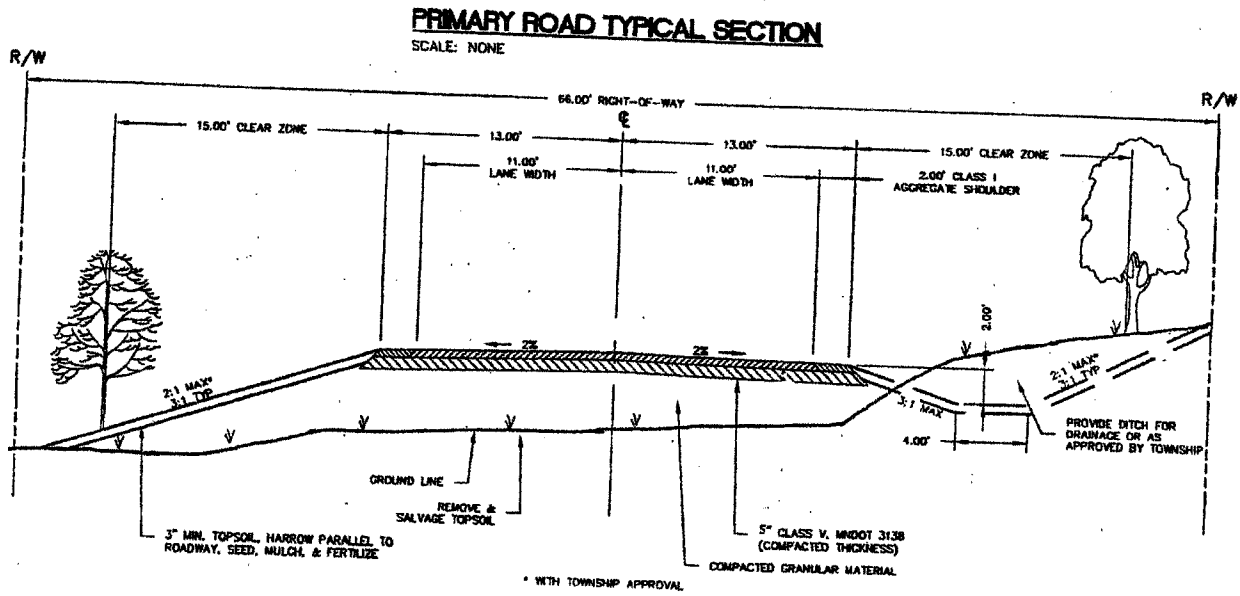


MAY TOWNSHIP
RECOMMENDED MINIMUM SECTIONS
FOR TOWNSHIP MAINTAINED ROADWAYS

DATED: NOVEMBER 12, 2007

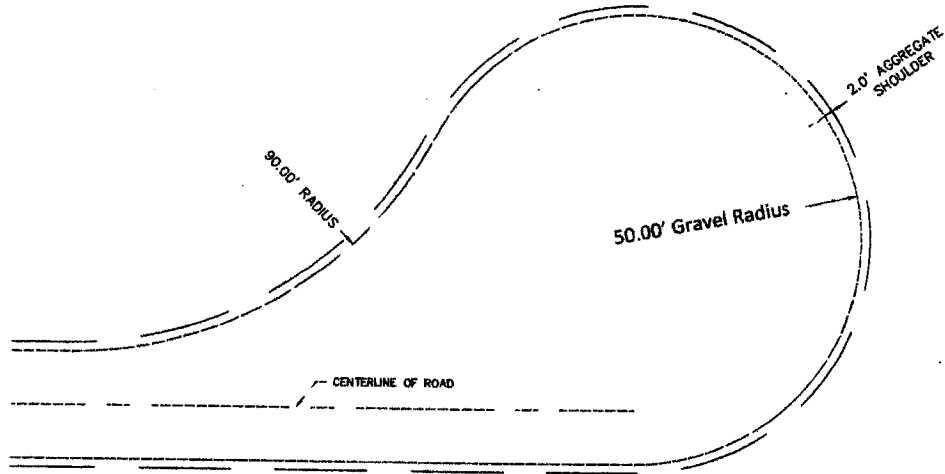
Appendix A



MAY TOWNSHIP

DATED: NOVEMBER 12, 2007

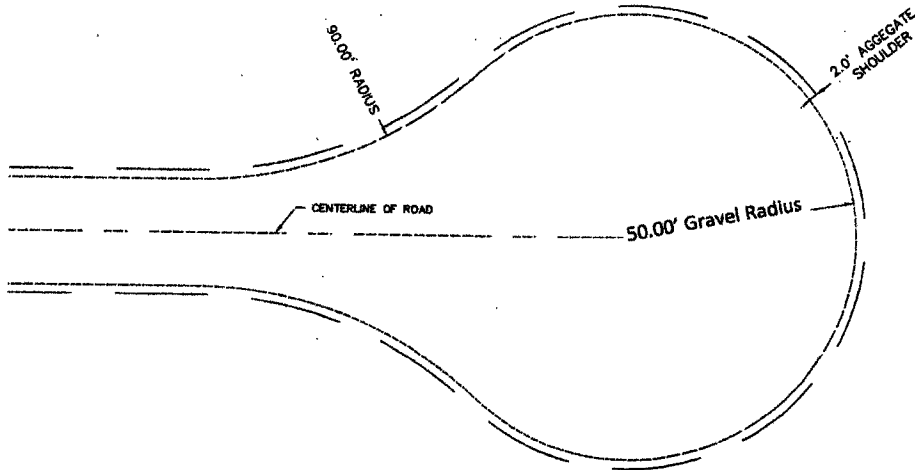
RECOMMENDED MINIMUM SECTIONS FOR TOWNSHIP MAINTAINED ROADWAYS



OFFSET CUL-DE-SAC

SCALE: NONE

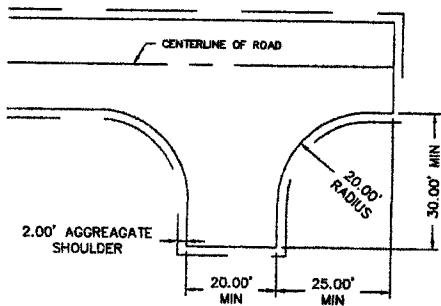
Appendix B



CUL-DE-SAC

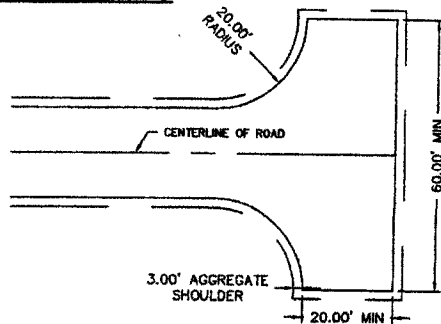
SCALE: NONE

TURN AROUNDS (ONLY WHEN APPROVED BY TOWNSHIP)



BRANCH TYPE TURNING AREA

SCALE: NONE



STANDARD T-TYPE TURNING AREA

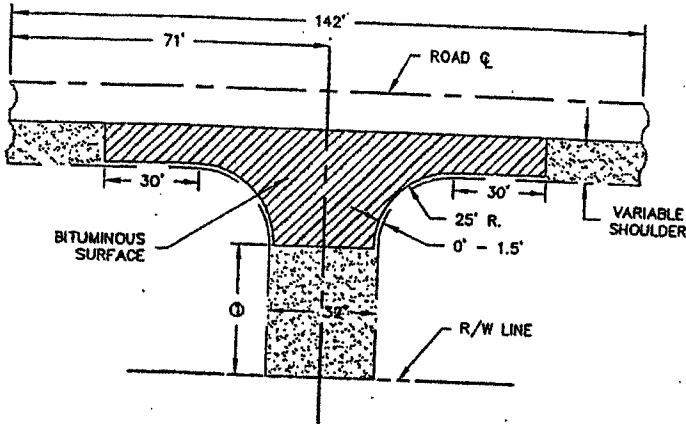
SCALE: NONE

MAY TOWNSHIP

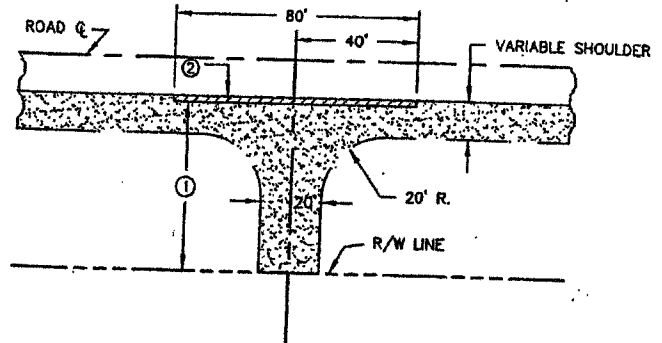
Appendix C

APPROACHES AND ENTRANCES STANDARDS

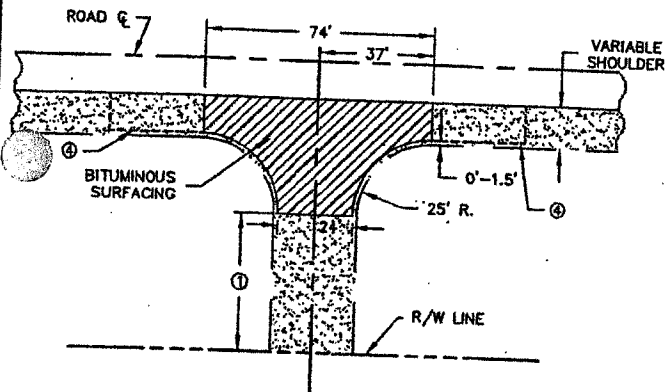
DATED: NOVEMBER 12, 2007



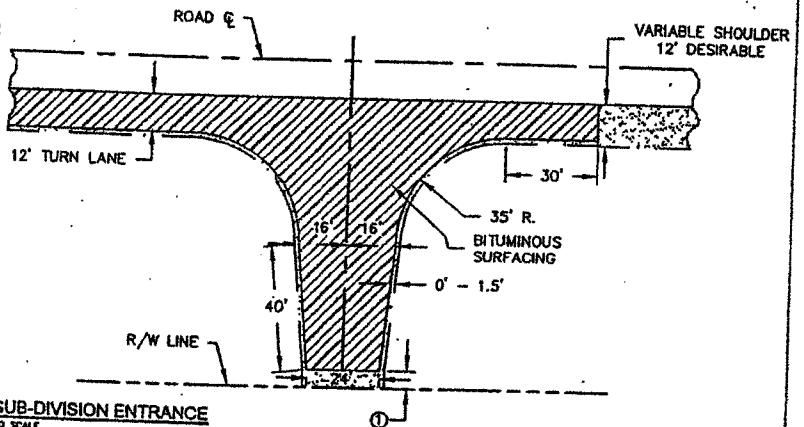
COMMERCIAL - INDUSTRIAL - FARM ENTRANCES
NO SCALE



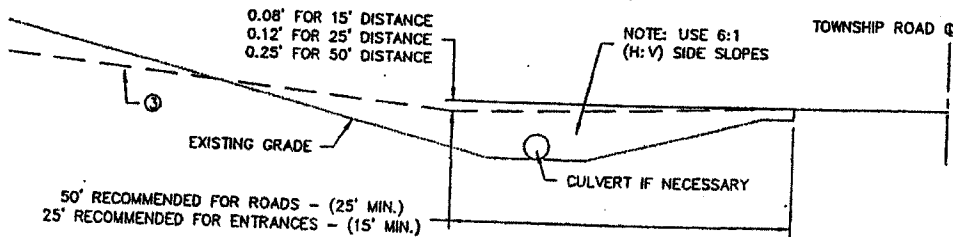
FIELD ENTRANCE
NO SCALE



RURAL RESIDENTIAL ENTRANCE
NO SCALE



SUB-DIVISION ENTRANCE
NO SCALE



CROSS SECTION
NO SCALE

NOTES:

- ① SURFACING TO MATCH EXISTING CONDITIONS, WHERE THERE IS NO SURFACING, PLACE GRAVEL BEYOND BITUMINOUS SURFACING TO R/W LINE.
 - ② PLACE 2 FT. WIDE BITUMINOUS SURFACING AS DIRECTED BY ENGINEER.
 - ③ 8% MAXIMUM COMMERCIAL, 10% MAXIMUM RESIDENTIAL.
 - ④ THE USE OF PAVING SIMILAR TO COMMERCIAL ENTRANCES MAY BE APPROPRIATE FOR SOME RESIDENCES. AS SHOWN IN PLANS OR DIRECTED BY THE ENGINEER.
- PROPER AND ADEQUATE DRAINAGE FACILITIES SHALL BE PROVIDED AS REQUIRED BY THE TOWNSHIP.
A MINIMUM OF FOUR INCHES OF GRAVEL SHALL BE PROVIDED

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 planting practices.

PURPOSE

- Stabilize erodible soil surface areas with existing or expected high rates of soil erosion by water.
- Stabilize erodible soil surface areas with existing or expected high rates of soil erosion by wind.
- Restore degraded sites that can not be stabilized through normal methods.
- Reduce damage from sediment and runoff to downstream areas.

CONDITIONS WHERE PRACTICE APPLIES

On areas with existing or expected high rates of erosion or degraded sites that usually cannot be stabilized by ordinary conservation treatment and/or management, and if left untreated, could be severely damaged by erosion or sedimentation or could cause significant off-site damage.

CRITERIA

General Criteria Applicable to All Purposes

Species selection for seeding or planting shall be based on current site conditions, 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.

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,

NRCS-Minnesota
June 2002

Mulching. This type of seeding is riskier than spring or summer seedings.

Species selection and seeding rates

Seeding mixtures will be selected from Table 1 of this standard, to best suit the site conditions. Seeding rates are based on the optimum amount of seed necessary to provide vegetative cover in a reasonable amount of time. Native or introduced species may be used. Use introduced species only in places where they already exist or where they will not spread into existing natural areas.

Where there are 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 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 ¼ to 1 ¼ bushels per acre with spring, summer or dormant seedings. Winter wheat or rye can be used with spring seedings only, at a rate of ½ to ¾ 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.

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.

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 or agricultural limestone to increase the pH of acid soils shall be included in the site specification with amounts, timing, and method of application.

Additional Criteria to Improve Wildlife Habitat

Where wildlife is the primary or secondary land use objective, the food and cover value of the planting can be enhanced by using an approved habitat evaluating procedure or species specific guide sheet. This procedure will aid in selecting plant species and providing habitat requirements necessary to achieve the objective. Select species that create an open structure that allows increased forb production and wildlife movement. See NRCS Conservation Practice Standard 645, Upland Wildlife Habitat Management for additional criteria.

Native grasses, forbs and legumes will be encouraged in mixtures to maximize plant diversity. Maximize plant and animal diversity by using prescribed burning or mechanical, biological or chemical cultural methods.

Maintenance practices and activities are not to disturb cover during May 1 to August 1, the primary avian nesting period for grassland species. 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.

CONSIDERATIONS

Species or mixes that are native to the region and have multiple values should be considered. Avoid species that are on the state invasive species list or plants that have a known potential to move off-site.

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

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 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.

PLANS AND SPECIFICATIONS

Specifications for applying this practice shall be prepared for each site, and recorded and filed using the approved specification sheets or narrative statements in the conservation plan.

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. NRCS Conservation 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.

REFERENCES

University of Minnesota Extension Bulletin 597-1993: Forage Legumes.

USDA-NRCS Plants Projects Internet Site:
<http://plants.usda.gov>.

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.

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 |
| Introduced 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 |
| Garrison 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 | 4 4 7 | 8.9 4.4 2.6 | 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