

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

CRITICAL AREA PLANTING

(Acre)

CODE 342

DEFINITION

Establishing permanent vegetation on sites that have or are expected to have high erosion rates, and on sites that have physical, chemical or biological conditions that prevent the establishment of vegetation with normal practices.

PURPOSE

- Stabilize areas with existing or expected high rates of soil erosion by water.
- Stabilize areas with existing or expected high rates of soil erosion by wind.
- Restore degraded sites that can not be stabilized through normal farming practices

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to highly disturbed areas such as active or abandoned mined lands, urban conservation sites, road construction areas, conservation practice construction sites, areas needing stabilization before or after natural disasters such as floods, hurricanes, tornados and wildfires and other areas degraded by human activities or natural events.

CRITERIA

General Criteria Applicable to All Purposes

A site investigation shall be conducted to plan the needed soil amendments, site preparation alternatives, erosion control methods, etc.

Species selected for seeding or planting shall be suited to current site conditions and intended uses, including climate conditions, soil characteristics, aspect, exposure to sunlight, slope, drainage, presence of concentrated flow areas, proximity to natural plant communities, and plant characteristics such as season of growth, vigor, disease resistance, ease of establishment, longevity of the species, adaptation to soil conditions, growth habit and conservation value. Grasses, forbs, trees and shrubs used singly or in combination are appropriate plant materials. Selected species will have the capacity to achieve adequate density and

vigor within an appropriate period to stabilize the site sufficiently to permit suited uses with ordinary management activities.

Seeding mixtures and rates of seeding or planting will be selected from Table 1 of the specifications for this standard, to best suit the site conditions. Species, rates of seeding or planting, minimum quality of planting stock, such as pure live seed (PLS) or stem caliper, method of seedbed preparation, and method of establishment shall be specified before application. Only viable, high quality seed or planting stock will be used.

Where there is known native prairie or certified native grass or forb seed production fields present, maintain an isolation distance of 165 feet for grasses and 1320 feet for forbs when planting the same species that have different genetic origins.

Seeding or planting shall be done at a time and in a manner that best ensures establishment and growth of the selected species. What constitutes successful establishment (e.g. minimum percent ground/canopy cover, percent survival, stand density, etc.), shall be specified before application.

Planting dates shall be scheduled during periods when soil moisture is adequate for germination and/or establishment. See the attached specifications for planting dates.

Plan and apply pest and nutrient management, mulching and other facilitating practices for plant growth to accelerate establishment of selected species.

The amount of plant biomass and cover needed to reduce wind and water erosion to the planned soil loss objective shall be determined using the current approved wind and/or water erosion prediction technology.

Comply with all applicable federal, state and local laws, rules and regulations including those concerned with invasive species or species that are no longer acceptable to federal, tribal, state, or local partners.

NRCS-Minnesota
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Additional Criteria to Restore Degraded Sites

If gullies or deep rills are present, they will be treated to allow equipment operation and ensure proper site and seedbed preparation.

Based on a soil test, soil amendments will be added to improve or eliminate physical or chemical conditions that inhibit plant establishment and growth. Required amendments, such as compost or manure to add organic matter and improve soil structure and water holding capacity; agricultural limestone to increase the pH of acid soils; or elemental sulfur to lower the pH of calcareous soils shall be included in the site specification with amounts, timing, and method of application.

CONSIDERATIONS

Species or mixes that are adapted to the site and have multiple values should be considered. Native species should be considered when appropriate to site treatment.

Avoid species that may harbor pests. Species diversity should be considered to avoid loss of function due to species-specific pests.

Plans should be in compliance with the Migratory Bird Treaty Act.

On low maintenance sites, the use of seeding mixtures that include native grass species should be considered for improved wildlife habitat and aesthetics.

Seeding has advantages over sodding including lower establishment costs, a variety of grass and legume species to select from, and easier to install and establish on difficult sites. Sodding has advantages including immediate erosion control, reduced chance of failure, few weed problems and quicker use of sodded surfaces.

For waterways and areas of concentrated flow, seeding across the direction of water flow is preferred to seeding up and down the waterway with the direction of flow.

Hydroseeding is recommended on slopes too steep for normal field equipment or where the use of normal field equipment is not feasible.

Fertilizer spreaders may be used to broadcast seed along with the lime and fertilizer requirements. Inert materials such as cracked corn may be used as bulk material to aid in seed dispersal.

Allelopathy effects have been documented with certain cereal grains used as temporary cover.

These crops produce chemical substances that inhibit the growth or establishment of following crops. Light tillage is often used to reduce allelopathy prior to seeding permanent cover.

Ground disturbing activities such as shaping and site preparation have the potential to affect significant cultural resources.

Planning and installation of other conservation practices such as Diversions, Land Smoothing, Obstruction Removal, Surface and Subsurface Drains or Underground Outlets may be necessary to prepare a critical area for planting.

If mulching is needed, follow the Mulching (484) standard.

When planning nutrient applications and tillage applications, encourage soil carbon buildup while discouraging greenhouse gas emissions.

PLANS AND SPECIFICATIONS

Prepare plans and specifications for each field or management unit according to the criteria and operation and maintenance sections of this standard. Specifications shall describe the requirements for applying this practice to meet the intended purpose.

Record practice specifications using approved specification sheets, job sheets or other acceptable documentation.

The following elements shall be addressed in the plan, as applicable, to meet the intended purpose:

- Site Preparation
- Topsoil
- Fertilizer Application
- Seedbed/Planting Bed Preparation
- Methods of Seeding / Planting
- Time of Seeding / Planting
- Selection of Species
- Seed / Plant Source
- Seed Analysis
- Rates of Seeding
- Mulching
- Planting Trees, Shrubs and Vines
- Supplemental Water for Plant Establishment
- Protection of Plantings

OPERATION AND MAINTENANCE

Use of the area shall be controlled as long as necessary to stabilize the site and achieve the intended purpose. Protect new seedings from domestic livestock grazing, fire and traffic until well established.

Control or exclude pests that will interfere with the timely establishment of vegetation. Mow, clip or use approved chemicals as often as necessary during the seeding year to control noxious weeds and undesirable plants.

After the seeding year, use spot mowing, chemical treatment or prescribed burning to control noxious weeds and other undesirable plants. Practice Standard 338, Prescribed Burning may also be used to maintain vigorous stands of native grasses.

Occasional grazing and/or haying may benefit the stand. If grazing or haying is to be used as a management tool, develop specific management guidelines that stimulate the health and vigor of the vegetation without reducing the erosion control benefits. Mow grassed waterways and diversions as needed to maintain desired flow capacity.

Inspections, reseeding or replanting, fertilization, and pest control may be needed to insure that this practice functions as intended throughout its expected life. Observation of establishment progress and success should be performed at regular intervals until the practice has met the criteria for successful establishment and implementation.

Where establishment of vegetation creates potential habitat for grass-nesting birds, the impacts of vegetative disturbance upon these birds and their nests should be considered and included in operation and maintenance plans. Maintenance activities that result in disturbance of vegetation will not be conducted during May 1 to August 1, the primary nesting season for grass-nesting birds where occupied habitat for these species exists.

Mowing during the nesting period may occur only in the establishment year. To benefit insect food sources for grassland nesting birds, spraying or other control of noxious weeds will be done on a "spot" basis to protect forbs and legumes that benefit native pollinators and other wildlife.

REFERENCES

USDA-NRCS 2006. The PLANTS database: <http://plants.usda.gov>, 19 October 2006).

National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

University of Minnesota Extension Bulletin BU-6240-E: Fertilizer Recommendations for Agronomic Crops in Minnesota.

United States Department of Agriculture-Natural Resources Conservation Service-Minnesota Field Office Technical Guide, Section IV, Conservation Practice Standards 484, Mulching and 645, Upland Wildlife Habitat Management.

Critical Area Planting (342)

Specifications

Seeding Dates

It is policy in Minnesota to perform permanent seeding and mulching as soon as possible after completion of projects under government contract or division of work agreements. Non-contract projects should be seeded as soon as possible after construction is completed when construction occurs between April 1 and September 1 (north) or September 10th (south). If possible, seed during the optimum seeding periods listed in the table below. If it is not possible to wait, seeding can be done outside of the optimum seeding periods; however these seedings will have a greater chance of failure. No seeding will be done from September 1(north) or Sept. 10 (south) to November 1. After those dates, a dormant seeding may be done. See Figure 1 for planting zones.

OPTIMUM SEEDING PERIODS

North

	Spring	Summer	Dormant
Cool Season Grass	April 1 – June 15	July 15 – Sept. 1	Nov. 1 – freeze-up
Warm Season Grass	May 15 – June 30		Nov. 1 – freeze-up

South

	Spring	Summer	Dormant
Cool Season Grass	April 1 – June 1	Aug. 1 – Sept. 10	Nov. 1 – freeze-up
Warm Season Grass	May 15 – June 30		Nov. 1 – freeze-up

Dormant seedings are made after soil temperatures are cool enough to prevent germination. Dormant seedings will not be made on areas covered with ice or when snow is deeper than 2 inches, and will be mulched according to NRCS Practice Standard 484, Mulching. This type of seeding is riskier than spring or summer seedings.

Seeding Rates

Seeding rates are based on pounds of Pure Live Seed (PLS) per acre. When designing a custom seed mixture, at least 50% of the mixture must be grass. Only viable, high quality and adapted seed will be used. All seed and planting materials shall be labeled and meet state seed quality law and standards. Seed must be clean and relatively free of weed seed and other contaminants.

Legume seed shall be inoculated with the appropriate strain of nitrogen fixing bacteria prior to planting. Pre-inoculated seed shall be planted prior to the expiration date on the inoculum tag or be re-inoculated within 24 hours prior to planting. When applied with a hydroseeder, four times the amount of inoculant recommended by the manufacturer shall be used. Inoculated seed shall not be held in a slurry with fertilizer for more than one hour.

Companion Crops

Small grain companion crops shall be used on all critical area seedings when the area is not mulched. Companion crops are optional if mulching is done. For mixtures of introduced grasses - oats, barley, or spring wheat shall be seeded at the rate of $\frac{3}{4}$ to $1 \frac{1}{4}$ bushels per acre with spring, summer or dormant seedings. Winter wheat or rye can be used with spring seedings only, at a rate of $\frac{1}{2}$ to $\frac{3}{4}$ bushels per acre. Companion crops shall be clipped before heading so they do not become competitive to the developing grass seeding. Annual rye grass may be used as a companion crop in lieu of small grain during all seeding periods at the rate of 3 pounds per acre. It does not have to be clipped.

For Native Grass Mixtures, include Canada Wild Rye or Sideoats Grama seeded at 1 – 2 lbs. per acre to serve the purpose of a companion crop.

Fertilizer and Lime

For mixtures with native species, fertilizer and lime are not recommended.

With introduced species, soil fertility and pH level will be amended to satisfy the needs of the specific plant species planned. Recommendations will be determined by using a soil test or, if no soil test is available, apply the following minimum amounts of fertilizer (pounds per acre):

	N	P ₂ O ₅	K ₂ O
CS - Cool Season Grass	80	80	80
CS grass & Legume	50	100	100

If the recommended fertilizer rate exceeds the criteria in NRCS Conservation Practice Standard 590, Nutrient Management, appropriate mitigating practices will be installed to reduce the risk of nutrient losses from the site.

Apply lime as needed to adjust soil pH to 6.0 for grass species and red clover. Adjust soil pH to 6.5 for seeding mixtures containing alfalfa.

Site Preparation and Topsoiling

The area will be shaped to final design grade, including installation of all measures to provide surface and subsurface drainage and needed erosion and sediment control practices. Grade to a stable slope when shaping to permit use of conventional equipment for fertilizer application, seedbed preparation, seeding, mulch application and mulch anchoring. For slopes steeper than 2:1 special practices such as soil bioengineering may be required. Eliminate all overfalls. The toe of the slope or the outlet of the concentrated flow channel shall be stable before attempting seeding.

On sites where exposed and underlying soil material will not support vegetation apply a minimum of 4 – 6 inches of topsoil as a part of construction. Topsoil shall be the highest quality surface soil available at the site and shall be free of debris, trash, stumps, rocks, roots, noxious weeds or any substance potentially toxic to plant growth. If available topsoil material is no better than the material to be covered, do not apply topsoil.

The surface of areas to be topsoiled shall be loosened to a depth of 2 inches. The topsoil shall be mixed within this depth to insure bonding of the topsoil and subsoil. Compact the topsoil enough to insure good contact with underlying soil but not so much that it will deter seed germination or prevent proper anchoring of mulch. Topsoil shall not be placed while in a frozen or muddy condition, when the subgrade is excessively wet or in a condition that may otherwise be detrimental to proper grading or proposed sodding or seeding. Smooth topsoil to allow seedbed preparation.

Seedbed Preparation and Seeding

During spring, summer or dormant seeding periods, seedbed preparation shall immediately follow construction activities. When construction is completed outside those periods or if dormant seeding is not planned, other erosion control methods such as applying mulch or seeding temporary cover will be used, and seedbed preparation will be done just prior to seeding during the next seeding period.

After construction and site preparation is completed, apply fertilizer and work the seedbed to a depth of 4 inches with a disc, field cultivator or similar equipment to loosen compacted layers, incorporate fertilizer and permit root penetration. On areas too steep for equipment to operate, scarify by hand. Then harrow or pack the seedbed prior to seeding to make a firm seedbed. The seedbed shall contain enough fine soil particles for uniform shallow coverage of the seed and contact with moisture and nutrients.

Apply the seed uniformly over the site by drilling, broadcasting or hydroseeding. Seed at a depth of ¼ to ½ inch, and firm the seedbed immediately to cover the seed by cultipacking or harrowing. Use hand raking where it is too steep or where surface obstructions hinder mechanical operations. Apply mulch if a cover crop is not being used.

With hydroseeding, seed and fertilizer may be applied in the same operation; however, separate operations may be desirable to avoid possible “burning” of the seed by the fertilizer. Hydroseeders shall provide continuous agitation and be capable of supplying a continuous, non-fluctuating flow of slurry.

Mulching

All critical area plantings will be mulched according to the NRCS Conservation Practice Standard 484, Mulching when a companion crop is not used. It is also required in the following situations:

- Fill heights greater than 10 feet in vertical height and/or longer than 30 feet.
- Designed channels to carry concentrated flows where velocity exceeds 2.5 f.p.s.
- All dormant seedings.

Mulching will be completed as soon as possible after seeding. When construction is completed and the permanent seeding is delayed for more than 30 days, it may be desirable to mulch the site before seeding, to control erosion. Prepare the seedbed, apply the fertilizer, and then apply and anchor the mulch material. When it is time to seed broadcast the seed uniformly over the mulch or use no-till equipment to plant through the mulch. When the seed is broadcast, double the seeding rate.

Temporary Cover

Completed sites or disturbed areas that will not have additional construction activity, where permanent seeding will not be done for 60 days or longer will be seeded to a temporary cover crop to stabilize eroding areas. For shorter periods of time, the need for temporary cover will be determined by site conditions. The residue from this crop may either be incorporated into the soil during seedbed preparation for the permanent seeding, or left on the surface and the planting made as a no-till seeding. Select temporary cover crops from the following table.

Species	Rate/Acre	Seeding Date
Oats	2 1/2 bushels	4/1 to 9/15
Sudangrass	1 bu (40 lbs.)	5/15 to 8/15
Millet	12 lbs.	5/15 to 8/15
Annual Ryegrass	8 lbs.	4/1 to 9/15
Cereal Rye	1 bushels	8/1 to 9/15
Winter Wheat	1 1/4 bushels	8/1 to 9/15

Sodding

Specifications for site preparation, topsoiling, seedbed preparation and fertilizing are the same as for seeding.

All sod used shall be free of noxious weeds, diseases and insects. Only moist, fresh sod shall be used. It shall be sufficiently moist to withstand exposure and handling during transplanting operations. Sod shall be machine cut at a uniform thickness of ½ to 1 inch, excluding top growth, and edges shall be cut straight and smooth. Sod strips shall not have dry or dead edges.

Lay sod as soon as possible after delivery to the site. Wet soil to a depth of two inches or more prior to laying the sod. Lay the sod from the lower end of the slope and work up slope. On steep slopes, use of ladders will speed up the laying and prevent damage to the sod. Sod strips shall be laid at right angles to the flow of water. Butt the edges and ends of each strip firmly together and stagger joints a minimum of 12 inches. Tamp or roll the laid sod to insure a solid contact of roots to soil surface. Outside edges of sodded areas shall be rolled in or banked flush with soil or other materials adjoining edges. On sites where surface drainage may try to follow sodded edges, extend sod strips 1 – 2 feet beyond the edges of the area being sodded every 8-10 feet to create a staggered effect.

On severely steep sites or when anticipating overland flow, sod shall be held in place by woven wire, wooden pegs, wire staples, or similar material. Pegs or staples will be a minimum of 10 inches long.

After laying sod, water thoroughly to wet the sod pad and the soil to a depth of 4 inches. In the absence of adequate rainfall, water during the first 30 days to keep underlying soil moist and allow the sod to become established. After the initial 30 day period, water as necessary to maintain adequate moisture in the root zone.

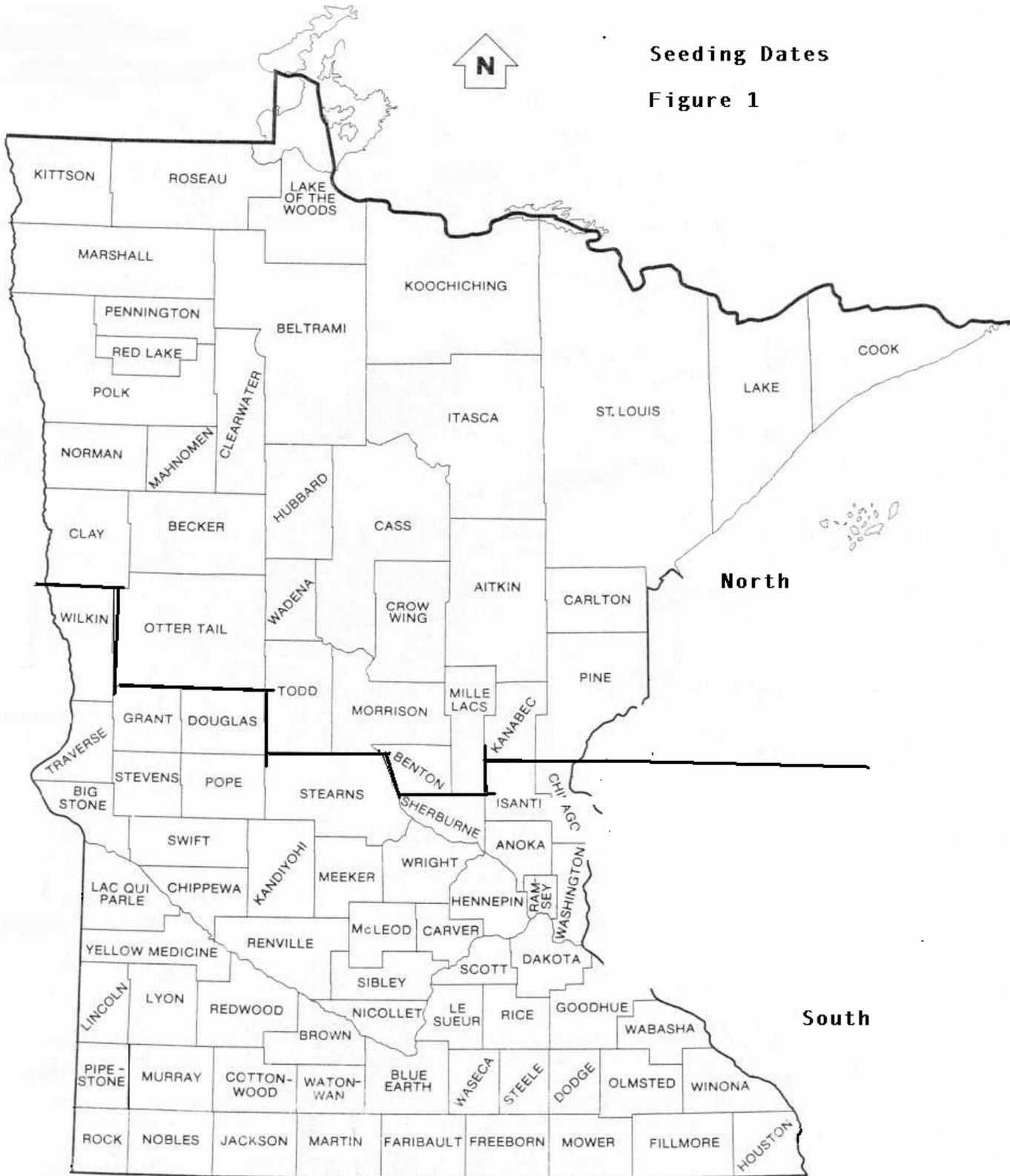


Table 1: Seeding Mixtures for Permanent Seedings

Seeding Mixture	Lbs/acre	Seeds/ft ² @1 lb./acre	Suitable Uses ¹	Drainage	Remarks
Smooth Brome Perennial Rye	20 3	3.1 6.3	CO, WW, CA	Moderate to well, Excessively drained	
Smooth Brome Timothy Perennial Rye	15 5 3	3.1 28.2 6.3	CO, WW, CA	Well to somewhat poorly drained	Add Red Clover or Alsike Clover if desired
Smooth Brome Red Top Perennial Rye	15 2 5	3.1 114.6 6.3	CO	Moderate to excessively drained	Add Alfalfa or Alsike Clover if desired
Intermediate Wheatgrass Timothy Canada Wildrye	23 7 7	2 28.2 2.6	CO, WW	Well to somewhat poorly drained	Add Alsike clover or Alfalfa if desired
Kentucky Blue Creeping Red Fescue Perennial Rye	5 - 5 10	40 - 5 6.3	CO,CA	Well to somewhat poorly drained	Add alsike or red clover if desired
Creeping Foxtail Timothy Red Top Perennial Rye	10 2 2 3	14 28.2 114.6 6.3	CO, WW, CA	Somewhat poorly to poorly drained	Add Red Clover if desired
Timothy Canada Wildrye Western Wheat Tall Wheat	2 7 10 5	28.2 2.6 2.5 1.8	CO,WW,CA	Moderate to somewhat poorly drained	
Big Bluestem Indiangrass Switchgrass Canada Wildrye	6 6 4 7	3.8 4 8.9 2.6	CO, CA	Moderate to well drained	
Big Bluestem Indiangrass Switchgrass Sideoats grama Little Bluestem	4 4 3 3 3	3.8 4 8.9 4.4 6	CO	Moderate to Excessively drained	
Switchgrass Sideoats Grama Canada Wildrye Western Wheat	4 4 7 5	8.9 4.4 2.6 2.5	CO, CA	Moderately to well drained	
Prairie Cordgrass Switchgrass Western Wheat Canada Wildrye	3 3 7 7	4.2 8.9 2.5 2.6	CO,CA,WW	Somewhat poorly to poorly drained	

1. Suitable Uses: CO = construction sites; CA = critical areas; WW = waterways