal nitrogen 12.23% nitrate nitrogen	
Available Phosphate (P2O5)	10 %
Soluble Potash (K2O)	20 %
Plant nutrient derived from: ammonium nitrate, potassium phosphate, potassium nitrate.	

Type 2 - Phosphorus Free Fertilizer

- Commercial fertilizer that contains no phosphorus. The analysis will have a zero for the middle number, such as 16-0-8.

Type 3 – Slow Release Fertilizer

- Specifically processed to release nitrogen at a slow rate. The primary nitrogen sources shall be in a coated, prilled urea form.
- Type 3 fertilizer is used with native seed mixes unless adjacent to surface water. Separation distance from a surface water may be variable and dependent on site topography and soil conditions.
- Label must state that at least 70% of the nitrogen component is slow-release water-insoluble nitrogen.

Figure 3: Sample fertilizer label showing 17% nitrogen, with at least 70% of the nitrogen (12.5%) slowly available.

Type 3 Fertilizer **17-18-28**	
GUARANTEED ANALYSIS	
Total Nitrogen (N)*.	17 %
4.5% Nitrate Nitrogen 12.5% Urea Nitrogen	
Available Phosphate (P2O5)	18 %
Soluble Potash (K2O)	28 %
Plant nutrient derived from: potassium nitrate, potassium phosphate, polymer-coated urea.	

Type 3 Fertilizer 17-18-28
GUARANTEED ANALYSIS
*12.5% Controlled release nitrogen from polymer-coated urea

Type 4 – Natural Based Fertilizer

- Fertilizer in which more than half of the fertilizer material is natural. Fertilizer shall be free of uncomposted organic matter, sewage sludge or raw manure.
- Type 4 fertilizer is typically used near surface water and stormwater treatment basins.

Analysis

Fertilizer is based on 3 primary nutrients as a percentage of the bag plus minerals and inert material making up the remainder. These 3 nutrients are Nitrogen (N), Phosphorus (P), and Potassium (K) and are shown as an N:P:K ratio. This ratio is also known as the fertilizer analysis.

Make sure the fertilizer analysis is correct for the project - Nitrogen(N):Phosphorus(P):Potassium(K) for example: 22-5-10 “Guaranteed Analysis” on label.

Rate

The fertilizer application rate is based on pounds of nitrogen per acre. It is determined by the plan or from site-specific soil test results. Verify with the contractor that they are applying the rate stated on the plan or the recommendation from the soil test report.

Quality Control

The label should include the name brand or trademark, guaranteed chemical analysis and the net weight of the fertilizer in the container.

Make sure the fertilizer is dry and not clumping in the container.

Installation

Fertilizer and other soil amendments should be added to the soil before seed bed preparation. Till the soil at least once within 24 hours of adding soil amendments. This places the fertilizer in the root zone and takes the fertilizer off of the soil surface where it may be lost as runoff. Seed no more than 48 hours after fertilizing.

If the contract allows, adding ½ the recommended rate at time of seeding is ideal to maximize nutrient uptake. Six to 8 weeks later after seed germination and emergence, application of the second ½ recommended rate occurs, typically by hydro-application.

Soil Preparation

Design

See the Chapter 13J of the FDG for design information regarding soil preparation.

Note that soil bed preparation is often needed for temporary stabilization, so Appendix 3 Seeding and Vegetation Establishment Pay Items says to estimate 1.5 acres of soil bed prep for every 1 acre of soil disturbance.

Construction

Subsoiling

Soil preparation is the first step in the vegetation establishment process, and this begins even before topsoil is placed by a process called “subsoiling”. Areas of the site that are used for material staging, equipment storage and temporary haul or access roads typically become compacted and must be decompacted by subsoiling before topsoil is placed. Decompaction is typically performed by operating deep disc rippers, in-line subsoiler implements, subsoil shanks or other equipment to decompact the subsoil. Decompaction will promote deeper root penetration especially for native seed mixes and will also promote storm water infiltration and storm water retention for plant use.

Figure 4: Subsoiling rippers attached to a dozer (left) and a backhoe arm (right). Note tracked vehicles which reduce harmful soil compaction.

Preventing Compaction

Minimize additional compaction after subsoiling by keeping equipment off of soil when it is saturated and also be using equipment with tracks or low ground pressure tires.

Tillage

Soil bed preparation consists of preparing the topsoil for seed and is done by disking or plowing the soil to a minimum depth of 3 inches (preferred depth 5 to 6 inches). The primary goals of seed bed preparation are to control weed species and to provide ideal growing conditions for seed to be installed. Tillage also incorporates fertilizer and other soil amendments and loosens soil to improve moisture retention. On sloped sites, all

equipment operations for tillage should be performed across the contour (versus up and down the slope) to help minimize erosion. Where large clods are present, culti-packing or rolling may be required before seeding to ensure uniform seeding depth and good seed to soil contact. Avoid doing seed bed preparation in excessively wet conditions as this may adversely affect the soil structure.

Figure 5: Seed bed preparation with a chisel plow.

Figure 6: Seed bed preparation in median insplope. Note vehicle tires which may increase potential harmful soil compaction.

Figure 7: Soil conditioner attachment for clod removal and soil tillage. Note tracked vehicles which reduce harmful soil compaction.

When tillage is not possible

There may be times where the topsoil is too wet for seed bed preparation. When the soil is too wet, attempting to prepare the seed bed with conventional tillage equipment may actually do more harm to the soil structure than doing nothing at all. Soils are too wet when they are at field capacity (saturated) or when they are significantly above the optimum moisture content. When the soil is too wet for proper soil bed preparation it is recommended to remove clods and lumps from the surface using small low ground pressure equipment or hand tools. Seed applied to the wet surface will inherently stick to the soil assuring good seed to soil contact even without the desired seed burial depth being achieved. Application of mulch or REPP must be completed after seeding but this may need to be installed using hand equipment or small equipment that will not sink into the wet soil or otherwise damage the soil structure.

Tillage may also not be possible in areas where slopes are too steep to safely operate conventional tillage equipment. In these cases, it is best to hydroseed with a hydraulic mulch product as soon as possible to prevent erosion from rain events. Where it is not possible to till the soil, it is recommended that the seed be applied immediately after grading to make good seed to soil contact before the soil dries or forms a crust.

If soils are too rocky for tillage equipment, the best approach would be to add suitable topsoil. If topsoil is not possible because the slope is too steep, some form of organic amendment should be included with the seed. Two approaches would be to blow on compost with seed in the top layer, or apply seed mixed with Organic Fiber Matrix using a hydroseeder. In either of these cases a hydraulic mulch should be applied after seeding.

Seed Mixtures

The seed mixtures described in MnDOT's Standard Specifications for Construction will be specified and used on construction projects.

The seeding rates in MnDOT seed mixes are for initial erosion control and roadside vegetation establishment. The rates are higher than rates used for conservation and other non-roadside native plantings since roadside plantings typically involve less ideal growing conditions.

Design

The following information replaces content in FDG Chapter 13J.5.3 and 13J.5.4.

Provide both a seeding pay item and seed mixture pay items for all temporary and permanent seeding operations.

Choosing Seed Mixtures

MnDOT seed mixtures all contain a diversity of species that are selected for their roadside setting and intended function. Native seed mixes are used in all areas that do not require mowing more than once per year. Non-native roadside mixes are used where two or more mowings are needed, such as the top cut swath on inslopes and typical medians. Turfgrass mixes and sod are used where lawn-type grass is needed, such as on boulevards.

It is normal to have three or more seed mixtures on a single project because each seed mixture is designed to fit particular portions of the roadside.

Figure 8: Example of multiple seed mixtures in use on a single project

Figures 9-14 and Table 1 show standard seed mixes to use in most roadside settings. Follow these standards unless site-specific conditions require exceptions to the rule. See Appendix C for pay items for seed and other components of vegetation establishment.

Exceptions to these standards could be required for the following reasons. Contact the Erosion and Stormwater Management Unit in OES to discuss the situation and whether custom seed mixes are needed.

- a roadside adjacent to a rare native plant community
- a project adjacent to or within tribal reservation or other trust land boundaries, or within treaty ceded territories where hunting and gathering rights are part of the treaty rights
- conditions that are particularly challenging for vegetation establishment

Typical Layouts

Figure 9: Typical Seed Mix Section for Rural Areas - Districts 1, 2(east), 3A

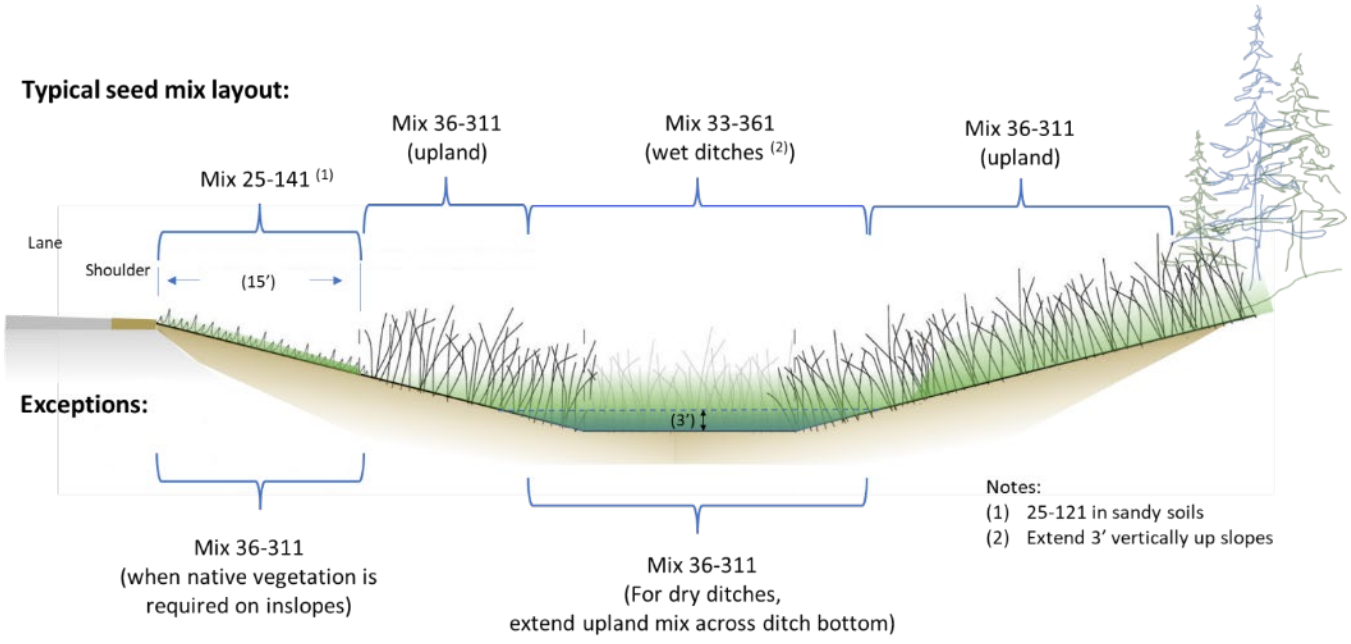


Figure 10: Typical Seed Mix Layout for Rural Areas - Districts 1, 2(east), 3A

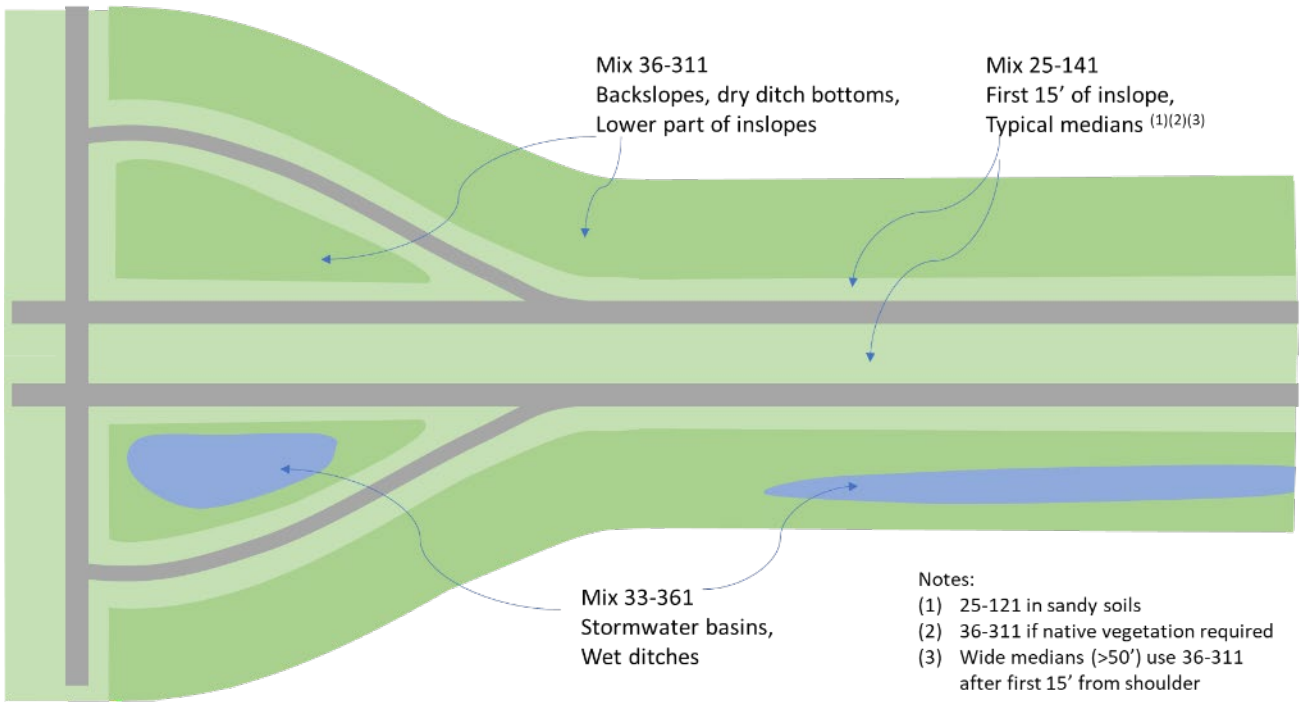


Figure 11: Typical Seed Mix Section for Rural Areas - Districts 2(west), 3B, 4, 6, 7, 8, Metro

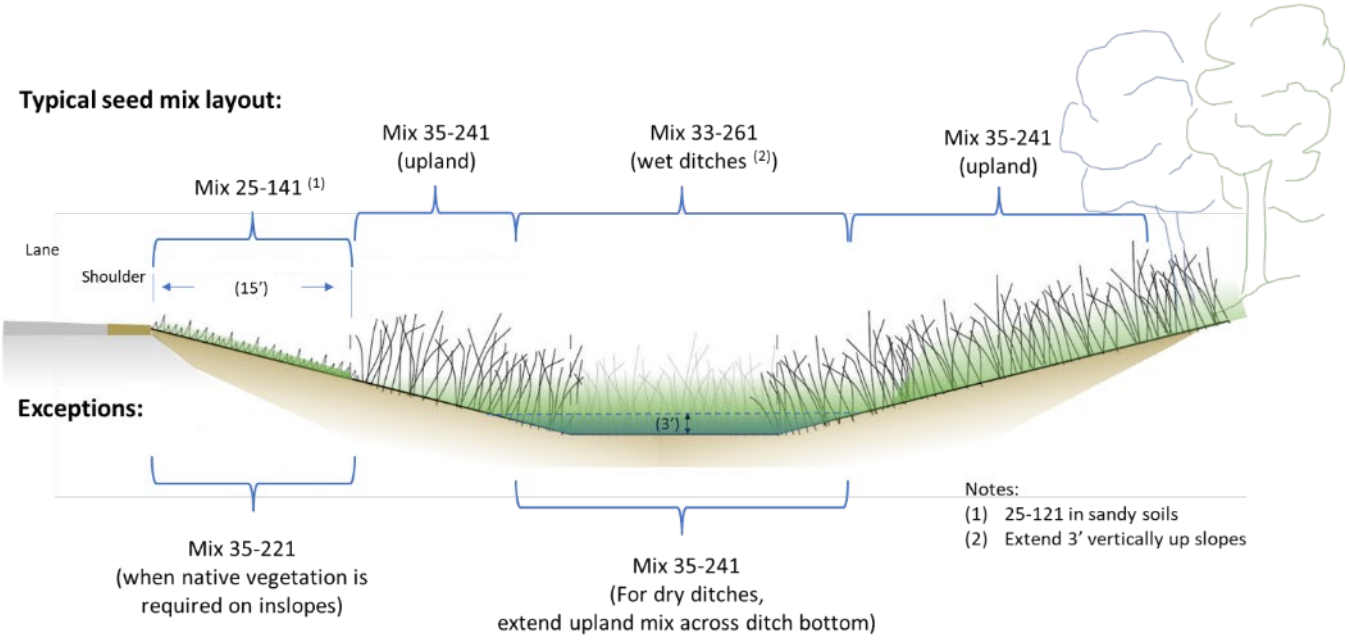


Figure 12: Typical Seed Mix Layout for Rural Areas - Districts 2(west), 3B, 4, 6, 7, 8, Metro

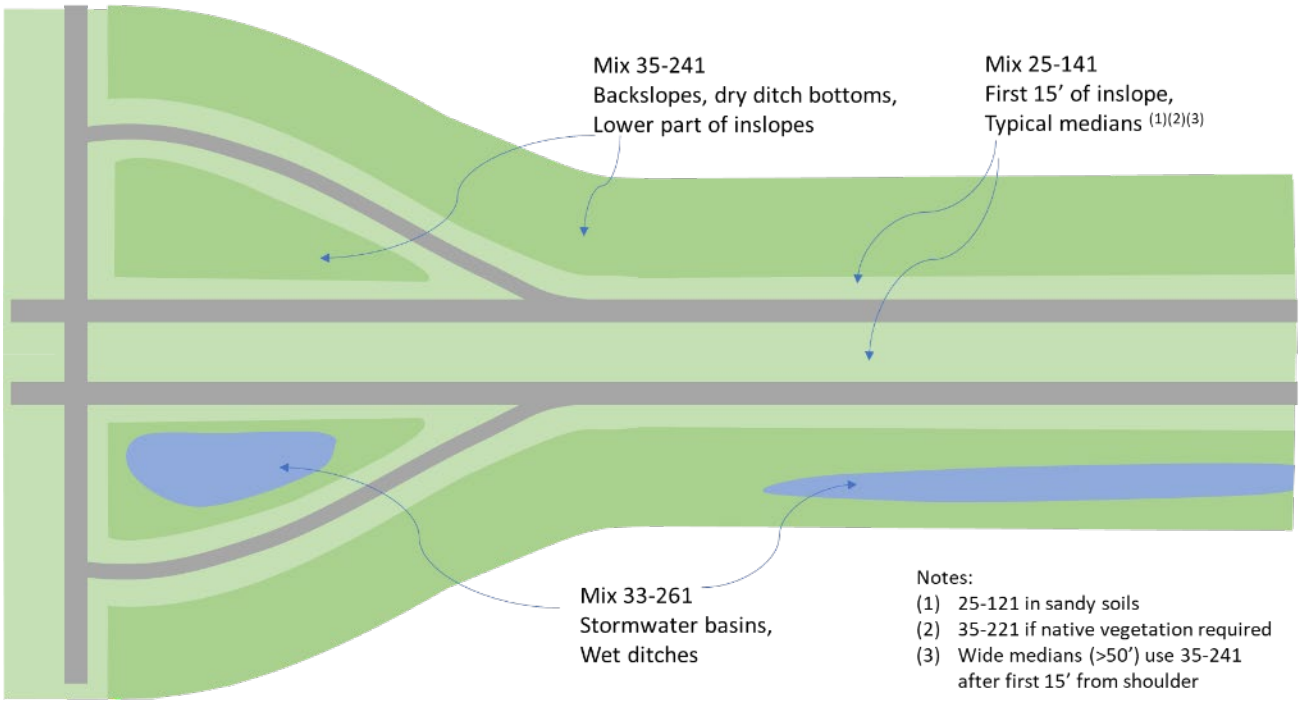


Figure 13: Typical Seed Mix Section for Urban Areas - Statewide

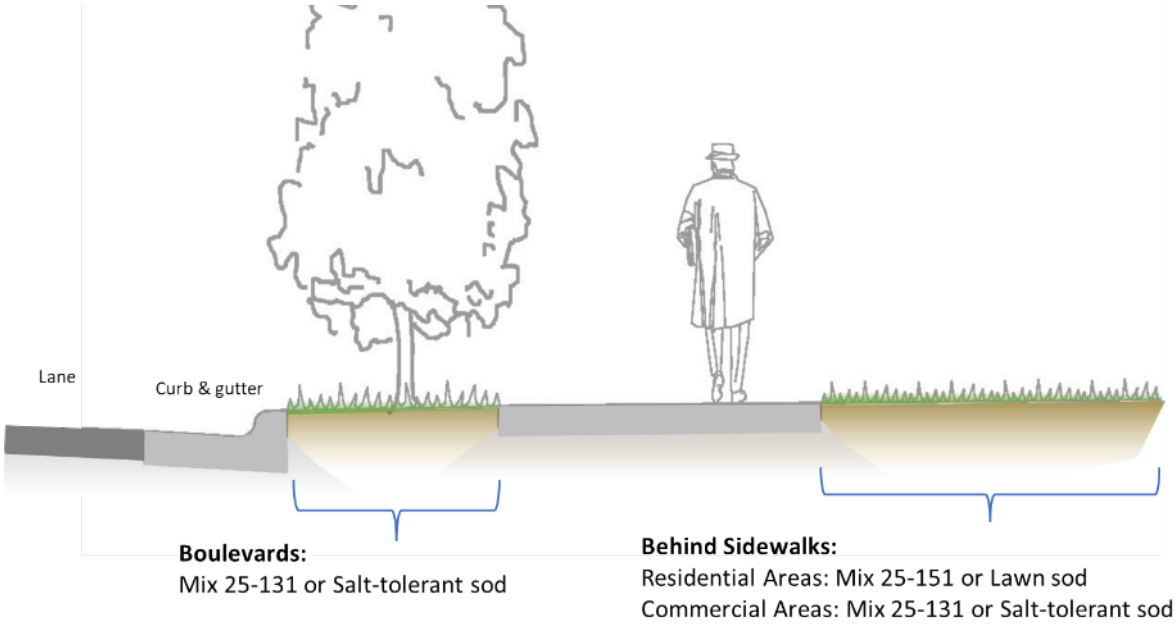


Figure 14: Typical Seed Mix Layout for Urban Areas - Statewide

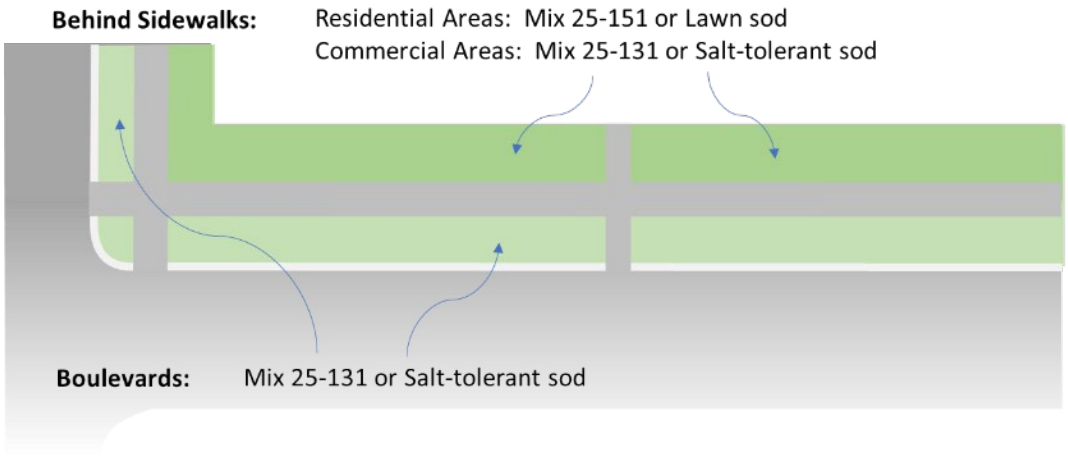


Table 1: Uses of all 20 standard MnDOT seed mixtures, including temporary and shade-tolerant mixtures

Purpose	District	Mixture	Pounds/ acre*
Temporary: Fall cover less than 1 year	Statewide	21-112	100
Temporary: Spring cover less than 1 year	Statewide	21-111	100
Temporary: less than 1 year on poor soils	Statewide	21-113	110
Temporary: 1-2 years	Statewide	22-111	30.5
Temporary: 2-5 years	Statewide	22-112	40
Temporary: 1+ years where native vegetation is used for permanent seeding	Statewide	32-241	38
Inslopes and regularly mowed areas in sandy soils	Statewide	25-121	61
Inslopes & regularly mowed areas	Statewide	25-141	59
Frequently mowed commercial areas and on boulevards	Statewide	25-131	220
Frequently mowed residential areas	Statewide	25-151	200
Backslopes and ditch bottoms in western and southern MN	2(west), 3B, 4, Metro, 6, 7, 8	35-241	36.5
Backslopes and ditch bottoms in western and southern MN where shorter vegetation is required.	2(west), 3B, 4, Metro, 6, 7, 8	35-221	36.5
Backslopes and ditch bottoms north-central and northeast MN	1, 2(east), 3A	36-311	33.5
Stormwater Ponds and wet ditch bottoms in Southern and Western MN	2(west), 3B, 4, Metro, 6, 7, 8	33-261	35
Stormwater ponds and wet ditch bottoms in Northeast MN	1, 2(east), 3A	33-361	35
Shady wet areas for culvert or bridge work in western & southern MN	2(west), 3B, 4, Metro, 6, 7, 8	34-261	31.5
Shady wet areas for culvert or bridge work in northeast MN	1, 2(east), 3A	34-361	31.5
Shady backslopes and ditch bottoms in southern and western MN	2(west), 3B, 4, Metro, 6, 7, 8	36-211	34.5
Shady backslopes and ditch bottoms in Northwest MN	2(west)	36-411	35.5
Shady backslopes and ditch bottoms in Central MN	2(east), 3B	36-711	35.5

* Seeding rates are based on Pure Live Seed (PLS) rates not bulk seed rates.

All areas are assumed to be full sun unless otherwise stated as shady

Why MnDOT uses native seed mixes

There are a number of advantages to using native seed mixes on MnDOT projects. Native vegetation is generally more tolerant of different soil types and soil moisture conditions and there is much greater species diversity in native seed mixes compared to the non-native turfgrass seed mixes. Native plants have greater root depth which makes them more drought tolerant than turf grasses and the deeper root structure also results in greater infiltration rates in established stands of native vegetation so there is a resulting stormwater treatment benefit to native vegetation. Other stormwater treatment benefits include but are not limited to greater filtration of sediments and reduction of storm water flow rates by retaining precipitation on the landscape and promoting infiltration. This also contributes to groundwater recharge.

Benefits from a management standpoint include cost savings resulting from the reduced maintenance needs of established native vegetation. There are maintenance needs in the first three to five years after planting that are needed to assure establishment success that include mowing, weed management and possibly some prescribed burns but, over time, native stands generally save maintenance costs by not requiring the mowing that turf grasses need and better drought resilience.

Native vegetation also has wildlife habitat benefits in that it provides habitat and food sources for beneficial wildlife such as insects, birds and some mammals. Planting native seed mixes on linear projects also creates native plant corridors and ecosystem connectivity that benefit plant and wildlife populations. Installation of native plantings especially along linear corridors such as roadways provides ecosystem connectivity. Native mixes may also be a requirement imposed by regulators via permit conditions, funding, and/or other forms of project authorization.

Native vegetation also promotes soil health since the deeper root systems that reduce erosion also benefit the soil by adding soil organic matter. This feeds soil microorganisms such as soil bacteria and fungi which play a key part in contributing to soil health and nutrient availability to plants. This system of soil health also increases the soil's ability to retain nutrients by biomass degradation and the ability to cycle nutrients with plants, reducing the need for fertilizing right of ways.

Construction

Seed Quality Control

Seed used on MnDOT projects must meet certain quality control standards to assure that high quality viable seed is installed. When seed arrives on a site the seed tags should be inspected to make sure the seed meets MnDOT specifications and is the correct mix for the project.

Seed Storage

If seed is not planted soon after being delivered to the site, care must be taken to store the seed properly to protect the viability of the seed. Seed should be stored at a temperature less than 70 degrees Fahrenheit and at relatively low humidity. A good rule of thumb is to store the seed at a temperature and humidity that equals less than 100. For example, 60 degrees Fahrenheit and 40 percent humidity. Care should also be taken to store seed away from exposure to rain and direct sunlight as well as rodents and insects.

Seed Tags on MnDOT Projects

Seed used on MnDOT projects must be labeled with an "Approved Seed Vendor Tag" (3876.2 (1)). This tag offers assurance that the vendor has complied with MnDOT specs as verified by the Minnesota Crop Improvement Association. Look for this tag on all packages of seed on a MnDOT project. There should be a unique serial number on each tag.

Figure 15: Approved Vendor tag must be attached to all seed bags. Digitally photo record all "Approved Seed Vendor Tags" labels.

Despite the assurance provided by this tag, mistakes can still happen. Look for the following on seed labels:

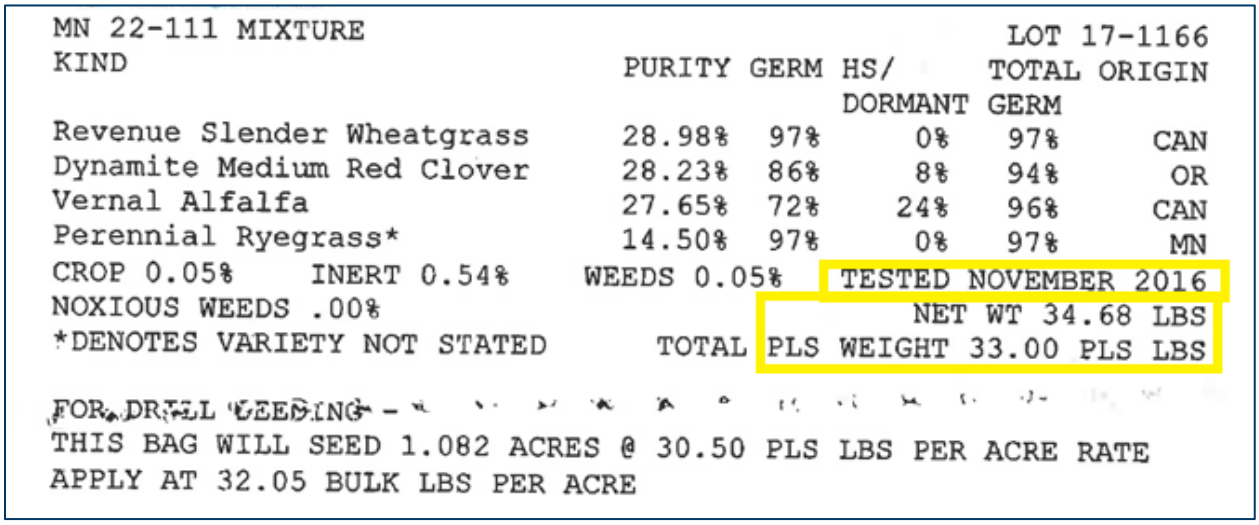
PLS weight:

- PLS stands for Pure Live Seed and is the actual viable seed in a bag, as opposed to the net weight (also known as bulk weight), which includes live seed as well as empty seed, chaff, etc.
- MnDOT pays for PLS weight, not net weight (3876.2 (4))
- PLS weight should always be smaller than net weight.

Germination Test Date and Coverage Area:

- MnDOT requires that seed be planted within 12 months of the test date.
- Area Covered: this is required on MnDOT seed labels and is provided for the convenience of installers and inspectors.

Figure 16: Example seed label. Test date should be within 12 months and PLS weight should be less than bulk weight.



MN 22-111 MIXTURE LOT 17-1166

KIND	PURITY	GERM	HS/ DORMANT	TOTAL GERM	ORIGIN
Revenue Slender Wheatgrass	28.98%	97%	0%	97%	CAN
Dynamite Medium Red Clover	28.23%	86%	8%	94%	OR
Vernal Alfalfa	27.65%	72%	24%	96%	CAN
Perennial Ryegrass*	14.50%	97%	0%	97%	MN

CROP 0.05% INERT 0.54% WEEDS 0.05% TESTED NOVEMBER 2016

NOXIOUS WEEDS .00% NET WT 34.68 LBS

*DENOTES VARIETY NOT STATED TOTAL PLS WEIGHT 33.00 PLS LBS

FOR DRILL SEEDING -

THIS BAG WILL SEED 1.082 ACRES @ 30.50 PLS LBS PER ACRE RATE

APPLY AT 32.05 BULK LBS PER ACRE

Partial bags of seed

If a contractor ends up with a partial bag of seed and asks to be paid for the portion that was used, do one of the following (in order of preference):

1. Have the contractor plant it all, if possible.
2. Take the partial bag and label. Have the contractor use it up next time they come to plant or if they need to reseed areas that did not take hold. Make sure the seed is stored at the proper temperature and humidity as described above.
3. Mark the tag with the remaining weight, give a copy to the contractor, and pay for what was used.

Expired seed

Seed should be planted within 12 months of the test date, according to MnDOT specs. Unexpected delays can result in seed that is just beyond the 12 months. Use the following approach for seed that is up to three months beyond the test date.

Plant the seed at an increased seeding rate – use 110% seeding rate for seed that is 1 month old, 120% of seeding rate if seed is 2 months old, and so on. Write a change order directing the increased seeding rate. The increased seeding rate should be done at no additional cost to MnDOT if the planting delays were caused by the contractor. Otherwise, MnDOT should pay for the additional seed.

Do not accept seed that is more than 15 months beyond the test date, as this may be a violation of state seed law.

Seeding

Design

Temporary Seeding

Use Rapid Stabilization Method pay items for temporary seeding on areas less than 2.0 acres, near water, areas where stormwater leaves project limits or enters a water of the state, and locations labeled as Areas of Environmental Sensitivity:

- Do not specify a seed mixture with Rapid Stabilization Methods. Seed is already included in the method.
- Indicate these rapid stabilization areas on the temporary erosion control plan.
- The type of seed and mulch used in rapid stabilization methods are defined in Spec 2575 but can be changed (in design or change order) to meet project-specific conditions.

Use the seeding pay item for temporary seeding on areas larger than 2.0 acres. Soil bed prep, fertilizer, soil amendments, and erosion prevention products all need to be specified as separate pay items.

Permanent Seeding

For permanent seeding on areas smaller than 2.0 acres, use the pay item Turf Establishment Lump Sum. This pay item includes the seed mixture 25-141. Add a note to the SEQ if the seed mixture needs to differ from the standard seed mixture.

Use the seeding pay item for permanent seeding areas larger than 2.0 acres. Subsoiling, soil bed prep, fertilizer, other soil amendments, and erosion prevention products all need to be specified as separate pay items.

Construction

Planting Dates for Seeding and Sodding

Specification 2575 lists planting dates and sodding dates that dictate when seed and sod should and shouldn't be planted on construction projects. These dates are based on typical seasonal weather patterns in Minnesota.

Table 2: Specification 2575 Planting Dates

Seed Mix or Sod Type	Spring Planting Dates	Fall Planting Dates
21-111	May 1 – Aug, 1	---
21-112	---	Aug. 1—Oct. 1
22-111, 22-112*	April 1 – July 20.	July 20 – Oct. 20
25-121, 25-131, 25-141, 25-151*	April 1 – June 1	July 20 – Sept. 20
25-142*	April 1 – Sept. 1	—

Seed Mix or Sod Type	Spring Planting Dates	Fall Planting Dates
Any mix beginning with a 3	April 15 – July 20	Sept. 20 – Oct. 20
Lawn Sod	April 15 – June 10	Aug. 10 – Nov. 1
Salt Tolerant Sod	April 15 – June 10	---

***For areas in Minnesota north of and including U.S. Highway 2, plant non-native seed mixtures (those beginning with 22- or 25-) from April 15 to September 20.**

The contractor is required to coordinate erosion prevention activities including vegetation establishment as part of the weekly erosion control look-ahead schedules (Specification 1717.2B). One objective of this coordination is to make sure that planting happens at a suitable time of year (2575.3A.2). However, the ideal planting times do not always line up with construction schedules, weather, and Construction Stormwater Permit (CSW Permit) timelines.

This document explains how to apply the standard seeding and sodding dates and when to allow exceptions to them. Seeding and sodding are collectively referred to as planting, and the specified seeding and sodding dates are referred to as standard dates or planting dates for the purpose of this document.

When to follow planting dates

Follow the planting dates listed in 2575 whenever the weather appears to have been following typical seasonal patterns and is predicted to continue following normal patterns. Use official weather observations and long term forecasts to assess conditions or contact OES ESM Unit Staff for assistance.

Do not allow planting outside of the planting dates when either of the following apply:

- Areas can be temporarily stabilized and will remain accessible by tillage and planting equipment when planting dates resume.
- The project area is experiencing normal summer conditions or moderate drought, as defined by official weather observations and long-term forecasts.

Adjustments to Planting Dates

Specification 2575 allows planting dates to be shortened or extended by up to ten days. This decision should be based on official weather observations and long-term forecasts. Shorten the dates for unseasonably hot and dry weather. Extend the dates if weather has been unseasonably cool and/or rainy and is predicted to continue being rainy.

Provide written documentation of the reason for adjusting planting dates. Written documentation can include paper, email, or weekly construction meeting minutes if the minutes are distributed to all parties after the meeting.

Temporary Stabilization

Soil stabilization of some form must follow Construction Stormwater Permit timeframe requirements, regardless of the time of year. If stabilization is required outside of planting dates, use a temporary stabilization method to prevent erosion until the next available planting period. For small areas (less than two acres), use a rapid stabilization method (2575.3M). For larger areas, use the plan defined stabilization method suitable to the

conditions. Use the change order template for temporary stabilization if no temporary stabilization pay items are included in the plan.

Till, plant, and re-stabilize these areas when planting dates resume. In areas where tillage is infeasible, the standard specification allows interseeding into in-place mulch, hydromulch, or blanket. See Specification 2575.3 B.5 and B.6 for details.

Exceptions to Planting Dates

Allow planting outside of the standard dates when any of the following apply:

a. Stabilization is required soon (according to CSW Permit or Public Waters Permit) on areas that cannot be easily worked later. This includes culvert ends, bridge abutments, steep slopes, engineered slopes, soft soils, or sites with higher categories of rolled erosion prevention products (3885 REPP Categories 35 and higher). It may also include situations where planting at a later date would significantly increase safety risk and cost because the road would be open to traffic.

b. The recent official weather observations and long-term forecasts indicate favorable growing conditions (such as unseasonably wet or cool conditions during summer, or unseasonably warm conditions in early spring or late fall).

c. The fall planting dates have ended but the site is ready for final stabilization, with no other soil-disturbing activity is planned for the site for the remainder of the project. Planting at this time when soil temperature is 40°F or below is allowed under 2575 as Dormant Seeding or Snow Seeding (2575.3 B.7) and dormant sodding (2575.3 F.3) . Obtain soil temperatures from the MN Department of Agriculture. Note: This late fall planting is not allowed for salt tolerant sod or for any sod within ten feet of the curb.

d. Temporary irrigation will be included in the contract.

What to do when planting outside of standard dates

Provide written documentation of the need to plant outside of planting dates. Written documentation can include paper, email, or weekly construction meeting minutes if the minutes are distributed to all parties after the meeting.

Require watering when seeding during summer. Use the watering change order template if a watering pay item is not included in the plan. Contact the Erosion and Stormwater Management Unit staff for more information on watering methods, timing, quantities, etc.

Arrange for vegetation monitoring.

- Areas planted in the summer will need to be monitored for the remainder of the year to determine when watering is needed and if re-seeding is needed.
- Areas planted after the fall seeding dates will need monitoring in the spring to determine if any re-seeding is needed.
- Weed Control Measures (mowing, herbicide) must be performed to control the spread of weeds. See the Vegetation Establishment section for information on timing and methods. Use the mowing change order template or the weed spraying change order template if these items are not included in the plan.
- Monitoring can be required of the contractor as part of the Quality Control Program (1717.2A) and Erosion and Sediment Control Schedule (1717.2B) or it can be conducted by project staff. Contact the OES ESM Unit for assistance.

Be prepared for supplemental seeding during the next specified planting window, as needed.

When not to plant, regardless of dates

There are times when planting is infeasible and very likely to fail, even if during the specified planting dates. Do not plant when any of the following apply.

- Site is under water (check for drainage problems; return to re-seed when it has been corrected and dried out)
- Region is in severe drought according to official weather observations and long-term forecasts

Stabilize the site with temporary erosion prevention (if it is not under water), monitor, and be prepared to plant when conditions are favorable.

Weather Data

Use the following links to view weather observations and 30-day forecasts to assess conditions related to planting.

- Rainfall – Interactive Map (National Weather Service)
- Year to Date Precipitation Chart (MN State Climatologist Office)
- Current Drought Rating for MN (United States Drought Monitor)
- 30-Day Forecast (National Weather Service)
- Soil Temperature Map (MN Department of Agriculture)

Seeding Methods

MnDOT specifications do not dictate the methods used. The contractor is allowed to use the method that best fits the situation. The following are the most common seeding methods. When planting native seed, ensure that seeding equipment is capable of dispensing fluffy native grass seed without plugging and evenly distributing the seed of various sizes that are found in native seed mixes.

Drop Seeding

This is the "standard" method for seeding on prepared sites such as those on construction projects where there is suitable access for standard drop seeding equipment.

A) Seed Installation - Seed should be installed with a drop seeder that will accurately meter the types of seed to be planted, keep all seeds uniformly mixed during the seeding and contain drop seed tubes for seed placement (Brillion-type). The drop seeder should be equipped with a culti-packer assembly to ensure good seed-to-soil contact. For native seed mixes, the seeder should contain a minimum of three seed boxes; a fine seed box, a box for large/fluffy seeds, and a box for cool season grasses or grains. It should be equipped with drop tubes and a packer assembly to compact the soil directly over the seed. All seeding should be done at a right angle to surface drainage.

B) Seeding Rates - Rates are specified in the mixture tabulation for the specified mix. The rates should be based on Pure Live Seed (PLS) weight not bulk weight.

C) Ensure seed-to-soil contact – If the drop seeder is not equipped with a cultipacker, the site should be culti-packed following the seeding and before applying mulch to ensure good seed-to-soil contact.

Figure 17: Drop seeder with culti-packer and chain drag attachment

Hydroseeding

Hydroseeding is an acceptable method for establishing the general and native seed mixtures when it is done correctly. However, it is imperative that the site is prepared and finished properly. MnDOT generally uses hydroseeding on steep slopes or other areas inaccessible to conventional seeding equipment. Hydroseeding is not recommended if the extended weather patterns are hot and dry and the soil surface is dry and dusty. The seed-water slurry should be applied within one hour after the seed is added to the hydroseeder tank.

A) Seed Installation - Seed should be installed by hydro-seeding evenly over the entire site. A fan-type nozzle should be used with approximately 500 gallons of water per acre.

B) Seeding Rates - Rates are specified in the mixture tabulation for the specified mix.

NOTE: When seeding in conjunction with a hydraulic mulch a two-step operation must be used. Spec 2575 requires that seed be placed first and the hydraulic mulch be applied afterwards. This is to ensure that seed comes into direct contact with the soil and not be trapped within the hydraulic mulch. The only exception to this is for Rapid Stabilization Method 3, which allows seed, hydraulic mulch, and fertilizer to be applied in a single operation.

Figure 18: Hydroseeding on a slope using a dye tracer to visually meter the application rate and coverage

Broadcast Seeding

Broadcast seeding is performed either with mechanical "cyclone" seeders, by hand seeding or by any other method that scatters seed over the soil surface. However, broadcast seeding may not be desirable if the weather is hot and dry and/or the soil moisture is content is low. It is essential that steps be taken to ensure good seed to soil contact when broadcast seeding is used. This method is preferred in smaller sites or where there is not room for standard drop seeder equipment.

A) Seed Installation - Seed should be installed by broadcasting it evenly over the entire site. Several types and sizes of broadcast seeders are available for use, ranging from fertilizer-type spreaders to power spreaders mounted on all-terrain vehicles. Seed should be mixed thoroughly prior to seeding and should be mixed occasionally in the spreader to prevent separation and settling.

B) Seeding Rates - Rates are specified in the mixture tabulation for the specified mix.

C) Harrowing - The site should be harrowed or raked following seeding.

D) Ensure seed-to-soil contact - The site should be cultipacked following harrowing to assure good seed to soil contact.

Figure 19: Broadcast seeder

Drill Seeding

This method (also known as slit seeding or no-till seeding) works well for native seed mixtures. It is also used for sites that did not establish well or if a temporary mulch or seed mixture was applied to the site before permanent seeding. An interseeder drill can be used to plant the seed without removing or tilling the existing vegetation or mulch. This allows seeding to be accomplished without disturbing the existing soil cover which will help to prevent erosion at the site.

A. Seed Installation - The seed mixture should be installed with a seed drill that will accurately meter the seed to be planted and keep all seeds uniformly mixed during the drilling. The drill should contain a legume box for small seeds, and it should be equipped with disc furrow openers and packer assembly to compact the soil directly over the drill rows. For native seed mixes, the drill should contain a minimum of two seed boxes; a fine seed box and a box for large/fluffy seeds. Maximum row spacing should be 8 inches. The inter-seeder drill must be outfitted with trash rippers that will slice through the vegetative mat and make a furrow into the underlying soil approximately 1 inch wide by 1/2 to 1 inch deep. These furrows shall be directly in line with the drill seed disc openers. Fine seed should be drop-seeded onto the ground surface from the fine seed box drill seeding should be done whenever possible at a right angle to surface drainage.

B. Seeding Rates - Rates are specified in the mixture tabulation for the specified mix.

C. Harrowing - Harrowing is not required when using this seeding method.

D. Ensure seed-to-soil contact - Cultipacking the site is recommended to ensure seed-to-soil contact and to close the furrows.

Figure 20: Interseeding into existing mulch cover that was used for temporary stabilization

Dormant Seeding

Dormant seeding is best done when the soil temperature at a depth of 1" is at or below 40 °F. November 1 is typically a good time to consider dormant seeding. Dormant seeding also provides a winter cold stratification for the forb seeds, which is needed for these species to germinate the following growing season. Native plantings generally respond well to dormant seeding. Dormant seeding may be somewhat risky due to factors such as weather, snow cover, predation, and soil erosion. Dormant seeding is allowed on projects when the fall planting dates have ended but the site is ready for final stabilization and no other soil disturbing activity is planned for the project. Planting at this time when soil temperatures are below 40 °F is allowed under 2575 as dormant or winter seeding (2575.3 B.7). The seedbed should be prepared for dormant seeding just like any other seeding to assure good seed to soil contact and this will also help to prevent seed predation. Care must be taken to assure the soil temperatures are cold enough for dormant seeding and that the weather forecast does not call for seasonally warm weather, which could cause seed germination late in the growing season and loss by winter kill.

Snow Seeding

Seeding on top of the snow with a prepared seedbed below the snow is known as snow seeding and usually performed due to time constraints which prevented seeding before winter conditions. When this is done the seed will melt through the snow and germinate when it reaches the correct temperature in the spring. Mulch can also be placed over the snow on top of the seeded site. Snow seeding can be done during the thawing days in February and March. Snow seed is most effective in areas where the seedbed has been prepared prior to freezing. This seeding method mimics how seeds are naturally dropped and weathered over the winter season. The rain and snow cycles that follow seeding along with freeze thaw cycles will cause the seed to migrate into the soil where it can germinate once the soil temperature increases. The freeze thaw cycles will also act to cold stratify forb seeds which should then germinate the following spring/summer.

Figure 21: Dormant seeding a native seed mix using a no-till drill

Seeding Rates

MnDOT seed mixes are designed to provide the optimum amount of seed for the construction conditions in which they are used. These seeding rates balance the need for rapid establishment and long-term diversity.

Do not allow contractors to seed at an increased rate or to add additional cover crop. This is sometimes done in an attempt to speed up establishment but will throw the mix off balance and may actually hinder long-term establishment. Increasing seeding rates or adding cover crop is a violation of MnDOT spec. The only times when additional seed should be applied are when using up the remainder of bag (see Partial Bags) and when compensating for seed that is one to three months beyond the test date (see Expired Seed).

Incorporation

Incorporation is the process of mixing the seed into the soil. Seed has to be in contact with the soil so it can absorb moisture and nutrients from the soil. Specification 2575 requires seed to be incorporated with a cultipacker immediately after seeding. Harrowing is also an acceptable method of incorporating seed. Some types of planters include cultipackers and therefore combine this step with the seeding. Some contractors will pull a harrow and/or cultipacker behind the seeder to enable them to accomplish seeding and incorporation into a single pass. This is also acceptable.

There are a few exceptions to this requirement. Seed drills do not need an additional pass for incorporation if they have press wheels, such as in the image in the drill seeding section above. Seeders with built-in cultipackers do not require a separate pass. Seeding on steep slopes that are too steep for equipment also does not require a separate pass for incorporation.

Figure 22: A cultipacker being used to incorporate seed

Figure 23: A harrow is a good method of incorporating seed.

Temporary Erosion Control

Design

See Chapter 13J of the FDG for design information regarding temporary erosion control.

Construction

Immediately after seeding, within 24 hours, mulch should be applied to protect the seed, retain soil moisture and enhance seed germination. In most cases on slopes 1:3 (Vertical:Horizontal) and flatter MnDOT Type 1

mulch (see specification below) at 90% soil coverage is applied. This generally requires about 2 tons per acre of straw mulch. If mulch applications are placed too heavily, it can hinder germination or smother new seedlings. Mulch should be disk anchored into the soil to prevent displacement by wind. Mulch may also be sprayed with a hydraulic tackifier to promote adhesion to the soil surface.

Disc anchoring should result in the mulch being crimped into the soil and "standing up," which will prevent the mulch from blowing away during windy conditions. Apply snow mulching prior to or during a snowfall event and the snow will hold the mulch in place. Placing mulch on snow when the sun is shining will also result in the straw mulch melting into the soil surface and being held in place. Placing straw mulch on a hard or icy snow surface will likely result in the mulch blowing away so it is important to snow mulch when the weather conditions are right (snow in the forecast).

Mulches and Hydraulic Erosion Control Products (HECP's) are not intended for use in areas of concentrated flow. In permanent erosion control practices, mulches and HECP products are used to reduce erosion by raindrop impact, hold seed in place and to retain soil moisture to improve plant germination and growth. Mulches are used for both temporary and permanent erosion control and mulches are intended to decompose and eventually be replaced by perennial vegetation. Mulches are typically used in areas where the slopes are less than 1:3 and hydromulches may be used on steeper slopes where mulch anchoring is not possible. The mulch decomposition process will ultimately add organic matter to the topsoil. Like mulches, HECP's are also used for both temporary and permanent erosion control and are intended to decompose within 2 weeks to 18 months depending on the type of HECP product used. HECP's should not be applied to snow covered soil as it will not stick to the soil surface and provide any stabilization of the soil surface.

Mulch

Mulch materials used on MnDOT projects include straw, agricultural hay, wood, aggregate and a combination of straw and hydraulic mulch (Type 4). Note: aggregate mulch is only used where permanent vegetation is not intended or not possible.

MnDOT Type 1 Mulch – This mulch consists of grain straw, hay, cuttings of agricultural grasses and legumes and may be used for either temporary or permanent stabilization. The material should be free of seed-bearing stalks of noxious grasses or weeds as defined by the rules and regulations of the Minnesota Department of Agriculture. Certification is not required for Type 1 mulch. At the time of delivery, the mulch shall be in an air-dried condition. Type 1 mulch is typically used as temporary stabilization where 20-000 series seed mixes are planted.

MnDOT Type 3 Mulch – Type 3 mulch, also called Certified Weed Free Mulch, consists of clean agricultural grain straw (wheat, oats, rye or barley) or clean straw harvested from native grass production fields and certified to be free of noxious weeds. Type 3 mulch is the most commonly specified type of straw mulch used on MnDOT projects. Type 3 mulch must be certified by Minnesota Crop Improvement Association (MCIA). Certification is indicated by a MCIA-issued tag that must be attached to each bale. Type 3 mulch should be air-dried at the time of delivery to the site. Type 3 mulch may be used as temporary stabilization for both 20-000 and 30-000 series seed mixes.

Figure 24: Certified weed free mulch tags must be attached to bales before they leave the field. Digitally photo record all Mulch labels.

Substitutions

When Type 3 mulch is specified but there are limited quantities of certified mulch available at the time of seeding, the Type 3 mulch may be replaced with the following options:

- Check the MCIA Mulch Availability Survey to verify there are no other regional sources of mulch available.
- Use Type 5 slash mulch produced from local tree clearing operations. Install at a rate that will not prohibit seedling development.
- Use Type 3 mulch at a lower rate and overspray with hydromulch to provide the necessary coverage or use all hydromulch if Certified Type 3 mulch is not available.
- Use Type 1 mulch supplied from known locations for temporary stabilization. Subsequent topsoil placement or soil bed preparation for permanent stabilization will incorporate the mulch for in-situ composting and Type 3 mulch or hydro mulch will be placed for stabilization until vegetation is established.
- Use legume-based stubble materials that have been inspected for weed free status. Avoid materials such as corn stubble that are light and/or uncrimpable as this will blow away.

Figure 25: Disc anchoring, or crimping, straw mulch

Sod

Design

Use sod in urban areas where rapid vegetation establishment is important for visual reasons or to honor local agreements.

Specify salt-tolerant sod in boulevards, urban medians, and commercial areas. Salt-tolerant sod consists of fine fescue grasses that not only tolerate salt better than bluegrass, but require less mowing, watering, and fertilizer than bluegrass. Fine fescues are also more shade-tolerant than bluegrass.

Specify lawn sod for use behind the sidewalk in residential areas. Lawn sod consists of Kentucky bluegrass. Bluegrass is less hardy than fine fescues but is better at recovering from heavy foot traffic and more suitable for areas that are mowed regularly.

Construction

Sod Installation For projects where quick vegetation establishment is desired such as in boulevards, medians or other public spaces, there are a number of different sod types that are used on MnDOT projects as outlined in Section 3872 of the specifications. These include the following:

- Lawn Sod – Lawn sod consists of a blend of Kentucky Bluegrass varieties and fine leafed turfgrass varieties. Lawn sod is used in residential areas on the far side of the sidewalk, not in the boulevard.

- Salt Tolerant Sod – Salt tolerant sod consists of a blend of mostly fine fescue varieties which are designed for installation in areas where salt impacts are anticipated such as in boulevards and medians of urban areas.
- Native Sod – Native sod is commercially produced from native grass and forb mixtures and are produced in turf reinforcement mats (TRM) or natural organic mats (pre-vegetated mats).

Sod growing days are any calendar day between April 15 and November 1. Sodding shall be avoided during June 10 to August 10 for lawn and mineral sod and sodding shall be avoided during June 10 to November 1 for Salt Tolerant sod. There may be exceptions to the sod growing days which may arise due to needs to permanently stabilize areas when work is completed outside of the sod growing days or if forecast weather conditions appear favorable for sod installation. Refer to the section on Planting Dates for Seeding and Sodding contained within this Manual for more information. Additional watering may be required in these circumstances or within the recommended sodding dates if there is not adequate precipitation to promote root growth into the soil.

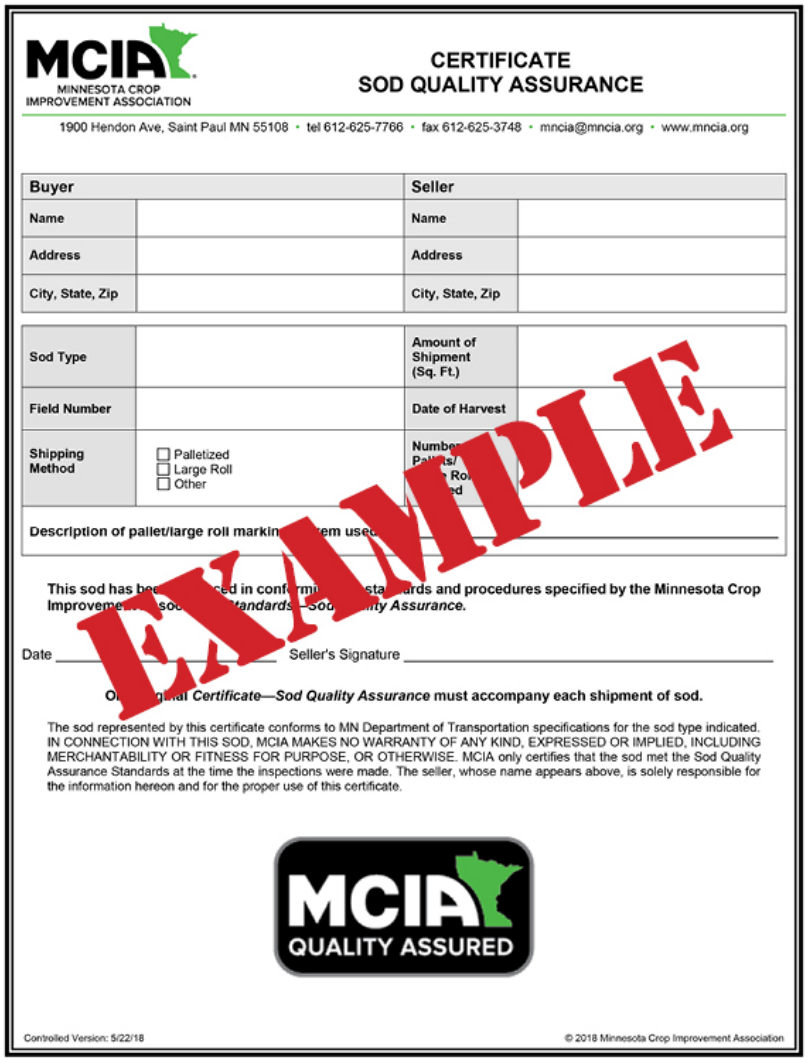
Prior to placing the sod and, preferably before the sod arrives at the site, the soil shall be prepared by removing all construction debris and rocks from the area and also performing deeper tillage in the subsoil if the area to be sodded has been compacted, this is done in order to promote infiltration and root penetration. The topsoil layer should be left approximately one inch below the finished sidewalk or curb surface in order to provide side support for the sod as well as to help prevent surface water runoff from the topsoil. The topsoil should also have fertilizer or other soil amendments added prior to sod placement as needed based on the results of topsoil testing results. The sod should be placed within 24 to 48 hours of delivery to the site to prevent drying and the topsoil should be pre-wetted as needed before the sod is placed. Once the sod is placed, it should be tamped or rolled to assure there is complete contact with the soil. Check on the sod rooting into the topsoil by pulling on a sod corner to see if the sod roots are penetrating the soil.

Figure 26: Evaluating sod rooting and soil moisture conditions

Salt Tolerant Sod

Look for the quality assurance certificate on any shipment of salt tolerant sod. If there's no certificate, it's not certified to be salt tolerant and should be rejected. The following illustration shows the certificate.

Figure 27: This certificate is required with deliveries of salt-tolerant sod.



MCIA
MINNESOTA CROP IMPROVEMENT ASSOCIATION

CERTIFICATE
SOD QUALITY ASSURANCE

1900 Hendon Ave, Saint Paul MN 55108 • tel 612-625-7766 • fax 612-625-3748 • mncia@mncia.org • www.mncia.org

Buyer		Seller	
Name		Name	
Address		Address	
City, State, Zip		City, State, Zip	

Sod Type		Amount of Shipment (Sq. Ft.)	
Field Number		Date of Harvest	
Shipping Method	☐ Palletized ☐ Large Roll ☐ Other	Numbe… Pa…s/ …e Ro… …ed	
Description of pallet/large roll markin… …em use…			

This sod has be… …ed in conf…m… …sta…ards and procedures specified by the Minnesota Crop Improveme… …soc… …tandards—Sod… …ity Assurance.

Date _____ Seller's Signature _____

O… …g…al *Certificate—Sod Quality Assurance* must accompany each shipment of sod.

The sod represented by this certificate conforms to MN Department of Transportation specifications for the sod type indicated. IN CONNECTION WITH THIS SOD, MCIA MAKES NO WARRANTY OF ANY KIND, EXPRESSED OR IMPLIED, INCLUDING MERCHANTABILITY OR FITNESS FOR PURPOSE, OR OTHERWISE. MCIA only certifies that the sod met the Sod Quality Assurance Standards at the time the inspections were made. The seller, whose name appears above, is solely responsible for the information hereon and for the proper use of this certificate.

MCIA QUALITY ASSURED

Controlled Version: 5/22/18

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EXAMPLE

Identifying Salt Tolerant Sod

The two different types of sod look very similar, but there are ways to tell them apart. Below is a quick guide. Contact the Office of Environmental Stewardship for help.

Figure 28: Comparison of bluegrass and fine fescue leaves

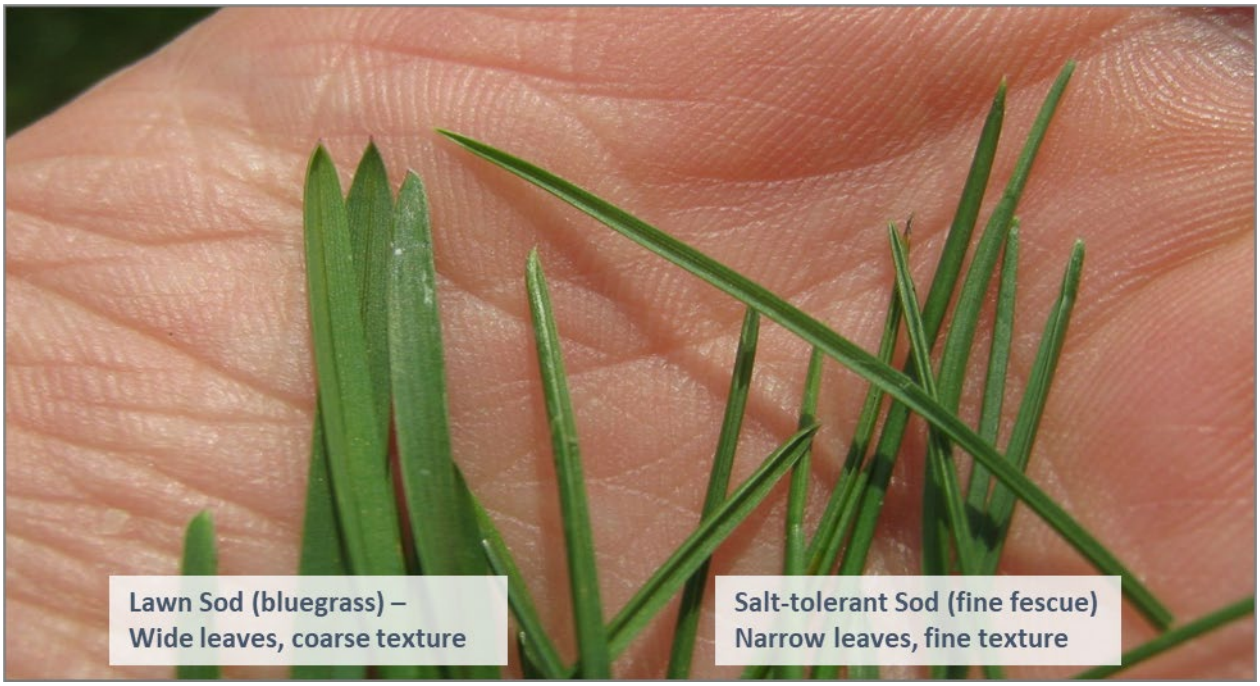


Figure 29: Comparison of lawn sod and salt-tolerant sod

Establishing Sod

The sod maintenance period is 30 calendar days and additional days up to a total of 60 days can be required at the discretion of the engineer if conditions warrant and/or the sod has not taken root into the soil after the 30-day maintenance period. The sod should be watered within 1 hour of installation and the watering should continue as needed for the first 10 days at a rate and frequency that keeps the sod and underlying soil moist but

not saturated. For the remainder of the 30-day monitoring period, the sod should be watered to supplement rainfall to provide one inch of water per week. This should continue until the sod has formed roots into the soil and is firmly in place. Any dried, dead, damaged or displaced sod should be replaced during the 30-day maintenance period. The sod should not be mowed until the roots have penetrated the soil and no sod showing signs of drought stress should be mowed. During the sod maintenance period, any dead sod or sod that contains greater than 50 percent noxious weeds should be replaced.

Figure 30: Watering sod with a water truck requires multiple light passes to prevent damaging sod and avoid unnecessary runoff.

Live Perennial Plugs

Design

Live plugs can be used in some wetland restoration projects, rain gardens or in native plantings where quick establishment is desired. Plugs are usually about 1 to 2 inches wide and with the roots fully encapsulated in soil or other growth medium. Live plugs are different from bare root seedlings and generally have a higher rate of survival after planting with proper maintenance.

Specify a minimum spacing, which will vary depending on the plant species being installed. Live plugs will require a special provision modifying 2571 or 2575. Contact the Office of Environmental Stewardship Erosion and Stormwater Management Unit for plug planting special provisions and assistance.

Construction

Consider installing a temporary holding wet nursery in a shaded portion of the project for Live Perennial Plugs, to increase plug survival. These temporary holding wet nurseries can be constructed with landscape timbers on the perimeter and intact (non-leaking/non-punctured) plastic sheeting inside the timbers. At all times during

plant storage prior to planting out, maintain temporary holding wet nursery with minimum 1 inch standing water. At project completion remove all parts of temporary holding wet nursery from project site.

Any in-place temporary erosion control materials should be maintained during installation of the live plugs and be replaced as necessary if damaged during planting. Some minor alterations to rolled erosion prevention products such as minor cuts to facilitate installation of plugs will be permitted for installation with prior approval from the Engineer.

Water perennial plugs immediately after plant installation and at a frequency of every 4 to 8 days after as required depending on factors such as recent weather conditions, plant types and landscape position. For example, plantings on a southern exposed slope will require more watering than plantings on a wetland edge. Once the plug roots have penetrated the soil and the plants have become established, the plantings may be mowed in a matter and schedule similar to native grass and forb seedings in order to control annual weeds. Spot spraying with herbicide may also be completed as needed to control weeds.

Vegetation Establishment

Design

Plans should include not just seed and seeding pay items, but also work that will be needed for establishment. This includes pay items or contingencies for mowing, weed control and watering. See Appendix C for a summary of these pay items.

Mowing

Include a mowing pay item on all projects with at least five acres of seeding. For quantities, estimate two acres of mowing for every acre of seeding. Specify hand mowing for small areas or steep slopes that mowers cannot access. Discuss mowing expectations with tribes when designing projects within tribal boundaries.

Add the following note to the first sheet of the Seeding Plan to guide the use of mowing:

- Mow permanently seeded areas in early June, mid-July, and late August unless otherwise directed by Engineer.

Weed Control

Include the pay items Weed Spraying (2575.505) and Weed Spray Mixture (2575.506) on all projects with seeding. Estimate half an acre of weed spraying per acre of seeding. Estimate 1 pint (1/8th of a gallon) of weed spray mixture for every one acre of weed spraying.

Add the following note to the SEQ for the Weed Spray Mixture pay item:

- Clopyralid herbicide labeled for right of way use and formulated at 3 pounds acid equivalent per gallon

Add the following note to the first sheet of the Seeding Plan to guide the use of spraying:

- Spray perennial noxious weeds growing in stockpiles and staging areas before flowering.
- Spot-spray perennial noxious weeds in areas of permanent seeding two or more weeks after mowing but before flowering.

Watering

Include a Water pay item (2575.523) on projects with critical areas, such as stormwater treatment basins, steep slopes, and RSS walls. Contact OES to discuss a temporary irrigation special provision.

Construction

Monitoring

Monitor plantings regularly between seeding and final project close-out. Try to identify problems early to avoid vegetation establishment delays at the end of the project. Turfgrass plantings and other non-native plantings should show a dense cover of small grass seedlings about 4 weeks after planting. Native plantings will show scattered seedlings of indicator species in 2-4 weeks, but other species will fill in over time. After a few months there should be 4 to 6 native seedlings per square foot. See the Seed Mix Information Sheets in the appendix for more detailed monitoring and establishment information.

The first plants to emerge from native plantings will be the annual or early successional perennial cover crops in the seed mix. Cover crops should emerge within two weeks of planting. The purpose of the cover crop is to provide ground cover to prevent soil erosion and sediment transport. Cover crops also, in general, provide a better environment for natives to germinate or establish underneath. It is important to manage cover crop height and density by mowing in order to assure the native species are not shaded out by the cover crop canopy and to prevent the cover crop from producing seed. This is also a good way to prevent the spread of annual weeds in a seeded area. Cover crops or temporary seed mixes may also be used for temporary stabilization when seeding of permanent seed mixes is not feasible if outside of the planting dates or other external climatic factors. MnDOT native seed mixes usually include annual cover crops such as oats or winter wheat with the oats planted in the spring and summer and the winter wheat used in the fall. There is interest in moving away from these types of cover crops and implementing more early successional cover crops such as slender wheatgrass or perennial ryegrass. Some cover crops which include legumes also have the ability to improve topsoil conditions by improving nitrogen availability (field pea) and mitigating soil compaction (tillage radish).

Native plantings are not generally as “attractive” as non-native turf grass plantings in the first and second year as it takes more time for the native seed to germinate and establish stand density. Maintenance is an important factor during this time to manage the cover crop density and seed setting as well as control of annual weeds. Maintenance usually consists of mowing and some spot herbicide application as needed.

Mowing

Mowing for general seed mixtures and turf grasses should be performed after initial seeding as needed to control annual weeds and they are generally mowed 3 times per year to control height as needed where these mixes are used in Right of Way clear zones. Turfgrass seed mixes such as 25-131 and 25-151 as well as sod

should be mowed in the first year after they reach a height of about 6 inches and should be mowed to a height of 2 to 3 inches. After year 1, the low and high maintenance seed mixes should be mowed around every 2 weeks or as needed for appearance. Seed mix 25-131 and salt-tolerant sod will require less frequent mowing than mix 25-151 and lawn sod.

Mowing is important for native grass and forb mixtures to control annual weeds and make sure that weeds do not shade out the desirable native species in the seed mix. In the first year, mowing should be done 2 to 3 times and the cut height should vary from 6 to 8 inches. In the second year of growth mowing should be completed (6 to 12 inches) once between June 1 and August 15 to control annual weeds before they flower. After the third year the native seed mixes should only be mowed as needed to control woody brush.

Discuss mowing expectations with tribes when working within tribal boundaries.

Weed Spraying

Mowing should help to control annual weeds on the site, but sometimes perennial weeds such as thistle may also need to be controlled by spot spraying with herbicide. The person applying the herbicide needs to be licensed for Category J. Spot spraying methods should be used whenever possible. Only allow broadcast spraying if perennial weed cover is greater than 50% and only after consultation with OES. The herbicide label should be reviewed by OES prior to use. The contractor needs to turn in a pesticide application report after spraying to document the type and amount of herbicide used.

Watering

Water plantings if conditions get very dry after germination or when seeding during summer. Temporary irrigation systems are the most effective and should be considered if several waterings will be needed. Watering from a water truck can work but requires care to ensure water is applied gently to avoid erosion and runoff. Use the watering change order template if a watering pay item is not included in the plan. Contact the Erosion and Stormwater Management Unit staff for more information on watering methods, timing, quantities, etc.

Vegetative Cover Requirements

The Construction Stormwater Permit (CSW Permit) requires perennial vegetation to be established before permit coverage can be closed out. Because the CSW Permit requires 70% of expected vegetative cover (CSW Permit 25.22), the actual vegetative cover required will depend on what vegetation a project is trying to grow. The following numbers show cover required for CSW Permit termination. Mature vegetation is expected to have greater coverage and MnDOT may require 100% coverage for turfgrass plantings.

- Turfgrass Mixes and 25-141 – 70% cover
- Most Native Plantings – 50-60% cover
- Mix 33-261 & 33-361 – 70% cover

Measuring Cover

Visual estimates of cover are usually inaccurate and imprecise. What follows is a more objective and more precise way to measure cover. Use this to measure vegetation establishment if there is uncertainty about whether a planting is ready to close out CSW Permit coverage.

- Choose an area where the vegetation establishment seems typical of the project as a whole.
- Visualize a line or transect about 100 yards long across that area.
- Walk along the line for 100 paces, paying attention to whether the tips of your boots intersect vegetation.
- Record the number of steps in which the very tip of your boot intersects vegetation (the number of "hits").
- The number of hits out of 100 paces is the percent cover.

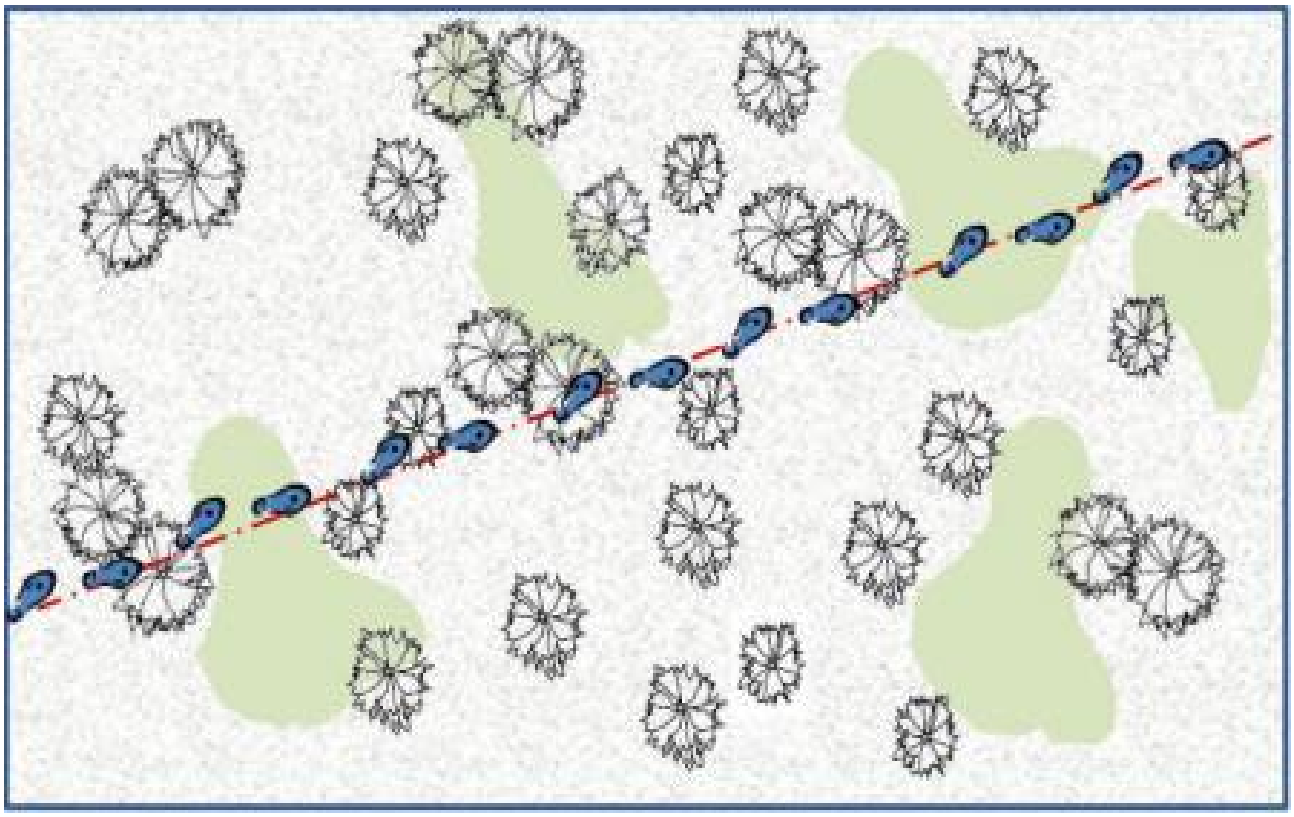
For better accuracy:

- Have a partner watch your feet and count hits while you look straight ahead. This will reduce any bias in where you place your feet.
- Walk at least three transects in different areas and average the results.
- Mark a thin but highly visible vertical line on the tip of your boot with wax crayon, masking tape, survey paint, etc. and only count vegetation as a hit when it intersects that line.
- Do not count weeds or annual vegetation as hits.

Note: this method can also be used to measure whether mulch has been applied at 90% cover.

Example: in this diagram, the tip of the footprint intersects vegetation (shown as green patches or line drawings of shrubs) on 7 out of 14 steps, giving a measurement of 50% cover.

Figure 31: Pacing a transect to measure of vegetative cover. In this example the tip of the footpring intersects vegetation on 7 out of 14 steps, giving a measurement of 50% cover. Illustration courtesy of K. Launchbaugh, University of Idaho.



Appendix A: State Seed Mixes

Table 3: Seed Mix Index - Click the mix number to see details for each seed mix

CATEGORY	NUMBER	PLS Rate	NAME	EXPECTED FINAL COVER
Cover Crop				
	21-111	100	Oats Cover Crop	95%
	21-112	100	Winter Wheat Cover Crop	95%
	21-113	110	Soil Building Cover Crop	95%
Mid-Term Stabilization				
	22-111	30.5	Two-year Stabilization	95%
	22-112	40.0	Five-year Stabilization	95%
Non-Native Grassland				
	25-121	61.0	Sandy General Roadside	75%
	25-131	220	Low Maintenance Turf	95%
	25-141	59	Mesic General Roadside	95%
	25-142	45	Agricultural Roadside	95%
	25-151	120	High Maintenance Turf	100%
Mid-term Stabilization Native				
	32-241	38	Native Construction Temporary	85%
Stormwater Facilities				
	33-261	35	Stormwater South and West	90%
	33-262	44	Dry (Agricultural) Swale / Pond	85%
	33-361	35	Stormwater Northeast	90%
Wetland				
	34-171	5.3	Wetland Rehabilitation	85%
	34-181	5	Emergent Wetland	80%
	34-261	31.5	Riparian South & West	85%
	34-262	14.5	Wet Prairie	90%
	34-271	12	Wet Meadow South & West	90%
	34-361	31.5	Riparian Northeast	85%
	34-371	12.5	Wet Meadow Northeast	90%
Grassland				
	35-221	36.5	Dry Prairie General	75%
	35-241	36.5	Mesic Prairie General	85%
	35-421	11	Dry Prairie Northwest	75%
	35-441	11	Mesic Prairie Northwest	85%
	35-521	12.5	Dry Prairie Southwest	75%
	35-541	12	Mesic Prairie Southwest	85%
	35-621	11	Dry Prairie Southeast	75%
	35-641	12	Mesic Prairie Southeast	85%
Woodland				
	36-211	34.5	Woodland Edge South & West	70%
	36-311	33.5	Woodland Edge Northeast	70%
	36-411	35.5	Woodland Edge Northwest	70%
	36-711	35.5	Woodland Edge Central	70%

Seed Mix Numbering

Seed mixes are numbered according to native/nonnative species, function, intended planting area, required hydrology, and version. This table can be used to select a suitable mix for a given project. However, not all number combinations will get you a specific mix. Some extrapolation may be needed.

Example:

> Need a native seed mix suitable for a wetland area next to stream in Lake County? The tables would give you 34-3xx. Under hydrology, there are nine choices, but only two are listed in the table of seed mixes available: 34-361 (Riparian NE), or 34-371 (Wet meadow NE). Best professional judgment will be needed to determine which one is best suited for the project.

Table 4: seed mix numbering system

Native/Nonnative		Function		Planting Area		Hydrology		Version
10,000	Hybrid	1,000	Cover Crop	100	statewide	10	general	1-9
20,000	Introduced	2,000	Mid Term Stabilization	200	South 1/2 & West 1/3	20	dry	1-9
30,000	Native	3,000	Stormwater Facilities	300	NE & North-central	30	dry mesic	1-9
40,000	Custom	4,000	Wetland	400	NW*	40	mesic	1-9
		5,000	Grassland	500	SW*	50	wet mesic	1-9
		6,000	Woodland	600	SE*	60	seasonally flooded	1-9
				700	Central**	70	saturated	1-9
						80	emergent	1-9
						90	submergent	1-9

*Use a mix for Planting Area 200 if no regional mix is available for Planting Areas 400-600.

**Use a mix for Planting Area 200 or 300 if no regional mix is available for Planting Area 700.

Seed Mix Tables

21-111 Oats Cover Crop

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
Oats	*Avena sativa*	100.00	112.08	100.00%	44.54
	Total	**100.00**	**112.08**	**100.00%**	**44.54**
Purpose:	Temporary cover crop for spring and summer plantings				
Planting Area:	Statewide				

21-112 Winter Wheat Cover Crop

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
Winter Wheat	*Triticum aestivum*	100.00	112.09	100.00%	26.08
	Total	**100.00**	**112.09**	**100.00%**	**26.08**
Purpose:	Temporary cover crop for fall plantings				
Planting Area:	Statewide				

21-113 Soil Building Cover Crop

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
Field Pea	*Pisum sativum*	50.00	56.04	45.46%	3.44
	Forbs Subtotal	**50.00**	**56.04**	**45.46%**	**3.44**
Oats	*Avena sativa*	60.00	67.25	54.54%	26.72
	Cover Crop Subtotal	**60.00**	**67.25**	**54.54%**	**26.72**
	Total	**110.00**	**123.29**	**100.00%**	**30.16**
Purpose:	Temporary cover crop with soil building function.				
Planting Area:	Statewide				
Combine all components when blending this mix.					

Back to seed mix index

22-111 Two-year Stabilization

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
slender wheatgrass	*Elymus trachycaulus*	9.00	10.09	29.50%	22.80
Perennial Ryegrass	*Lolium perenne*	4.50	5.04	14.76%	22.42
	Grasses Subtotal	**13.50**	**15.13**	**44.26%**	**45.22**
Alfalfa	*Medicago sativa*	8.50	9.53	27.86%	44.25
Red Clover	*Trifolium pratense*	8.50	9.53	27.88%	53.13
	Forbs Subtotal	**17.00**	**19.05**	**55.74%**	**97.38**
	Total	**30.50**	**34.19**	**100.00%**	**142.60**
Purpose:	One to two year soil stabilization with non-native species				
Planting Area:	Statewide				
Combine all components when blending this mix.					

22-112 Five-year Stabilization

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
Perennial Ryegrass	*Lolium perenne*	13.50	15.13	33.75%	67.25
Smooth Brome	*Bromus inermis*	6.00	6.73	14.99%	19.67
slender wheatgrass	*Elymus trachycaulus*	2.00	2.24	5.01%	5.08
big bluestem	*Andropogon gerardii*	0.50	0.56	1.25%	1.83
	Grasses Subtotal	**22.00**	**24.66**	**55.00%**	**93.83**
Alfalfa	*Medicago sativa*	8.50	9.53	21.25%	44.25
Red Clover	*Trifolium pratense*	5.50	6.16	13.74%	34.35
Alsike Clover	*Trifolium hybridum*	3.50	3.92	8.75%	54.70
American vetch	*Vicia americana*	0.50	0.56	1.26%	0.38
	Forbs Subtotal	**18.00**	**20.18**	**45.00%**	**133.68**
	Total	**40.00**	**44.83**	**100.00%**	**227.51**
Purpose:	Two to five year soil stabilization with non-native species.				
Planting Area:	Statewide				
Combine all components when blending this mix.					

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25-121 Sandy General Roadside

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
Park Kentucky bluegrass	*Poa pratensis Park*	16.00	17.93	26.23%	510.50
Perennial Ryegrass	*Lolium perenne*	13.50	15.13	22.13%	67.25
Smooth Brome	*Bromus inermis*	8.00	8.97	13.12%	26.25
Canada bluegrass*	*Poa compressa*	7.75	8.69	12.70%	425.50
Hard fescue	*Festuca trachyphylla*	4.25	4.76	6.96%	55.10
slender wheatgrass	*Elymus trachycaulus*	2.00	2.24	3.29%	5.08
switchgrass	*Panicum virgatum*	1.50	1.68	2.46%	7.73
little bluestem	*Schizachyrium scoparium*	1.50	1.68	2.46%	8.28
sand dropseed	*Sporobolus cryptandrus*	1.50	1.68	2.45%	110.00
	Grasses Subtotal	**56.00**	**62.77**	**91.80%**	**1215.69**
Red Clover	*Trifolium pratense*	4.50	5.04	7.38%	28.13
purple prairie clover	*Dalea purpurea*	0.50	0.56	0.82%	2.75
	Forbs Subtotal	**5.00**	**5.60**	**8.20%**	**30.88**
	Total	**61.00**	**68.37**	**100.00%**	**1246.57**
Purpose:	General non-native roadside for dry or sandy soils.				
Planting Area:	Statewide. Well suited for Pine Moraines & Outwash Plains, Mille Lacs Uplands, and Anoka Sand Plain subsections. Mn/DOT Distrct 3A and eastern 3B				
Combine all components when blending this mix. *Species in the sheeps fescue complex (Festuca spp.) may be used interchangeably with Canada bluegrass in this mix. Varieties must match those listed on the substitution table.					

25-131 Low Maintenance Turf

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
red fescue	*Festuca rubra*	64.00	71.73	29.09%	667.00
Chewing's Fescue	*Festuca rubra ssp. commutata*	44.00	49.32	20.00%	458.60
Low Maintenance Kentucky bluegrass	*Poa pratensis Low Maintenance*	36.00	40.35	16.36%	1148.70
Hard fescue	*Festuca trachyphylla*	30.00	33.63	13.64%	389.10
Sheep Fescue	*Festuca ovina*	25.00	28.02	11.37%	304.22
Perennial Ryegrass	*Lolium perenne*	21.00	23.54	9.54%	104.60
	Total	**220.00**	**246.59**	**100.00%**	**3072.22**
Purpose:	Salt, shade and drought tolerant turfgrass. Requires less frequent mowing and less fertilization than conventional turfgrass.				
Planting Area:	Statewide				
Combine all components when blending this mix.					

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25-141 Mesic General Roadside

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
Park Kentucky bluegrass	*Poa pratensis Park*	15.75	17.65	26.69%	502.50
Perennial Ryegrass	*Lolium perenne*	13.25	14.85	22.46%	66.00
Smooth Brome	*Bromus inermis*	7.75	8.69	13.14%	25.42
Canada bluegrass*	*Poa compressa*	7.50	8.41	12.71%	412.00
fowl bluegrass	*Poa palustris*	4.00	4.48	6.78%	191.00
slender wheatgrass	*Elymus trachycaulus*	2.00	2.24	3.40%	5.08
Timothy	*Phleum pratense*	1.75	1.96	2.97%	49.50
switchgrass	*Panicum virgatum*	1.50	1.68	2.54%	7.70
	Grasses Subtotal	**53.50**	**59.97**	**90.69%**	**1259.20**
Alfalfa	*Medicago sativa*	3.50	3.92	5.92%	18.20
White Clover	*Trifolium repens*	2.00	2.24	3.39%	32.70
	Forbs Subtotal	**5.50**	**6.16**	**9.31%**	**50.90**
	Total	**59.00**	**66.13**	**100.00%**	**1310.10**
Purpose:	General non-native mix for roadsides with mesic soils.				
Planting Area:	Statewide				
Combine all components when blending this mix. *Species in the sheeps fescue complex (Festuca spp.) may be used interchangeably with Canada bluegrass in this mix. Varieties must match those listed on the substitution table.					

25-142 Agricultural Roadside

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
Perennial Ryegrass	*Lolium perenne*	13.50	15.13	30.00%	67.25
Smooth Brome	*Bromus inermis*	7.75	8.69	17.23%	25.43
fowl bluegrass	*Poa palustris*	6.00	6.73	13.33%	286.50
slender wheatgrass	*Elymus trachycaulus*	2.00	2.24	4.45%	5.08
Timothy	*Phleum pratense*	1.75	1.96	3.89%	49.43
switchgrass	*Panicum virgatum*	1.50	1.68	3.33%	7.70
	Grasses Subtotal	**32.50**	**36.43**	**72.23%**	**441.39**
Alfalfa	*Medicago sativa*	12.50	14.01	27.77%	65.07
	Forbs Subtotal	**12.50**	**14.01**	**27.77%**	**65.07**
	Total	**45.00**	**50.44**	**100.00%**	**506.46**
Purpose:	General non-native roadside for areas that will be cut for hay.				
Planting Area:	Statewide				
Combine all components when blending this mix.					

Back to seed mix index

25-151 High Maintenance Turf

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
elite Kentucky bluegrass	*Poa pratensis Elite*	50.00	56.05	25.00%	1595.32
low maintenance Kentucky bluegrass	*Poa pratensis Low Maintenance*	50.00	56.05	25.00%	1595.32
Park Kentucky bluegrass	*Poa pratensis Park*	50.00	56.05	25.00%	1595.32
perennial ryegrass	*Lolium perenne*	34.00	38.11	17.00%	169.38
red fescue	*Festuca rubra*	16.00	17.94	8.00%	166.76
	Total	**200.00**	**224.20**	**100.00%**	**5,122.08**
Purpose:	Conventional turfgrass. Not salt, shade or drought tolerant. Requires more mowing, fertilizer and water than the low maintenance turf mix.				
Planting Area:	Statewide				
Combine all components when blending this mix.					

32-241 Native Construction Temporary

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
slender wheatgrass	*Elymus trachycaulus*	2.50	2.80	6.57%	6.33
nodding wild rye	*Elymus canadensis*	2.00	2.24	5.26%	3.82
Virginia wild rye	*Elymus virginicus*	2.00	2.24	5.26%	3.09
fringed brome	*Bromus ciliatus*	1.40	1.57	3.69%	5.67
big bluestem	*Andropogon gerardii*	1.25	1.40	3.30%	4.60
side-oats grama	*Bouteloua curtipendula*	1.00	1.12	2.64%	2.21
Indian grass	*Sorghastrum nutans*	1.00	1.12	2.63%	4.40
switchgrass	*Panicum virgatum*	0.75	0.84	1.97%	3.85
fowl bluegrass	*Poa palustris*	0.60	0.67	1.57%	28.50
	Grasses Subtotal	**12.50**	**14.01**	**32.89%**	**62.47**
partridge pea	*Chamaecrista fasiculata*	0.27	0.30	0.72%	0.27
black-eyed susan	*Rudbeckia hirta*	0.09	0.10	0.23%	3.00
Canada tick trefoil	*Desmodium canadense*	0.07	0.08	0.20%	0.15
hoary vervain	*Verbena stricta*	0.05	0.06	0.13%	0.50
wild bergamot	*Monarda fistulosa*	0.02	0.02	0.04%	0.39
	Forbs Subtotal	**0.50**	**0.56**	**1.32%**	**4.31**
Oats	Avena sativa	25.00	28.02	65.79%	11.14
	Cover Crop Subtotal	**25.00**	**28.02**	**65.79%**	**11.14**
	Total	**38.00**	**42.59**	**100.00%**	**77.91**
Purpose:	Mid-term soil stabilization using native species. Also suitable for sides of agricultural drainage ditches or low-diversity mesic prairie planting.				
Planting Area:	Tallgrass Aspen Parklands, Prairie Parkland, and Eastern Broadleaf Forest Provinces. Mn/DOT Districts 2(west), 3B, 4, Metro, 6, 7 & 8.				

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33-261 Stormwater South & West

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
big bluestem	*Andropogon gerardii*	2.00	2.24	5.72%	7.35
fringed brome	*Bromus ciliatus*	2.00	2.24	5.73%	8.10
Virginia wild rye	*Elymus virginicus*	1.50	1.68	4.28%	2.31
fowl bluegrass	*Poa palustris*	1.06	1.19	3.03%	50.70
slender wheatgrass	*Elymus trachycaulus*	1.00	1.12	2.85%	2.53
switchgrass	*Panicum virgatum*	0.38	0.43	1.07%	1.93
prairie cordgrass	*Spartina pectinata*	0.38	0.43	1.07%	0.91
Indian grass	*Sorghastrum nutans*	0.12	0.13	0.36%	0.55
bluejoint	*Calamagrostis canadensis*	0.06	0.07	0.18%	6.40
	Grasses Subtotal	**8.50**	**9.53**	**24.29%**	**80.78**
awl-fruited sedge	*Carex stipata*	0.25	0.28	0.71%	3.10
dark green bulrush	*Scirpus atrovirens*	0.19	0.21	0.54%	31.70
woolgrass	*Scirpus cyperinus*	0.06	0.07	0.18%	39.00
	Sedges & Rushes Subtotal	**0.50**	**0.56**	**1.43%**	**73.80**
golden alexanders	*Zizia aurea*	0.20	0.22	0.56%	0.79
autumn sneezeweed	*Helenium autumnale*	0.13	0.15	0.36%	5.97
marsh milkweed	*Asclepias incarnata*	0.11	0.12	0.32%	0.20
leafy beggarticks	*Bidens frondosa*	0.11	0.12	0.31%	0.20
Canada anemone	*Anemone canadensis*	0.07	0.08	0.19%	0.20
obedient plant	*Physostegia virginiana*	0.07	0.08	0.21%	0.30
tall coneflower	*Rudbeckia laciniata*	0.07	0.08	0.21%	0.37
New England aster	*Symphyotrichum novae-angliae*	0.07	0.08	0.19%	1.56
flat-topped aster	*Doellingeria umbellata*	0.06	0.07	0.17%	1.50
spotted Joe pye weed	*Eutrochium maculatum*	0.06	0.07	0.18%	2.19
blue vervain	*Verbena hastata*	0.05	0.06	0.15%	1.85
	Forbs Subtotal	**1.00**	**1.12**	**2.85%**	**15.13**
Oats	*Avena sativa*	25.00	28.02	71.43%	11.14
	Cover Crop Subtotal	**25.00**	**28.02**	**71.43%**	**11.14**
	Total	**35.00**	**39.23**	**100.00%**	**180.85**
Purpose:	Stormwater pond edges, temporarily flooded dry ponds, and temporarily flooded ditch bottoms.				
Planting Area:	Tallgrass Aspen Parklands, Prairie Parkland, and Eastern Broadleaf Forest Provinces. Mn/DOT Districts 2(west), 3B, 4, Metro, 6, 7 & 8.				

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33-262 Dry (Agricultural) Swale/Pond

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
nodding wild rye	*Elymus canadensis*	4.00	4.48	9.09%	7.64
slender wheatgrass	*Elymus trachycaulus*	4.00	4.48	9.10%	10.15
Virginia wild rye	*Elymus virginicus*	2.50	2.80	5.67%	3.85
fowl bluegrass	*Poa palustris*	1.60	1.79	3.64%	76.50
big bluestem	*Andropogon gerardii*	1.50	1.68	3.40%	5.50
American slough grass	*Beckmannia syzigachne*	1.50	1.68	3.42%	27.60
fringed brome	*Bromus ciliatus*	1.50	1.68	3.40%	6.05
Indian grass	*Sorghastrum nutans*	1.50	1.68	3.40%	6.60
switchgrass	*Panicum virgatum*	0.40	0.45	0.91%	2.05
	Grasses Subtotal	**18.50**	**20.74**	**42.03%**	**145.94**
blue vervain	*Verbena hastata*	0.10	0.11	0.23%	3.50
purple prairie clover	*Dalea purpurea*	0.09	0.10	0.21%	0.50
Canada tick trefoil	*Desmodium canadense*	0.09	0.10	0.21%	0.19
Early Sunflower	*Heliopsis helianthoides*	0.09	0.10	0.20%	0.20
black-eyed susan	*Rudbeckia hirta*	0.07	0.08	0.17%	2.49
marsh milkweed	*Asclepias incarnata*	0.06	0.07	0.13%	0.10
	Forbs Subtotal	**0.50**	**0.56**	**1.15%**	**6.98**
Oats	*Avena sativa*	25.00	28.02	56.82%	11.14
	Cover Crop Subtotal	**25.00**	**28.02**	**56.82%**	**11.14**
	Total	**44.00**	**49.32**	**100.00%**	**164.06**
Purpose:	Temporarily flooded swales in agricultural settings.				
Planting Area:	Tallgrass Aspen Parklands, Prairie Parkland, and Eastern Broadleaf Forest Provinces. Mn/DOT Districts 2(west), 3B, 4, Metro, 6, 7 & 8.				

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33-361 Stormwater Northeast

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
fringed brome	*Bromus ciliatus*	3.65	4.09	10.43%	14.75
nodding wild rye	*Elymus canadensis*	2.00	2.24	5.71%	3.82
Virginia wild rye	*Elymus virginicus*	2.00	2.24	5.73%	3.09
fowl bluegrass	*Poa palustris*	0.64	0.72	1.82%	30.40
tall manna grass	*Glyceria grandis*	0.16	0.18	0.44%	4.00
bluejoint	*Calamagrostis canadensis*	0.05	0.06	0.13%	4.80
	Grasses Subtotal	**8.50**	**9.53**	**24.26%**	**60.86**
dark green bulrush	*Scirpus atrovirens*	0.27	0.30	0.76%	45.00
woolgrass	*Scirpus cyperinus*	0.10	0.11	0.27%	60.00
porcupine sedge	*carex hystericina*	0.09	0.10	0.26%	1.00
pointed broom sedge	*Carex scoparia*	0.04	0.04	0.12%	1.30
	Sedges & Rushes Subtotal	**0.50**	**0.56**	**0.12%**	**107.30**
marsh milkweed	*Asclepias incarnata*	0.45	0.50	1.30%	0.80
spotted Joe pye weed	*Eutrochium maculatum*	0.15	0.17	0.42%	5.10
Canada anemone	*Anemone canadensis*	0.10	0.11	0.29%	0.30
flat-topped aster	*Doellingeria umbellata*	0.10	0.11	0.29%	2.50
common boneset	*Eupatorium perfoliatum*	0.05	0.06	0.15%	3.00
tall meadow-rue	*Thalictrum dasycarpum*	0.05	0.06	0.16%	0.40
grass-leaved goldenrod	*Euthamia graminifolia*	0.04	0.04	0.11%	5.00
blue monkey flower	*Mimulus ringens*	0.02	0.02	0.07%	20.00
giant goldenrod	*Solidago gigantea*	0.02	0.02	0.06%	2.00
eastern panicled aster	*Symphyotrichum lanceolatum*	0.02	0.02	0.05%	1.00
	Forbs Subtotal	**1.00**	**1.12**	**2.90%**	**40.10**
Oats	*Avena sativa*	25.00	28.02	71.43%	11.14
	Cover Crop Subtotal	**25.00**	**28.02**	**71.43%**	**11.14**
	Total	**35.00**	**39.23**	**100.00%**	**219.40**
Purpose:	Stormwater pond edges, temporarily flooded dry ponds, and temporarily flooded ditch bottoms.				
Planting Area:	Laurentian Mixed Forest Province. Mn/DOT Districts 1, 2(east) and 3A.				

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34-171 Wetland Rehabilitation

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
Virginia wild rye	*Elymus virginicus*	3.00	3.36	56.61%	4.63
fowl bluegrass	*Poa palustris*	1.00	1.12	18.89%	47.80
	Grasses Subtotal	**4.00**	**4.48**	**75.50%**	**52.43**
dark green bulrush	*Scirpus atrovirens*	0.36	0.40	6.70%	60.00
fox sedge	*Carex vulpinoidea*	0.20	0.22	3.85%	7.50
path rush	*Juncus tenuis*	0.16	0.18	3.03%	59.00
woolgrass	*Scirpus cyperinus*	0.08	0.09	1.51%	50.00
	Sedges & Rushes Subtotal	**0.80**	**0.90**	**15.09%**	**176.50**
Water Horehound	*Lycopus americanus*	0.33	0.37	6.29%	23.15
nodding bur marigold	*Bidens cernua*	0.13	0.15	2.45%	1.00
blue monkey flower	*Mimulus ringens*	0.04	0.04	0.67%	30.00
	Forbs Subtotal	**0.50**	**0.56**	**9.41%**	**54.15**
	Total	**5.30**	**5.94**	**100.00%**	**283.08**
Purpose:	Interseeding into establishing wetlands after weed control spraying. Also suitable for two to five year short term soil stabilization for areas with saturated soils.				
Planting Area:	Statewide				

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34-181 Emergent Wetland

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
American slough grass	*Beckmannia syzigachne*	0.70	0.78	14.07%	12.92
rice cut grass	*Leersia oryzoides*	0.30	0.34	5.93%	3.70
tall manna grass	*Glyceria grandis*	0.25	0.28	4.98%	6.40
	Grasses Subtotal	**1.25**	**1.40**	**24.98%**	**23.02**
river bulrush	*Bolboschoenus fluviatilis*	0.76	0.85	15.20%	1.20
soft stem bulrush	*Schoenoplectus tabernaemontani*	0.44	0.49	8.78%	5.00
Three-square bulrush	*Schoenoplectus pungens*	0.23	0.26	4.54%	1.00
bristly sedge	*Carex comosa*	0.18	0.20	3.63%	2.00
least spikerush	*Eleocharis acicularis*	0.10	0.11	1.94%	2.50
marsh spikerush	*Eleocharis palustris*	0.10	0.11	2.03%	1.90
lake sedge	*Carex lacustris*	0.06	0.07	1.19%	0.24
woolgrass	*Scirpus cyperinus*	0.05	0.06	1.02%	32.00
tussock sedge	*Carex stricta*	0.04	0.04	0.77%	0.75
Torrey's rush	*Juncus torreyi*	0.04	0.04	0.85%	25.00
	Sedges & Rushes Subtotal	**2.00**	**2.24**	**39.95%**	**71.59**
giant bur reed	*Sparganium eurycarpum*	0.49	0.55	9.80%	0.09
common water plantain	*Alisma triviale*	0.40	0.45	8.00%	9.70
broad-leaved arrowhead	*Sagittaria latifolia*	0.30	0.34	6.07%	6.80
Sweet flag	*Acorus americanus*	0.28	0.31	5.53%	0.67
marsh milkweed	*Asclepias incarnata*	0.28	0.31	5.67%	0.50
	Forbs Subtotal	**1.75**	**1.96**	**35.07%**	**17.76**
	Total	**5.00**	**5.60**	**100.00%**	**112.37**
Purpose:	Emergent wetland restoration for use in wetland mitigation, shoreline restoration, wet stormwater ponds where emergent vegetation is desired.				
Planting Area:	Statewide				

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34-261 Riparian South & West

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
Virginia wild rye	*Elymus virginicus*	1.75	1.96	5.56%	2.70
American slough grass	*Beckmannia syzigachne*	1.36	1.52	4.30%	24.90
fowl bluegrass	*Poa palustris*	0.84	0.94	2.66%	40.00
riverbank wild rye	*Elymus riparius*	0.50	0.56	1.58%	0.53
prairie cordgrass	*Spartina pectinata*	0.30	0.34	0.96%	0.74
tall manna grass	*Glyceria grandis*	0.25	0.28	0.80%	6.50
rice cut grass	*Leersia oryzoides*	0.16	0.18	0.51%	2.00
fowl manna grass	*Glyceria striata*	0.09	0.10	0.29%	3.00
	Grasses Subtotal	**5.25**	**5.88**	**16.66%**	**80.37**
fox sedge	*Carex vulpinoidea*	0.20	0.22	0.65%	7.50
dark green bulrush	*Scirpus atrovirens*	0.12	0.13	0.38%	20.00
pointed broom sedge	*Carex scoparia*	0.06	0.07	0.21%	2.00
woolgrass	*Scirpus cyperinus*	0.05	0.06	0.15%	30.00
tussock sedge	*Carex stricta*	0.04	0.04	0.13%	0.80
path rush	*Juncus tenuis*	0.03	0.03	0.09%	10.00
	Sedges & Rushes Subtotal	**0.50**	**0.56**	**1.61%**	**70.30**
blue vervain	*Verbena hastata*	0.15	0.17	0.46%	5.00
marsh milkweed	*Asclepias incarnata*	0.12	0.13	0.38%	0.21
giant sunflower	*Helianthus giganteus*	0.07	0.08	0.22%	0.25
spotted Joe pye weed	*Eutrochium maculatum*	0.06	0.07	0.18%	2.00
bunched ironweed	*Vernonia fasciculata*	0.06	0.07	0.18%	0.50
autumn sneezeweed	*Helenium autumnale*	0.05	0.06	0.17%	2.50
spotted touch-me-not	*Impatiens capensis*	0.05	0.06	0.17%	0.08
Virginia mountain mint	*Pycnanthemum virginianum*	0.05	0.06	0.16%	4.00
tall coneflower	*Rudbeckia laciniata*	0.05	0.06	0.15%	0.25
common boneset	*Eupatorium perfoliatum*	0.03	0.03	0.11%	2.00
great lobelia	*Lobelia siphilitica*	0.03	0.03	0.09%	5.00
giant goldenrod	*Solidago gigantea*	0.02	0.02	0.07%	2.00
blue monkey flower	*Mimulus ringens*	0.01	0.01	0.02%	5.07
	Forbs Subtotal	**0.75**	**0.84**	**2.36%**	**28.86**
Oats	*Avena sativa*	25.00	28.02	79.37%	11.14
	Cover Crop Subtotal	**25.00**	**28.02**	**79.37%**	**11.14**
	Total	**31.50**	**35.31**	**100.00%**	**190.66**
Purpose:	Native riparian and floodplain plantings for wetland mitigation, ecological restoration, or general permanent cover after culvert or bridge work. Tolerates partial shade.				
Planting Area:	Tallgrass Aspen Parklands, Prairie Parkland, and Eastern Broadleaf Forest Provinces. Mn/DOT Districts 2(west), 3B, 4, Metro, 6, 7 & 8.				

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34-262 Wet Prairie

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
Virginia wild rye	*Elymus virginicus*	1.75	1.96	12.07%	2.70
fringed brome	*Bromus ciliatus*	1.50	1.68	10.38%	6.08
big bluestem	*Andropogon gerardii*	1.00	1.12	6.89%	3.67
switchgrass	*Panicum virgatum*	0.75	0.84	5.16%	3.85
Indian grass	*Sorghastrum nutans*	0.50	0.56	3.44%	2.20
prairie cordgrass	*Spartina pectinata*	0.50	0.56	3.41%	1.20
fowl bluegrass	*Poa palustris*	0.20	0.22	1.39%	9.60
tall manna grass	*Glyceria grandis*	0.15	0.17	1.02%	3.80
fowl manna grass	*Glyceria striata*	0.11	0.12	0.73%	3.50
bluejoint	*Calamagrostis canadensis*	0.04	0.04	0.27%	4.00
	Grasses Subtotal	**6.50**	**7.29**	**44.76%**	**40.60**
fox sedge	*Carex vulpinoidea*	0.10	0.11	0.66%	3.50
dark green bulrush	*Scirpus atrovirens*	0.10	0.11	0.72%	17.74
Broad-leaved Wooly Sedge	*Carex pellita*	0.05	0.06	0.32%	0.47
woolgrass	*Scirpus cyperinus*	0.03	0.03	0.18%	16.00
tussock sedge	*Carex stricta*	0.02	0.02	0.17%	0.48
	Sedges & Rushes Subtotal	**0.30**	**0.34**	**2.05%**	**38.19**
Canada tick trefoil	*Desmodium canadense*	0.50	0.56	3.41%	1.00
golden alexanders	*Zizia aurea*	0.25	0.28	1.76%	1.03
blue vervain	*Verbena hastata*	0.15	0.17	1.06%	5.25
marsh milkweed	*Asclepias incarnata*	0.08	0.09	0.55%	0.14
Virginia mountain mint	*Pycnanthemum virginianum*	0.08	0.09	0.55%	6.50
red-stemmed aster	*Symphyotrichum puniceum*	0.08	0.09	0.56%	2.40
flat-topped aster	*Doellingeria umbellata*	0.05	0.06	0.34%	1.20
autumn sneezeweed	*Helenium autumnale*	0.05	0.06	0.35%	2.39
sawtooth sunflower	*Helianthus grosseserratus*	0.05	0.06	0.38%	0.30
spotted Joe pye weed	*Eutrochium maculatum*	0.04	0.04	0.30%	1.50
Canada anemone	*Anemone canadensis*	0.03	0.03	0.21%	0.09
common boneset	*Eupatorium perfoliatum*	0.03	0.03	0.23%	2.00
bunched ironweed	*Vernonia fasciculata*	0.03	0.03	0.23%	0.30
grass-leaved goldenrod	*Euthamia graminifolia*	0.02	0.02	0.11%	2.00
great blazing star	*Liatris pycnostachya*	0.02	0.02	0.17%	0.10
Culver's root	*Veronicastrum virginicum*	0.02	0.02	0.14%	6.00
great lobelia	*Lobelia siphilitica*	0.01	0.01	0.05%	1.40
blue monkey flower	*Mimulus ringens*	0.01	0.01	0.05%	6.40
	Forbs Subtotal	**1.50**	**1.68**	**10.45%**	**40.00**
Oats	*Avena sativa*	6.20	6.95	42.74%	2.76
	Cover Crop Subtotal	**6.20**	**6.95**	**42.74%**	**2.76**
	Total	**14.50**	**16.25**	**100.00%**	**121.55**
Purpose:	Wet prairie reconstruction for wetland mitigation or ecological restoration.				
Planting Area:	Tallgrass Aspen Parklands, Prairie Parkland, and Eastern Broadleaf Forest Provinces. Mn/DOT Districts 2(west), 3B, 4, Metro, 6, 7 & 8.				

34-271 Wet Meadow South & West

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
fringed brome	*Bromus ciliatus*	1.10	1.23	9.18%	4.45
Virginia wild rye	*Elymus virginicus*	1.00	1.12	8.37%	1.55
fowl bluegrass	*Poa palustris*	0.35	0.39	2.88%	16.50
rice cut grass	*Leersia oryzoides*	0.25	0.28	2.07%	3.10
tall manna grass	*Glyceria grandis*	0.15	0.17	1.26%	3.90
fowl manna grass	*Glyceria striata*	0.10	0.11	0.83%	3.30
bluejoint	*Calamagrostis canadensis*	0.05	0.06	0.41%	5.00
	Grasses Subtotal	**3.00**	**3.36**	**25.00%**	**37.80**
bristly sedge	*Carex comosa*	0.21	0.24	1.78%	2.36
dark green bulrush	*Scirpus atrovirens*	0.18	0.20	1.48%	30.00
awl-fruited sedge	*Carex stipata*	0.17	0.19	1.40%	2.10
fox sedge	*Carex vulpinoidea*	0.14	0.16	1.13%	5.00
woolgrass	*Scirpus cyperinus*	0.08	0.09	0.67%	50.00
pointed broom sedge	*Carex scoparia*	0.05	0.06	0.43%	1.60
path rush	*Juncus tenuis*	0.04	0.04	0.34%	15.00
tussock sedge	*Carex stricta*	0.03	0.03	0.21%	0.50
	Sedges & Rushes Subtotal	**0.90**	**1.01**	**7.44%**	**106.56**
golden alexanders	*Zizia aurea*	0.25	0.28	2.06%	1.00
marsh milkweed	*Asclepias incarnata*	0.24	0.27	2.03%	0.43
red-stemmed aster	*Symphyotrichum puniceum*	0.17	0.19	1.42%	5.00
blue vervain	*Verbena hastata*	0.13	0.15	1.12%	4.61
Virginia mountain mint	*Pycnanthemum virginianum*	0.06	0.07	0.53%	5.10
sawtooth sunflower	*Helianthus grosseserratus*	0.04	0.04	0.30%	0.20
autumn sneezeweed	*Helenium autumnale*	0.03	0.03	0.23%	1.30
eastern panicled aster	*Symphyotrichum lanceolatum*	0.03	0.03	0.22%	1.50
bunched ironweed	*Vernonia fasciculata*	0.03	0.03	0.28%	0.30
common boneset	*Eupatorium perfoliatum*	0.02	0.02	0.18%	1.30
spotted Joe pye weed	*Eutrochium maculatum*	0.02	0.02	0.18%	0.75
great lobelia	*Lobelia siphilitica*	0.02	0.02	0.13%	2.90
giant goldenrod	*Solidago gigantea*	0.02	0.02	0.14%	1.50
grass-leaved goldenrod	*Euthamia graminifolia*	0.01	0.01	0.06%	1.00
blue monkey flower	*Mimulus ringens*	0.01	0.01	0.07%	6.80
tall meadow-rue	*Thalictrum dasycarpum*	0.01	0.01	0.12%	0.11
Culver's root	*Veronicastrum virginicum*	0.01	0.01	0.12%	4.20
	Forbs Subtotal	**1.10**	**1.23**	**9.19%**	**38.00**
Oats	*Avena sativa*	7.00	7.85	58.37%	3.12
	Cover Crop Subtotal	**7.00**	**7.85**	**58.37%**	**3.12**
	Total	**12.00**	**13.45**	**100.00%**	**185.48**
Purpose:	Wet meadow / Sedge meadow reconstruction for wetland mitigation or ecological restoration projects				
Planting Area:	Tallgrass Aspen Parklands, Prairie Parkland, and Eastern Broadleaf Forest Provinces. Mn/DOT Districts 2(west), 3B, 4, Metro, 6, 7 & 8.				

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34-361 Riparian Northeast

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
Virginia wild rye	*Elymus virginicus*	2.00	2.24	6.33%	3.08
American slough grass	*Beckmannia syzigachne*	1.50	1.68	4.78%	27.64
fowl bluegrass	*Poa palustris*	0.70	0.78	2.23%	33.50
riverbank wild rye	*Elymus riparius*	0.50	0.56	1.57%	0.53
tall manna grass	*Glyceria grandis*	0.25	0.28	0.80%	6.50
rice cut grass	*Leersia oryzoides*	0.15	0.17	0.49%	1.93
fowl manna grass	*Glyceria striata*	0.09	0.10	0.29%	3.00
bluejoint	*Calamagrostis canadensis*	0.06	0.07	0.19%	6.00
	Grasses Subtotal	**5.25**	**5.88**	**16.68%**	**82.18**
fox sedge	*Carex vulpinoidea*	0.20	0.22	0.65%	7.50
dark green bulrush	*Scirpus atrovirens*	0.12	0.13	0.38%	20.00
pointed broom sedge	*Carex scoparia*	0.06	0.07	0.21%	2.00
woolgrass	*Scirpus cyperinus*	0.05	0.06	0.15%	30.00
tussock sedge	*Carex stricta*	0.04	0.04	0.13%	0.80
path rush	*Juncus tenuis*	0.03	0.03	0.09%	10.00
	Sedges & Rushes Subtotal	**0.50**	**0.56**	**1.61%**	**70.30**
blue vervain	*Verbena hastata*	0.22	0.25	0.68%	7.35
marsh milkweed	*Asclepias incarnata*	0.12	0.13	0.38%	0.21
spotted Joe pye weed	*Eutrochium maculatum*	0.11	0.12	0.34%	3.70
grass-leaved goldenrod	*Euthamia graminifolia*	0.07	0.08	0.22%	9.00
giant sunflower	*Helianthus giganteus*	0.07	0.08	0.22%	0.25
common boneset	*Eupatorium perfoliatum*	0.05	0.06	0.16%	3.00
flat-topped aster	*Doellingeria umbellata*	0.04	0.04	0.13%	1.00
spotted touch-me-not	*Impatiens capensis*	0.03	0.03	0.11%	0.05
blue monkey flower	*Mimulus ringens*	0.02	0.02	0.05%	13.00
giant goldenrod	*Solidago gigantea*	0.02	0.02	0.05%	1.50
	Forbs Subtotal	**0.75**	**0.84**	**2.34%**	**39.06**
Oats	*Avena sativa*	25.00	28.02	79.37%	11.14
	Cover Crop Subtotal	**25.00**	**28.02**	**79.37%**	**11.14**
	Total	**31.50**	**35.31**	**100.00%**	**202.67**
Purpose:	Native riparian and floodplain plantings for wetland mitigation, ecological restoration, or general permanent cover after culvert or bridge work. Tolerates partial shade.				
Planting Area:	Laurentian Mixed Forest Province. Mn/DOT Districts 1, 2(east) and 3A.				

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34-371 Wet Meadow Northeast

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
fringed brome	*Bromus ciliatus*	2.00	2.24	16.04%	8.10
Virginia wild rye	*Elymus virginicus*	1.50	1.68	11.99%	2.31
fowl bluegrass	*Poa palustris*	0.65	0.73	5.19%	31.00
tall manna grass	*Glyceria grandis*	0.25	0.28	1.96%	6.30
bluejoint	*Calamagrostis canadensis*	0.10	0.11	0.78%	10.00
	Grasses Subtotal	**4.50**	**5.04**	**35.96%**	**57.71**
dark green bulrush	*Scirpus atrovirens*	0.20	0.22	1.56%	33.00
woolgrass	*Scirpus cyperinus*	0.06	0.07	0.51%	40.00
pointed broom sedge	*Carex scoparia*	0.05	0.06	0.39%	1.50
tussock sedge	*Carex stricta*	0.04	0.04	0.35%	0.85
	Sedges & Rushes Subtotal	**0.35**	**0.39**	**2.81%**	**75.35**
marsh milkweed	*Asclepias incarnata*	0.24	0.27	1.95%	0.43
spotted Joe pye weed	*Eutrochium maculatum*	0.14	0.16	1.15%	5.00
Canada anemone	*Anemone canadensis*	0.10	0.11	0.82%	0.30
flat-topped aster	*Doellingeria umbellata*	0.10	0.11	0.81%	2.50
common boneset	*Eupatorium perfoliatum*	0.09	0.10	0.68%	5.00
grass-leaved goldenrod	*Euthamia graminifolia*	0.04	0.04	0.31%	5.00
blue monkey flower	*Mimulus ringens*	0.03	0.03	0.24%	25.00
giant goldenrod	*Solidago gigantea*	0.03	0.03	0.20%	2.30
eastern panicled aster	*Symphyotrichum lanceolatum*	0.03	0.03	0.28%	2.00
	Forbs Subtotal	**0.80**	**0.90**	**6.44%**	**47.53**
Oats	*Avena sativa*	6.85	7.68	54.79%	3.05
	Cover Crop Subtotal	**6.85**	**7.68**	**54.79%**	**3.05**
	Total	**12.50**	**14.01**	**100.00%**	**183.64**
Purpose:	Wet meadow / Sedge meadow reconstruction for wetland mitigation or ecological restoration.				
Planting Area:	Laurentian Mixed Forest Province. Mn/DOT Districts 1, 2(east) and 3A.				

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35-221 Dry Prairie General

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
side-oats grama	*Bouteloua curtipendula*	3.00	3.36	8.22%	6.61
little bluestem	*Schizachyrium scoparium*	3.00	3.36	8.22%	16.53
nodding wild rye	*Elymus canadensis*	1.00	1.12	2.74%	1.91
kalm's brome	*Bromus kalmii*	0.73	0.82	2.00%	2.14
big bluestem	*Andropogon gerardii*	0.70	0.78	1.92%	2.57
Indian grass	*Sorghastrum nutans*	0.70	0.78	1.92%	3.09
blue grama	*Bouteloua gracilis*	0.50	0.56	1.37%	7.35
junegrass	*Koeleria macrantha*	0.25	0.28	0.69%	18.37
prairie dropseed	*Sporobolus heterolepis*	0.12	0.13	0.34%	0.73
	Grasses Subtotal	**10.00**	**11.21**	**27.42%**	**59.30**
black-eyed susan	*Rudbeckia hirta*	0.31	0.35	0.84%	10.32
purple prairie clover	*Dalea purpurea*	0.19	0.21	0.51%	1.02
hoary vervain	*Verbena stricta*	0.13	0.15	0.34%	1.29
lead plant	*Amorpha canescens*	0.09	0.10	0.26%	0.42
blue giant hyssop	*Agastache foeniculum*	0.06	0.07	0.17%	2.07
butterfly milkweed	*Asclepias tuberosa*	0.06	0.07	0.17%	0.10
Canada milk vetch	*Astragalus canadensis*	0.06	0.07	0.18%	0.40
bird's foot coreopsis	*Coreopsis palmata*	0.06	0.07	0.16%	0.21
white prairie clover	*Dalea candida*	0.06	0.07	0.15%	0.39
Canada tick trefoil	*Desmodium canadense*	0.06	0.07	0.18%	0.13
stiff sunflower	*Helianthus pauciflorus*	0.06	0.07	0.17%	0.09
wild bergamot	*Monarda fistulosa*	0.06	0.07	0.15%	1.42
stiff goldenrod	*Oligoneuron rigidum*	0.06	0.07	0.15%	0.83
large-flowered beard tongue	*Penstemon grandiflorus*	0.06	0.07	0.17%	0.32
smooth aster	*Symphyotrichum laeve*	0.06	0.07	0.17%	1.26
rough blazing star	*Liatris aspera*	0.04	0.04	0.12%	0.25
gray goldenrod	*Solidago nemoralis*	0.04	0.04	0.10%	3.86
heath aster	*Symphyotrichum ericoides*	0.04	0.04	0.10%	2.58
	Forbs Subtotal	**1.50**	**1.68**	**4.09%**	**26.96**
Oats	*Avena sativa*	25.00	28.02	68.49%	11.13
	Cover Crop Subtotal	**25.00**	**28.02**	**68.49%**	**11.13**
	Total	**36.50**	**40.91**	**100.00%**	**97.39**
Purpose:	General dry prairie mix for native roadsides, ecological restoration, or conservation program plantings.				
Planting Area:	Tallgrass Aspen Parklands, Prairie Parkland, and Eastern Broadleaf Forest Provinces. Mn/DOT Districts 2(west), 3B, 4, Metro, 6, 7 & 8.				

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35-241 Mesic Prairie General

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
big bluestem	*Andropogon gerardii*	2.00	2.24	5.48%	7.35
Indian grass	*Sorghastrum nutans*	2.00	2.24	5.48%	8.82
side-oats grama	*Bouteloua curtipendula*	1.60	1.79	4.39%	3.53
little bluestem	*Schizachyrium scoparium*	1.60	1.79	4.39%	8.82
nodding wild rye	*Elymus canadensis*	1.17	1.31	3.20%	2.23
slender wheatgrass	*Elymus trachycaulus*	1.00	1.12	2.73%	2.53
kalm's brome	*Bromus kalmii*	0.50	0.56	1.37%	1.47
prairie dropseed	*Sporobolus heterolepis*	0.07	0.08	0.18%	0.39
switchgrass	*Panicum virgatum*	0.06	0.07	0.17%	0.32
	Grasses Subtotal	**10.00**	**11.21**	**27.39%**	**35.46**
black-eyed susan	*Rudbeckia hirta*	0.31	0.35	0.86%	10.56
purple prairie clover	*Dalea purpurea*	0.19	0.21	0.51%	1.03
Early Sunflower	*Heliopsis helianthoides*	0.13	0.15	0.34%	0.29
blue giant hyssop	*Agastache foeniculum*	0.06	0.07	0.15%	1.82
lead plant	*Amorpha canescens*	0.06	0.07	0.15%	0.25
Canada milk vetch	*Astragalus canadensis*	0.06	0.07	0.17%	0.39
white prairie clover	*Dalea candida*	0.06	0.07	0.17%	0.44
Canada tick trefoil	*Desmodium canadense*	0.06	0.07	0.18%	0.13
stiff sunflower	*Helianthus pauciflorus*	0.06	0.07	0.17%	0.09
wild bergamot	*Monarda fistulosa*	0.06	0.07	0.17%	1.61
stiff goldenrod	*Oligoneuron rigidum*	0.06	0.07	0.17%	0.94
smooth aster	*Symphyotrichum laeve*	0.06	0.07	0.17%	1.26
hoary vervain	*Verbena stricta*	0.06	0.07	0.17%	0.64
golden alexanders	*Zizia aurea*	0.06	0.07	0.15%	0.23
common milkweed	*Asclepias syriaca*	0.04	0.04	0.10%	0.06
butterfly milkweed	*Asclepias tuberosa*	0.04	0.04	0.10%	0.06
blue vervain	*Verbena hastata*	0.04	0.04	0.12%	1.50
rough blazing star	*Liatris aspera*	0.03	0.03	0.08%	0.18
great blazing star	*Liatris pycnostachya*	0.03	0.03	0.09%	0.13
heath aster	*Symphyotrichum ericoides*	0.03	0.03	0.09%	2.30
	Forbs Subtotal	**1.50**	**1.68**	**4.11%**	**23.89**
Oats	*Avena sativa*	25.00	28.02	68.50%	11.14
	Cover Crop Subtotal	**25.00**	**28.02**	**68.50%**	**11.14**
	Total	**36.50**	**40.91**	**100.00%**	**70.49**
Purpose:	General mesic prairie mix for native roadsides, ecological restoration, or conservation program plantings.				
Planting Area:	Tallgrass Aspen Parklands, Prairie Parkland, and Eastern Broadleaf Forest Provinces. Mn/DOT Districts 2(west), 3B, 4, Metro, 6, 7 & 8.				

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35-241 Dry Prairie Northwest

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
little bluestem	*Schizachyrium scoparium*	1.50	1.68	13.63%	8.26
side-oats grama	*Bouteloua curtipendula*	1.20	1.35	10.89%	2.64
nodding wild rye	*Elymus canadensis*	1.00	1.12	9.09%	1.91
slender wheatgrass	*Elymus trachycaulus*	1.00	1.12	9.11%	2.54
kalm's brome	*Bromus kalmii*	0.90	1.01	8.17%	2.64
blue grama	*Bouteloua gracilis*	0.75	0.84	6.81%	11.00
porcupine grass	*Hesperostipa spartea*	0.45	0.50	4.09%	0.11
junegrass	*Koeleria macrantha*	0.25	0.28	2.23%	18.00
sand dropseed	*Sporobolus cryptandrus*	0.20	0.22	1.86%	15.00
	Grasses Subtotal	**7.25**	**8.13**	**65.88%**	**62.10**
purple prairie clover	*Dalea purpurea*	0.11	0.12	0.99%	0.60
Canada milk vetch	*Astragalus canadensis*	0.07	0.08	0.61%	0.42
white prairie clover	*Dalea candida*	0.06	0.07	0.55%	0.42
Early Sunflower	*Heliopsis helianthoides*	0.06	0.07	0.55%	0.14
prairie coneflower	*Ratibida columnifera*	0.06	0.07	0.55%	0.93
black-eyed susan	*Rudbeckia hirta*	0.06	0.07	0.55%	2.03
Canada tick trefoil	*Desmodium canadense*	0.05	0.06	0.45%	0.10
heart-leaved alexanders	*Zizia aptera*	0.05	0.06	0.50%	0.24
Prairie Wild Onion	*Allium stellatum*	0.03	0.03	0.27%	0.12
stiff sunflower	*Helianthus pauciflorus*	0.03	0.03	0.31%	0.05
rough blazing star	*Liatris aspera*	0.03	0.03	0.23%	0.15
wild bergamot	*Monarda fistulosa*	0.03	0.03	0.27%	0.77
stiff goldenrod	*Oligoneuron rigidum*	0.03	0.03	0.27%	0.45
smooth aster	*Symphyotrichum laeve*	0.03	0.03	0.27%	0.61
dotted blazing star	*Liatris punctata*	0.02	0.02	0.18%	0.05
gray goldenrod	*Solidago nemoralis*	0.02	0.02	0.17%	2.00
heath aster	*Symphyotrichum ericoides*	0.01	0.01	0.14%	1.10
	Forbs Subtotal	**0.75**	**0.84**	**6.86%**	**10.18**
Oats	*Avena sativa*	3.00	3.36	27.26%	1.34
	Cover Crop Subtotal	**3.00**	**3.36**	**27.26%**	**1.34**
	Total	**11.00**	**12.33**	**100.00%**	**73.62**
Purpose:	Regional dry prairie reconstruction for wetland mitigation, ecological restoration, or conservation program plantings.				
Planting Area:	Tallgrass Aspen Parklands Province, Red River Prairie Section, Hardwood Hills subsection of the MN & NE IA Morainal Section, far western portions of the Laurentian Mixed Forest Province. Mn/DOT Districts 2(west) & 4(north).				

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35-441 Mesic Prairie Northwest

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
little bluestem	*Schizachyrium scoparium*	1.50	1.68	13.66%	8.28
side-oats grama	*Bouteloua curtipendula*	1.20	1.35	10.89%	2.64
Indian grass	*Sorghastrum nutans*	1.20	1.35	10.91%	5.29
big bluestem	*Andropogon gerardii*	1.00	1.12	9.08%	3.67
nodding wild rye	*Elymus canadensis*	1.00	1.12	9.09%	1.91
slender wheatgrass	*Elymus trachycaulus*	1.00	1.12	9.11%	2.54
porcupine grass	*Hesperostipa spartea*	0.42	0.47	3.82%	0.11
switchgrass	*Panicum virgatum*	0.18	0.20	1.59%	0.90
	Grasses Subtotal	**7.50**	**8.41**	**68.15%**	**25.33**
golden alexanders	*Zizia aurea*	0.17	0.19	1.56%	0.70
purple prairie clover	*Dalea purpurea*	0.09	0.10	0.83%	0.50
blue vervain	*Verbena hastata*	0.09	0.10	0.77%	2.91
Canada tick trefoil	*Desmodium canadense*	0.08	0.09	0.77%	0.17
black-eyed susan	*Rudbeckia hirta*	0.07	0.08	0.59%	2.20
Canada milk vetch	*Astragalus canadensis*	0.06	0.07	0.54%	0.37
white prairie clover	*Dalea candida*	0.06	0.07	0.55%	0.42
Early Sunflower	*Heliopsis helianthoides*	0.06	0.07	0.55%	0.14
great blazing star	*Liatris pycnostachya*	0.06	0.07	0.54%	0.24
prairie coneflower	*Ratibida columnifera*	0.06	0.07	0.55%	0.93
Virginia mountain mint	*pycnanthemum virginianum*	0.04	0.04	0.34%	3.00
Prairie Wild Onion	*Allium stellatum*	0.03	0.03	0.27%	0.12
rough blazing star	*Liatris aspera*	0.03	0.03	0.28%	0.18
wild bergamot	*Monarda fistulosa*	0.03	0.03	0.27%	0.77
stiff goldenrod	*Oligoneuron rigidum*	0.03	0.03	0.27%	0.45
smooth aster	*Symphyotrichum laeve*	0.03	0.03	0.27%	0.61
heath aster	*Symphyotrichum ericoides*	0.01	0.01	0.14%	1.10
	Forbs Subtotal	**1.00**	**1.12**	**9.09%**	**14.81**
Oats	*Avena sativa*	2.50	2.80	22.76%	1.12
	Cover Crop Subtotal	**2.50**	**2.80**	**22.76%**	**1.12**
	Total	**11.00**	**12.33**	**100.00%**	**41.25**
Purpose:	Regional mesic prairie reconstruction for wetland mitigation, ecological restoration, or conservation program plantings.				
Planting Area:	Tallgrass Aspen Parklands Province, Red River Prairie Section, Hardwood Hills subsection of the MN & NE IA Morainal Section, may extend into the far western portions of the Laurentian Mixed Forest Province. Mn/DOT Districts 2(west) & 4(north).				

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35-521 Dry Prairie Southwest

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
little bluestem	*Schizachyrium scoparium*	1.50	1.68	11.96%	8.24
side-oats grama	*Bouteloua curtipendula*	1.40	1.57	11.16%	3.08
nodding wild rye	*Elymus canadensis*	1.20	1.35	9.63%	2.30
slender wheatgrass	*Elymus trachycaulus*	1.00	1.12	7.99%	2.53
blue grama	*Bouteloua gracilis*	0.95	1.06	7.57%	13.90
porcupine grass	*Hesperostipa spartea*	0.75	0.84	6.02%	0.19
junegrass	*Koeleria macrantha*	0.30	0.34	2.40%	22.00
sand dropseed	*Sporobolus cryptandrus*	0.15	0.17	1.20%	11.00
	Grasses Subtotal	**7.25**	**8.13**	**57.93%**	**63.23**
golden alexanders	*Zizia aurea*	0.21	0.24	1.68%	0.85
purple prairie clover	*Dalea purpurea*	0.10	0.11	0.80%	0.55
hoary vervain	*Verbena stricta*	0.10	0.11	0.78%	1.00
narrow-leaved purple coneflower	*Echinacea angustifolia*	0.08	0.09	0.62%	0.20
stiff goldenrod	*Oligoneuron rigidum*	0.07	0.08	0.53%	1.00
black-eyed susan	*Rudbeckia hirta*	0.07	0.08	0.52%	2.20
Canada milk vetch	*Astragalus canadensis*	0.06	0.07	0.51%	0.40
white prairie clover	*Dalea candida*	0.06	0.07	0.46%	0.40
Canada tick trefoil	*Desmodium canadense*	0.04	0.04	0.36%	0.09
Early Sunflower	*Heliopsis helianthoides*	0.04	0.04	0.35%	0.10
round-headed bush clover	*Lespedeza capitata*	0.03	0.03	0.27%	0.10
wild bergamot	*Monarda fistulosa*	0.03	0.03	0.24%	0.76
smooth aster	*Symphyotrichum laeve*	0.03	0.03	0.24%	0.60
rough blazing star	*Liatris aspera*	0.02	0.02	0.18%	0.13
dotted blazing star	*Liatris punctata*	0.02	0.02	0.16%	0.05
bracted spiderwort	*Tradescantia bracteata*	0.02	0.02	0.13%	0.06
whorled milkweed	*Asclepias verticillata*	0.01	0.01	0.10%	0.05
heath aster	*Symphyotrichum ericoides*	0.01	0.01	0.10%	0.90
	Forbs Subtotal	**1.00**	**1.12**	**8.03%**	**9.44**
Oats	*Avena sativa*	4.25	4.76	34.04%	1.90
	Cover Crop Subtotal	**4.25**	**4.76**	**34.04%**	**1.90**
	Total	**12.50**	**14.01**	**100.00%**	**74.57**
Purpose:	Regional dry prairie reconstruction for wetland mitigation, ecological restoration, or conservation program plantings.				
Planting Area:	North-Central Glaciated Plains Section. Mn/DOT Districts 3A(southwest) 3B, 4(south), 7 & 8.				

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35-541 Mesic Prairie Southwest

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
little bluestem	*Schizachyrium scoparium*	1.50	1.68	12.50%	8.27
Indian grass	*Sorghastrum nutans*	1.50	1.68	12.54%	6.63
big bluestem	*Andropogon gerardii*	0.90	1.01	7.49%	3.30
side-oats grama	*Bouteloua curtipendula*	0.90	1.01	7.49%	1.98
nodding wild rye	*Elymus canadensis*	0.90	1.01	7.46%	1.71
slender wheatgrass	*Elymus trachycaulus*	0.90	1.01	7.46%	2.27
western wheatgrass	*Pascopyrum smithii*	0.50	0.56	4.15%	1.30
green needle grass	*Nassella viridula*	0.44	0.49	3.67%	1.70
switchgrass	*Panicum virgatum*	0.16	0.18	1.30%	0.80
	Grasses Subtotal	**7.70**	**8.63**	**64.06%**	**27.96**
golden alexanders	*Zizia aurea*	0.25	0.28	2.06%	1.00
partridge pea	*Chamaecrista fasciculata*	0.10	0.11	0.84%	0.10
narrow-leaved purple coneflower	*Echinacea angustifolia*	0.08	0.09	0.65%	0.20
purple prairie clover	*Dalea purpurea*	0.07	0.08	0.61%	0.40
gray-headed coneflower	*Ratibida pinnata*	0.07	0.08	0.61%	0.80
blue vervain	*Verbena hastata*	0.07	0.08	0.61%	2.50
Canada milk vetch	*Astragalus canadensis*	0.06	0.07	0.53%	0.40
Early Sunflower	*Heliopsis helianthoides*	0.06	0.07	0.50%	0.14
black-eyed susan	*Rudbeckia hirta*	0.06	0.07	0.49%	2.00
Canada tick trefoil	*Desmodium canadense*	0.05	0.06	0.45%	0.11
hoary vervain	*Verbena stricta*	0.05	0.06	0.41%	0.50
wild bergamot	*Monarda fistulosa*	0.04	0.04	0.29%	0.90
white prairie clover	*Dalea candida*	0.03	0.03	0.24%	0.20
rough blazing star	*Liatris aspera*	0.03	0.03	0.28%	0.20
stiff goldenrod	*Oligoneuron rigidum*	0.03	0.03	0.28%	0.50
smooth aster	*Symphyotrichum laeve*	0.03	0.03	0.25%	0.60
great blazing star	*Liatris pycnostachya*	0.02	0.02	0.21%	0.10
	Forbs Subtotal	**1.10**	**1.23**	**9.31%**	**10.65**
Oats	*Avena sativa*	3.20	3.59	26.63%	1.42
	Cover Crop Subtotal	**3.20**	**3.59**	**26.63%**	**1.42**
	Total	**12.00**	**13.45**	**100.00%**	**40.03**
Purpose:	Regional mesic prairie reconstruction for wetland mitigation, ecological restoration, or conservation program plantings.				
Planting Area:	North-Central Glaciated Plains Section. Mn/DOT Districts 3A(southwest) 3B, 4(south), 7 & 8.				

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35-621 Dry Prairie Southeast

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
little bluestem	*Schizachyrium scoparium*	1.51	1.69	13.70%	8.30
nodding wild rye	*Elymus canadensis*	1.50	1.68	13.61%	2.86
slender wheatgrass	*Elymus trachycaulus*	1.18	1.32	10.76%	3.00
side-oats grama	*Bouteloua curtipendula*	1.13	1.27	10.23%	2.48
blue grama	*Bouteloua gracilis*	0.68	0.76	6.19%	10.00
junegrass	*Koeleria macrantha*	0.41	0.46	3.71%	30.00
kalm's brome	*Bromus kalmii*	0.31	0.35	2.78%	0.90
prairie dropseed	*Sporobolus heterolepis*	0.26	0.29	2.32%	1.50
sand dropseed	*Sporobolus cryptandrus*	0.22	0.25	1.98%	16.00
	Grasses Subtotal	**7.20**	**8.07**	**65.28%**	**75.04**
purple prairie clover	*Dalea purpurea*	0.15	0.17	1.32%	0.80
white prairie clover	*Dalea candida*	0.09	0.10	0.78%	0.60
black-eyed susan	*Rudbeckia hirta*	0.09	0.10	0.86%	3.20
butterfly milkweed	*Asclepias tuberosa*	0.06	0.07	0.52%	0.09
Early Sunflower	*Heliopsis helianthoides*	0.06	0.07	0.51%	0.13
stiff goldenrod	*Oligoneuron rigidum*	0.06	0.07	0.59%	0.98
bird's foot coreopsis	*Coreopsis palmata*	0.05	0.06	0.50%	0.20
large-flowered beard tongue	*Penstemon grandiflorus*	0.04	0.04	0.35%	0.20
round-headed bush clover	*Lespedeza capitata*	0.03	0.03	0.31%	0.10
wild bergamot	*Monarda fistulosa*	0.03	0.03	0.30%	0.85
rough blazing star	*Liatris aspera*	0.02	0.02	0.17%	0.11
dotted blazing star	*Liatris punctata*	0.02	0.02	0.23%	0.06
horsemint	*Monarda punctata*	0.02	0.02	0.22%	0.80
silky aster	*Symphyotrichum sericeum*	0.02	0.02	0.19%	0.20
heart-leaved alexanders	*Zizia aptera*	0.02	0.02	0.21%	0.10
whorled milkweed	*Asclepias verticillata*	0.01	0.01	0.11%	0.05
gray goldenrod	*solidago nemoralis*	0.01	0.01	0.14%	1.65
skyblue aster	*Symphyotrichum oolentangiense*	0.01	0.01	0.06%	0.20
bracted spiderwort	*Tradescantia bracteata*	0.01	0.01	0.12%	0.05
	Forbs Subtotal	**0.80**	**0.90**	**7.49%**	**10.37**
Oats	*Avena sativa*	3.00	3.36	27.23%	1.33
	Cover Crop Subtotal	**3.00**	**3.36**	**27.23%**	**1.33**
	Total	**11.00**	**12.33**	**100.00%**	**86.75**
Purpose:	Regional dry prairie reconstruction for wetland mitigation, ecological restoration, or conservation program plantings.				
Planting Area:	Eastern Broadleaf Forest Province excluding Hardwood Hills subsection. Mn/DOT Districts Metro & 6.				

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35-641 Mesic Prairie Southeast

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
Indian grass	*Sorghastrum nutans*	2.00	2.24	16.68%	8.82
side-oats grama	*Bouteloua curtipendula*	1.37	1.54	11.38%	3.01
little bluestem	*Schizachyrium scoparium*	1.27	1.42	10.59%	7.00
nodding wild rye	*Elymus canadensis*	1.05	1.18	8.77%	2.01
big bluestem	*Andropogon gerardii*	0.90	1.01	7.49%	3.30
slender wheatgrass	*Elymus trachycaulus*	0.90	1.01	7.50%	2.28
switchgrass	*Panicum virgatum*	0.21	0.24	1.78%	1.10
	Grasses Subtotal	**7.70**	**8.63**	**64.19%**	**27.52**
partridge pea	*Chamaecrista fasciculata*	0.60	0.67	5.00%	0.60
Canada milk vetch	*Astragalus canadensis*	0.16	0.18	1.33%	1.00
Canada tick trefoil	*Desmodium canadense*	0.15	0.17	1.24%	0.30
hoary vervain	*Verbena stricta*	0.10	0.11	0.85%	1.05
purple prairie clover	*Dalea purpurea*	0.09	0.10	0.76%	0.50
golden alexanders	*Zizia aurea*	0.07	0.08	0.60%	0.29
butterfly milkweed	*Asclepias tuberosa*	0.06	0.07	0.53%	0.10
Early Sunflower	*Heliopsis helianthoides*	0.05	0.06	0.43%	0.12
black-eyed susan	*Rudbeckia hirta*	0.05	0.06	0.38%	1.54
smooth aster	*Symphyotrichum laeve*	0.05	0.06	0.41%	1.00
bracted spiderwort	*Tradescantia bracteata*	0.04	0.04	0.34%	0.15
blue vervain	*Verbena hastata*	0.04	0.04	0.37%	1.50
rough blazing star	*Liatris aspera*	0.03	0.03	0.21%	0.15
great blazing star	*Liatris pycnostachya*	0.03	0.03	0.29%	0.14
stiff goldenrod	*Oligoneuron rigidum*	0.02	0.02	0.17%	0.31
gray-headed coneflower	*Ratibida pinnata*	0.02	0.02	0.15%	0.20
whorled milkweed	*Asclepias verticillata*	0.01	0.01	0.10%	0.05
white prairie clover	*Dalea candida*	0.01	0.01	0.07%	0.06
wild bergamot	*Monarda fistulosa*	0.01	0.01	0.06%	0.18
heath aster	*Symphyotrichum ericoides*	0.01	0.01	0.05%	0.40
	Forbs Subtotal	**1.60**	**1.79**	**13.34%**	**9.64**
Oats	*Avena sativa*	2.70	3.03	22.47%	1.20
	Cover Crop Subtotal	**2.70**	**3.03**	**22.47%**	**1.20**
	Total	**12.00**	**13.45**	**100.00%**	**38.36**
Purpose:	Regional mesic prairie reconstruction for wetland mitigation, ecological restoration, or conservation program plantings.				
Planting Area:	Eastern Broadleaf Forest Province excluding Hardwood Hills subsection. Mn/DOT Districts Metro & 6.				

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36-211 Woodland Edge South & West

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
kalm's brome	*Bromus kalmii*	1.50	1.68	4.34%	4.40
nodding wild rye	*Elymus canadensis*	1.25	1.40	3.61%	2.38
slender wheatgrass	*Elymus trachycaulus*	1.25	1.40	3.64%	3.18
big bluestem	*Andropogon gerardii*	1.00	1.12	2.90%	3.68
side-oats grama	*Bouteloua curtipendula*	1.00	1.12	2.89%	2.20
Indian grass	*Sorghastrum nutans*	1.00	1.12	2.89%	4.40
little bluestem	*Schizachyrium scoparium*	0.62	0.69	1.79%	3.40
bottlebrush grass	*Elymus hystrix*	0.32	0.36	0.91%	0.88
switchgrass	*Panicum virgatum*	0.06	0.07	0.17%	0.30
	Grasses Subtotal	**8.00**	**8.97**	**23.14%**	**24.82**
black-eyed susan	*Rudbeckia hirta*	0.18	0.20	0.52%	6.10
American vetch	*Vicia americana*	0.18	0.20	0.52%	0.14
white prairie clover	*Dalea candida*	0.17	0.19	0.50%	1.20
Canada tick trefoil	*Desmodium canadense*	0.14	0.16	0.42%	0.29
Early Sunflower	*Heliopsis helianthoides*	0.13	0.15	0.38%	0.30
golden alexanders	*Zizia aurea*	0.11	0.12	0.33%	0.46
blue giant hyssop	*Agastache foeniculum*	0.10	0.11	0.28%	3.20
wild bergamot	*Monarda fistulosa*	0.06	0.07	0.18%	1.60
stiff goldenrod	*Oligoneuron rigidum*	0.06	0.07	0.17%	0.90
Clayton's sweet cicely	*Osmorhiza claytonii*	0.06	0.07	0.17%	0.06
smooth wild rose	*Rosa blanda*	0.06	0.07	0.17%	0.06
showy goldenrod	*Solidago speciosa*	0.06	0.07	0.18%	1.80
smooth aster	*Symphyotrichum laeve*	0.06	0.07	0.19%	1.30
Lance-leaved Figwort	*Scrophularia lanceolata*	0.05	0.06	0.14%	3.20
common yarrow	*Achillea millefolium*	0.03	0.03	0.09%	2.00
white snakeroot	*Ageratina altissima*	0.03	0.03	0.09%	1.70
zigzag goldenrod	*Solidago flexicaulis*	0.02	0.02	0.05%	0.50
	Forbs Subtotal	**1.50**	**1.68**	**4.38%**	**24.80**
Oats	*Avena sativa*	25.00	28.02	72.48%	11.14
	Cover Crop Subtotal	**25.00**	**28.02**	**72.48%**	**11.14**
	Total	**34.50**	**38.67**	**100.00%**	**60.75**
Purpose:	Partly shaded grassland planting for native roadsides, reclamation, etc.				
Planting Area:	Tallgrass Aspen Parklands, Prairie Parkland, and Eastern Broadleaf Forest Provinces. Mn/DOT Districts 2(west), 3B, 4, Metro, 6, 7 & 8.				

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36-311 Woodland Edge Northeast

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
fringed brome	*Bromus ciliatus*	2.00	2.24	5.98%	8.10
slender wheatgrass	*Elymus trachycaulus*	2.00	2.24	5.96%	5.06
nodding wild rye	*Elymus canadensis*	1.25	1.40	3.72%	2.38
fowl bluegrass	*Poa palustris*	0.87	0.98	2.59%	41.50
poverty grass	*Danthonia spicata*	0.50	0.56	1.50%	4.60
False Melic	*Schizachne purpurascens*	0.25	0.28	0.75%	2.90
bluejoint	*Calamagrostis canadensis*	0.13	0.15	0.37%	12.90
	Grasses Subtotal	**7.00**	**7.85**	**20.87%**	**77.44**
American vetch	*Vicia americana*	0.50	0.56	1.50%	0.38
black-eyed susan	*Rudbeckia hirta*	0.26	0.29	0.77%	8.70
smooth wild rose	*Rosa blanda*	0.16	0.18	0.47%	0.15
stiff goldenrod	*Oligoneuron rigidum*	0.14	0.16	0.42%	2.10
smooth aster	*Symphyotrichum laeve*	0.14	0.16	0.43%	2.90
tall cinquefoil	*Drymocallis arguta*	0.06	0.07	0.19%	5.30
gray goldenrod	*Solidago nemoralis*	0.06	0.07	0.18%	6.80
flat-topped aster	*Doellingeria umbellata*	0.04	0.04	0.12%	1.00
upland white aster	*Solidago ptarmicoides*	0.04	0.04	0.13%	1.00
common yarrow	*Achillea millefolium*	0.03	0.03	0.09%	2.00
Lindley's Aster	*Symphyotrichum ciliolatum*	0.03	0.03	0.10%	1.00
pearly everlasting	*Anaphalis margaritacea*	0.02	0.02	0.05%	1.30
large-leaved aster	*Eurybia macrophylla*	0.02	0.02	0.05%	0.18
	Forbs Subtotal	**1.50**	**1.68**	**4.50%**	**32.81**
Oats	*Avena sativa*	25.00	28.02	74.63%	11.14
	Cover Crop Subtotal	**25.00**	**28.02**	**74.63%**	**11.14**
	Total	**33.50**	**37.55**	**100.00%**	**121.39**
Purpose:	Partly shaded grassland planting for native roadsides, reclamation, etc in north-central and northeast MN				
Planting Area:	Laurentian Mixed Forest Province excluding Chippewa Plains, Pine Moraines & Outwash Plains, and Mille Lacs Uplands subsections. Mn/DOT Districts 1 & 2(east).				

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36-411 Woodland Edge Northwest

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
kalm's brome	*Bromus kalmii*	2.00	2.24	5.64%	5.88
Virginia wild rye	*Elymus virginicus*	1.75	1.96	4.93%	2.70
side-oats grama	*Bouteloua curtipendula*	1.00	1.12	2.81%	2.20
nodding wild rye	*Elymus canadensis*	1.00	1.12	2.81%	1.91
slender wheatgrass	*Elymus trachycaulus*	1.00	1.12	2.81%	2.53
fringed brome	*Bromus ciliatus*	0.75	0.84	2.12%	3.04
big bluestem	*Andropogon gerardii*	0.50	0.56	1.42%	1.85
Indian grass	*Sorghastrum nutans*	0.50	0.56	1.40%	2.19
poverty grass	*Danthonia spicata*	0.38	0.43	1.06%	3.46
bluejoint	*Calamagrostis canadensis*	0.06	0.07	0.18%	6.40
little bluestem	*Schizachyrium scoparium*	0.06	0.07	0.18%	0.35
	Grasses Subtotal	**9.00**	**10.09**	**25.36%**	**32.50**
black-eyed susan	*Rudbeckia hirta*	0.31	0.35	0.86%	10.35
purple prairie clover	*Dalea purpurea*	0.18	0.20	0.51%	1.00
tall meadow-rue	*Thalictrum dasycarpum*	0.13	0.15	0.35%	0.92
American vetch	*Vicia americana*	0.13	0.15	0.37%	0.10
golden alexanders	*Zizia aurea*	0.13	0.15	0.36%	0.51
blue giant hyssop	*Agastache foeniculum*	0.12	0.13	0.35%	4.10
smooth wild rose	*Rosa blanda*	0.10	0.11	0.28%	0.10
white prairie clover	*Dalea candida*	0.06	0.07	0.16%	0.40
stiff goldenrod	*Oligoneuron rigidum*	0.06	0.07	0.17%	0.91
upland white aster	*Solidago ptarmicoides*	0.06	0.07	0.16%	1.30
Early Sunflower	*Heliopsis helianthoides*	0.04	0.04	0.12%	0.10
common yarrow	*Achillea millefolium*	0.03	0.03	0.09%	2.00
lead plant	*Amorpha canescens*	0.03	0.03	0.09%	0.15
Tall Thimbleweed	*Anemone virginiana*	0.03	0.03	0.08%	0.30
columbine	*Aquilegia canadensis*	0.03	0.03	0.08%	0.40
prairie sage	*Artemisia ludoviciana*	0.03	0.03	0.09%	2.90
flat-topped aster	*Doellingeria umbellata*	0.03	0.03	0.09%	0.80
	Forbs Subtotal	**1.50**	**1.68**	**4.21%**	**26.33**
Oats	*Avena sativa*	25.00	28.02	70.43%	11.14
	Cover Crop Subtotal	**25.00**	**28.02**	**70.43%**	**11.14**
	Total	**35.50**	**39.79**	**100.00%**	**69.96**
Purpose:	Partly shaded grassland planting for native roadsides, reclamation, etc.				
Planting Area:	Tallgrass Aspen Parklands Province. Mn/DOT District 2(west).				

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36-711 Woodland Edge Central

Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
Virginia wild rye	*Elymus virginicus*	1.75	1.96	4.93%	2.70
kalm's brome	*Bromus kalmii*	1.50	1.68	4.22%	4.40
little bluestem	*Schizachyrium scoparium*	1.13	1.27	3.17%	6.20
side-oats grama	*Bouteloua curtipendula*	1.00	1.12	2.81%	2.20
slender wheatgrass	*Elymus trachycaulus*	1.00	1.12	2.81%	2.53
nodding wild rye	*Elymus canadensis*	0.75	0.84	2.11%	1.43
big bluestem	*Andropogon gerardii*	0.50	0.56	1.42%	1.85
fringed brome	*Bromus ciliatus*	0.50	0.56	1.39%	2.00
Indian grass	*Sorghastrum nutans*	0.50	0.56	1.41%	2.20
poverty grass	*Danthonia spicata*	0.37	0.41	1.04%	3.40
	Grasses Subtotal	**9.00**	**10.09**	**25.31%**	**28.91**
Canada milk vetch	*Astragalus canadensis*	0.25	0.28	0.71%	1.58
black-eyed susan	*Rudbeckia hirta*	0.20	0.22	0.57%	6.80
purple prairie clover	*Dalea purpurea*	0.18	0.20	0.51%	1.00
Early Sunflower	*Heliopsis helianthoides*	0.13	0.15	0.37%	0.30
smooth wild rose	*Rosa blanda*	0.09	0.10	0.27%	0.09
round-headed bush clover	*Lespedeza capitata*	0.07	0.08	0.19%	0.20
blue giant hyssop	*Agastache foeniculum*	0.06	0.07	0.18%	2.10
white prairie clover	*Dalea candida*	0.06	0.07	0.16%	0.40
wild bergamot	*Monarda fistulosa*	0.06	0.07	0.18%	1.60
Clayton's sweet cicely	*Osmorhiza claytonii*	0.06	0.07	0.17%	0.06
showy goldenrod	*Solidago speciosa*	0.06	0.07	0.17%	1.80
smooth aster	*Symphyotrichum laeve*	0.06	0.07	0.18%	1.30
skyblue aster	*Symphyotrichum oolentangiense*	0.06	0.07	0.17%	1.80
golden alexanders	*Zizia aurea*	0.06	0.07	0.16%	0.23
lead plant	*Amorpha canescens*	0.05	0.06	0.13%	0.21
common yarrow	*Achillea millefolium*	0.03	0.03	0.09%	2.00
pearly everlasting	*Anaphalis margaritacea*	0.02	0.02	0.05%	1.30
	Forbs Subtotal	**1.50**	**1.68**	**4.26%**	**22.77**
Oats	*Avena sativa*	25.00	28.02	70.43%	11.14
	Cover Crop Subtotal	**25.00**	**28.02**	**70.43%**	**11.14**
	Total	**35.50**	**39.79**	**100.00%**	**62.81**
Purpose:	Partly shaded grassland planting for native roadsides, reclamation, etc.				
Planting Area:	Chippewa Plains, Pine Moraines & Outwash Plains, and Mille Lacs Uplands subsections. Mn/DOT Districts 2(southeast) & 3A.				

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Appendix B: Vegetation Types

Low-maintenance turfgrass

Low-maintenance turfgrass is a mixture of fine fescue species with some bluegrass and ryegrass. It grows more slowly than bluegrass and therefore requires less water, fertilizer, and mowing. It is also more tolerant to shade and salt than bluegrass.

Un-mowed fine fescue planting on a rural roadside, established from seed

Salt tolerant sod along a sidewalk

Overview

Seed Mix	25-131 “Low Maintenance Turfgrass” and Salt-Tolerant Sod
Purpose	Salt-tolerant turfgrass, also shade-tolerant and requires less watering, fertilizer, and mowing than bluegrass. Slow to recover from heavy foot traffic.
Where to use	Boulevards, commercial settings, lawns that do not get a lot of foot traffic.
MnDOT District	Statewide
Height	3-5”
Cost*	Seed Mix 25-131: $800 – 1,000/acre; Salt Tolerant Sod: $45,000 - $50,000/acre
When to plant	Seed: April 1 – June 1 & July 20 – Sept 20; Sod: April 15 – June 10

*Costs are based on MnDOT Average Bid Prices. Seed mix cost is for seed only and does not include installation and establishment costs. Sod cost includes materials, installation, and establishment work.

Establishment Maintenance

Year 1

- Watch for germination in 1-2 weeks.
- Initial seedling density should be at least 1 per square inch.
- Water if rainfall is less than 1" per week, continue until established.
- Mow when grass reaches 5-6" high, cut back to 3-4" height.
- Re-seed any bare patches – plants do not spread quickly like bluegrass does.

Long-term maintenance

- Mow 4-8 times per year if turfgrass appearance is desired.
- Spot-spray weeds only if necessary.
- Re-seed any bare patches – plants do not spread quickly like bluegrass does.

Photo: University of MN Dept. of Horticultural Sciences

Key Indicator Species

Look for the narrow, rolled leaves of fine fescue. These plantings should have very little bluegrass.

Bluegrass leaves (left) are wide, flat, and have tips folded like the end of a canoe. Fine fescue (right) leaves are narrow and rolled.

Bluegrass leaves (left) are wide, flat, and have tips folded like the end of a canoe. Fine fescue (right) leaves are narrow and rolled.

Short native roadside vegetation

Native vegetation is sometimes needed on inslopes and medians. Seed mix 35-221 grows shorter to allow this. It also grows well on dry, sandy soils. This mix contains many native plant species from several functional groups to create a locally-adapted, diverse planting that is resilient to MN weather extremes and provides necessary roadside functions such as erosion control and stormwater management.

Short native roadside vegetation growing on the inslope of an interstate highway .

Short native vegetation growing on dry, sandy soil.

Overview

Seed Mixes	35-221
Purpose	Short roadside vegetation where native vegetation is needed on inslopes and medians
Where to use	Inslopes and medians; also on dry or sandy soils that are not regularly mowed
MnDOT District	Districts 2(west), 3B, 4, Metro, 6, 7, & 8
Height	2-4 feet
Cost*	$900 per acre
When to plant	April 15 – July 20 and Sept 20 – Oct 20 (36-311 can be planted April 15 – Oct 20)

*Costs are based on MnDOT Average Bid Prices. Seed Mix cost is for seed only and does not include installation and establishment costs.

Establishment Maintenance

Year 1

- Watch for indicator species to emerge in 3-5 weeks.
- Perennial seedling density should be 4-6 plants per square foot.
- Water if conditions get very dry after germination.
- Mow 2-3 times, when 18” high or before weeds flower. Cut to 6-10” height.

First year, showing scattered small bunch grasses;

Year 2

- Look for at least 1 perennial plant per sq foot.
- Planted vegetation should cover 50% of the soil surface by mid-summer.
- Mow 1-2 times, before weeds flower. Cut to 8-12” height.
- Spot-spray perennial noxious weeds and birdsfoot trefoil.

Lower photo: 2nd year grasses and forbs filling in

Long-term maintenance

- Mow or burn every 3-5 years. Spot spray weeds and brush as needed.

Key Indicator Species

Black-eyed Susan - fuzzy oval leaves

Little bluestem – smooth leaves, flattened, reddish base

Side-oats Grama – evenly spaced hairs on leaf edges

Tall native roadside vegetation

This is the most common vegetation type used for roadsides on MnDOT projects. It provides long term erosion control and stormwater management for most areas that aren't mowed regularly. It uses many native plant species to create a locally adapted planting that is resilient to MN weather extremes.

Fall wildflowers in ditch bottom

Tall native grasses in ditch bottom and backslope

Overview

Seed Mixes	35-241
Purpose	General roadside vegetation for full sun in areas that will be mowed no more than once per year
Where to use	Backslopes and ditch bottoms that aren't saturated and aren't regularly mowed; also wide medians (50' or wider)
MnDOT District	Districts 2(west), 3B, 4, Metro, 6, 7, & 8
Height	4-6 feet
Cost*	$600 - $700 per acre
When to plant	April 15 – July 20 and Sept 20 – Oct 20 (36-311 can be planted April 15 – Oct 20)

*Costs are based on MnDOT Average Bid Prices. Seed Mix cost is for seed only and does not include installation and establishment costs.

Establishment Maintenance

Year 1

- Watch for indicator species to emerge in 3-5 weeks.
- Perennial seedling density should be 4-6 plants per square foot.
- Water if conditions get very dry after germination.
- Mow 2-3 times, when 18” high or before weeds flower. Cut to 6-10” height.

First year, showing scattered small bunch grasses;

Year 2

- Look for at least 1 perennial plant per sq foot.
- Planted vegetation should cover 50% of the soil surface by mid-summer.
- Mow 1-2 times, before weeds flower. Cut to 8-12” height.
- Spot-spray perennial noxious weeds and birdsfoot trefoil.

Second year, with grasses and forbs filling in

Long-term maintenance

- Mow or burn every 3-5 years. Spot spray weeds and brush as needed.

Key Indicator Species

Black-eyed Susan - fuzzy oval leaves

Golden Alexanders - round leaf w/ coarse teeth

Sideoats Grama – evenly spaced hairs on leaf edges

Shade-tolerant roadside vegetation

The woodland edge seed mixes consist of native species that grow well in up to 50% shade. These mixes contain many native plant species from several functional groups to create a locally-adapted, diverse planting that is resilient to MN weather extremes and provides necessary roadside functions such as erosion control and stormwater management.

Northern MN roadside planting similar to Seed Mix 36-311 Woodland Edge Northeast

Southern MN planting similar to Mix 33-211 Woodland Edge South & West

Overview

Seed Mixes	36-211, 36-311, 36-411, and 36-711 "Woodland Edge" mixes
Purpose	General roadside vegetation for partly-shaded settings in areas that will be mowed no more than once per year
Where to use	Shaded backslopes, and ditch bottoms that aren't saturated and aren't regularly mowed
MnDOT District	Statewide; Mix 36-311 is the primary seed mix for District 1 and the east half of District 2
Height	3-6 feet
Cost*	$1,000 - $1,200 per acre
When to plant	April 15 – July 20 and Sept 20 – Oct 20 (36-311 can be planted April 15 – Oct 20)

*Costs are based on MnDOT Average Bid Prices. Seed Mix cost is for seed only and does not include installation and establishment costs.

Establishment Maintenance

Year 1

- Watch for indicator species to emerge in 2-4 weeks.
- Perennial seedling density should be 4-6 plants per square foot.
- Water if conditions get very dry after germination.
- Mow 2-3 times, when 18” high or before weeds flower. Cut to 6-10” height.

Year 2

- Look for at least 1 perennial plant per square foot.
- Planted vegetation should cover 50% of the soil surface by mid-summer.
- Mow 1-2 times, before weeds flower. Cut to 8-12” height.
- Spot-spray perennial noxious weeds and birdsfoot trefoil.

Long-term maintenance

- Mow or burn every 3-5 years. Spot spray weeds and brush as needed.

Key Indicator Species

Figure 32: Black-eyed Susan - fuzzy oval leaves

Figure 33: Yarrow - feather-like leaves

Stormwater treatment seed mixes

Plantings around stormwater treatment basins and in wet ditches need to handle a wide range of moisture conditions. Seed mixes 33-261 and 33-361 were designed for this. These mixes contains many native plant species from several functional groups to create a locally-adapted, diverse planting that is resilient to MN weather extremes and provides necessary roadside functions such as erosion control and stormwater management.

Grasses and forbs similar to Mix 33-261 growing along the edge of a stormwater retention pond in SE MN

Grasses and bulrushes similar to Mix 33-361 in a wet ditch in NE MN

Overview

Seed Mixes	33-261 (western and southern MN) & 33-361 (NE MN)
Purpose	Vegetation that tolerates conditions ranging from short inundation to occasionally dry
Where to use	Retention basin sideslopes, infiltration/filtration basin bottoms, and wet ditches
MnDOT District	Mix 33-261: Districts 2(west), 3B, 4, Metro, 6, 7, & 8 Mix 33-361: Districts 1, 2(east), & 3A
Height	4-6 feet
Cost*	$900 - $1200 per acre
When to plant	April 15 – July 20 and Sept 20 – Oct 20 (36-311 can be planted April 15 – Oct 20)

*Costs are based on MnDOT Average Bid Prices. Seed Mix cost is for seed only and does not include installation and establishment costs.

Establishment Maintenance

Year 1

- Watch for indicator species to emerge in 3-5 weeks.
- Perennial seedling density should be 4-6 plants per square foot.
- Water if conditions get very dry after germination.
- Mow 2-3 times, when 18” high or before weeds flower. Cut to 6-10” height.

First year, showing scattered small bunch grasses and cover crop;

Year 2

- Look for at least 1 perennial plant per sq foot.
- Planted vegetation should cover 50% of the soil surface by mid-summer.
- Mow 1-2 times, before weeds flower. Cut to 8-12” height.
- Spot-spray perennial noxious weeds and birdsfoot trefoil.

Second year, with grasses and forbs filling in

Long-term maintenance

- Mow or burn every 3-5 years. Spot spray weeds and brush as needed.

Key Indicator Species

Black-eyed Susan - fuzzy oval leaves

Swamp Milkweed – smooth opposite leaves, white sap

Blue Vervain – leaves are fuzzy, serrated, opposite, & puckered

Inslope and Median Seed Mixes

Coming soon

Bluegrass Turf

Coming soon

Appendix C: Pay Items

Table 5: Seeding and Vegetation Establishment Pay Items

Item Number	Description	Rate	Unit	Notes
2574.505	Subsoiling	NA	Acre	Use on all projects with soil disturbance. Estimate 0.5 acre of subsoiling for every 1 acre of soil disturbance.
2574.505	Soil Tracking	NA	Acre	Use on slopes steeper than 1.5H : 1V
2574.505	Soil Bed Preparation	NA	Acre	Use on all projects with soil disturbance. Estimate 1.5 acres of soil bed prep for every 1 acre of soil disturbance.
2574.509	Lime	2 tons/acre	Ton	Use if soil test shows pH ≤6.3**
2574.508	Fertilizer Type 1 (commercial)	200 pounds/ Acre*	Pound	Use with temporary seeding; 10-10-20
2574.508	Fertilizer Type 1 (commercial)	350 pounds/ Acre*	Pound	Use with 2X-XXX seed mixes in areas away from water; 20-10-20
2574.508	Fertilizer Type 3 (slow release)	200 pounds/ Acre*	Pound	Use with 2X-XXX seed mixes near water or for sod; 22-5-10
2574.508	Fertilizer Type 3 (slow release)	350 pounds/ Acre*	Pound	Use with 3X-XXX seed mixes in areas away from water; 22-5-10
2574.508	Fertilizer Type 4 (natural based)	120 pounds/ Acre*	Pound	Use with 3X-XXX seed mixes near water; 18-1-8 for loam & clay loam, 17-10-7 for sandy soils
2575.505	Seeding	NA	acre	Use on all projects with soil disturbance
2575.508	Seed Mixture ____	See notes	Pound	See Choosing Seed Mixtures for mix numbers, seeding rates, and location information
2575.504	Sodding Type Lawn	NA	Square yard	Use in residential areas behind sidewalks
2575.504	Sodding Type Salt Tolerant	NA	Square yard	Use in areas where salt use is expected (boulevards, road edges, medians, commercial areas)
2575.505	Mowing	NA	acre	Use on projects lasting more than 3 months. Include 2 acres of mowing for each acre seeded.

Item Number	Description	Rate	Unit	Notes
2575.505	Weed Spraying	0.5	acre	Use on all projects with seeding. Include 0.5 acre of spraying for each acre seeded
2575.506	Weed Spray Mixture	0.125 gallon/ acre	gallon	Use on all projects with seeding. Estimate 1 pint (1/8th gallon) of weed spray mixture for each acre of weed spraying. Add this note to SEQ: Clopyralid herbicide labeled for right of way use and formulated at 3 pounds acid equivalent per gallon
2575.523	Water	See notes	M gallon	Use for critical slopes or other situations where support for vegetation establishment may be needed. Estimate 3,000 M gallons (30,000 gallons) per acre per week. Assume three weeks.
2504.601	Irrigation System		Lump sum	Use for critical slopes or other situations where repeated watering will be critical to vegetation establishment

***** Actual fertilizer rates and analyses should be based on project-specific topsoil test results. These fertilizer analyses and rates are general recommendations.

**Common in sandy soils in Districts 1 (Pine Co.), 2(east), 3, and Metro (Anoka and Chisago)