Minnesota Department of Transportation

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Memo

TO: District 8

FROM: Brett Troyer, P.E.
Erosion Control Engineer

DATE: September 22, 2016

SUBJECT: Vegetation Establishment Recommendations

Please distribute this memorandum to personnel designing projects in your district, including consultants

This letter contains the vegetation establishment recommendations for projects in **DISTRICT8**. Specifying appropriate soil preparation practices, seed, stabilization methods and vegetation establishment methods is key to controlling erosion and permanent vegetation establishment.

The items outlined in this memo should be utilized as the default practice for identifying items needed for erosion control or permanent vegetation. Localized conditions may need special seed mixtures or erosion control methods. Questions regarding this memo, or development of any special erosion control measures or seed mixes, should be defined in project special provisions after consultation with OES personnel.

Technical Support contact for District 8 is **Lori Belz, 651-366-3607**

This memo contains guidance information for designers and includes two summary attachments. Attachment 1 provides items for erosion prevention and sediment control during temporary soil exposure. Temporary erosion control recommendations may not be required in areas that are staged to be completed within the required time limits for soil stabilization (typically set by USCOE, MPCA or DNR permitting). When possible, those areas should go directly to permanent vegetation establishment. Attachment 2 is divided into five steps for identifying necessary items to include in a plan set for permanent vegetation establishment.

Soil

1. Slope Dressing

All topsoil's should be salvaged and retained on site for use on the project. This is to minimize erosion potential, minimize introducing new weed seed, and provide for sustainable plant growth. Include an earthwork summary and notes in the plans. Areas where topsoil is known to have an infestation of noxious weeds that soil will need to be taken care of separately, contact OES Roadside Vegetation Management Unit for Special Provisions.

It is ideal to place 6 inches of topsoil in areas to be seeded; however, this will have to be adjusted to the amount of available topsoil. If there is a shortage of available topsoil use one of the two methods to supplement the shortage:

a. Use, existing muck soils (up to 20% organic matter) mixed with granular subsoils at a ratio of 1:2 to create a topsoil-like material. Designers will need to calculate excess quantities of excavated muck soils and available granular soils to complete this step and identify it in the plans. Or,
b. Use Common Topsoil Borrow.

Soil tests are always recommended during the design process to provide baseline Soil Health. Soil Health includes the micro/ macro nutrients (Nitrogen, Phosphorous, and Potassium), pH as well cation exchange and soluble salts. Knowing these values will guide us to the need for fertilizer, lime, gypsum and other soil

amendments. This will help to maximize vegetation establishment and minimize impacts to our waters. The University of Minnesota (UofM) Soil Testing and other private laboratories can perform the soil analysis and provide recommendations for fertilizer ratios/rates as well as other soil amendments. Request the UofM Soil Analysis Package 2 for Professional Turf Management or equivalent to obtain the baseline Soil Health values.

2. Topsoil Material (Spec 3877)

These are soils that are provided to solve availability, specific slope, bio-retention, bio-detention and ditch stability problems.

a. Common Topsoil Borrow: General use topsoil to supplement existing topsoil to meet the minimum depth of 4 inches.
b. Loam Topsoil Borrow: General landscape and planting beds if soils are deficient in rooting potential.
c. Sandy Clay Loam Topsoil Borrow: Processed topsoil for placement on turf reinforcement mats, cellular confinements systems, tied or untied concrete mats, and for tree root protection or restoration.
d. Rooting Topsoil Borrow: General rooting soils, with excellent drainage characteristics composed of three material components of sand, compost and loam topsoil Borrow
e. Boulevard Topsoil Borrow: High performance median landscape bed media that supplies proper level of compaction, water holding capacity and nutrient retention of equal parts of loam, sand, and compost
f. Filter Topsoil Borrow: Well drained water quality planting and filtration/infiltration medium composed of a sand/compost blend.
g. Organic Topsoil Borrow: Excellent turf growing medium or supplementing existing poor topsoil, consisting of a blend of the salvaged topsoil and compost.

Soil Preparation (Spec 2574)

Identified as Step 1 in the Permanent Vegetation Establishment table (Attachment 2)

1. Subsoiling

Designate areas that are not to be used for staging, or driving (eg. infiltration treatments, wetland soil edges, certain utilities, Areas of Environmental Sensitivity). Storage areas for equipment, stockpiles, and materials (i.e. Precast Median Barriers), temporary haul and access roads must be de-compacted before final turf establishment. Provide a subsoiling pay item quantity for these areas where vegetation is proposed.

2. Soil Bed Preparation

Provide this for all areas that will require turf establishment. Provide in the plans soil bed preparation, pay item 2574.578 on slopes flatter than 1:2 and Soil tracking, pay item 2574.580 on slopes 1:2 and steeper.

3. Lime (Spec 3879)

Lime is helpful in establishing vegetation in acidic type soils. Lime recommendations are typically based on soil test pH results. If soil tests indicate the pH is below 6.3 apply 2 tons/acre of agricultural lime on the project.

4. Fertilizer (Spec 3881)

The three types for vegetation establishment are as follows; Type 1 is commercial, type 3 is slow release nitrogen, and type 4 is natural base. It is the designer's responsibility to include the fertilizer analysis (N:P:K ratios) and application rates as a note in the statement of estimated quantities or tabulation sheets. One example is shown below (quantities, analysis, and application rates will need to be filled in appropriately):

STATEMENT OF ESTIMATED QUANTITIES						
Tab	Sheet No.	Item No.	Description	Unit		Total Estimated Quantities
A	123	2574.508	Fertilizer Type 3	(1)	LB	xxx
A	123	2574.508	Fertilizer Type 4	(2)	LB	xxx

(1) Fertilizer analysis xx-xx-xx, application rate aaa lbs/acre for seed areas
Fertilizer analysis xx-xx-xx, application rate bbb lbs/acre for sod areas
(2) Fertilizer analysis yy-yy-yy, application rate ccc lbs/acre for seed areas

If you have multiple fertilizer analyses of the same fertilizer type it can further be broken down and shown in the tab sheets to break down the pounds of each.

Turf Establishment (Spec 2575)

Turf establishment lump sum is for establishing permanent soil covers for small areas, typically under 2.5 acres in size. These would include turn lane construction, lighting projects, and culvert replacement.

NOTE: Provide a note in the statement of estimated quantities or tabulations when the seed mixture requirement differs from the 25-141 mixture shown in the 2575 that modifies any of the standard language of this item as shown in 2575.3 L specification.

Temporary Erosion Control is not part of this item and will need to be addressed and incorporated into the plans separately.

Seed (Spec 2575)

Identified as Step 1 in Attachment 1 and Step 2 in Attachment 2

1. *Seeding (Spec 2575)*
   - Provide a seeding pay item for all temporary and permanent seeding operations.
   - For temporary seeding purposes provide the following;
     i. Use the seeding pay item when seeding contiguous areas larger than 2.0 acres.
     ii. Use rapid stabilization methods for areas that are: less than 2.0 acres, near water, or where stormwater leaves project limits. The plan must indicate areas for Rapid Stabilization; quantities should include an estimate of multiple applications based on staging or phase of construction. These are for small critical areas, scattered over the project site. Use in Areas of Environmental sensitivity (AES) and may be noted on plan sheet as 'Site Management Plan Area.

   The seeding method depends on the soil type and existing plant materials. On occasion there may be need to indicate the seeding method for final or temporary stabilization.

   - Drill seeding
     i. Specify drill inter-seeding for native or general seed mixtures when seeding into either an established temporary vegetative cover or areas where temporary straw mulch is placed.
   - Broadcast seeding
     i. <u>Hydraulic application:</u> Specify in all plans for temporary seeding and seeding of difficult areas such as slopes steeper than 1:2, limited access, or saturated soils.
     ii. <u>Hand application:</u> Specify for small areas, areas under maintenance restrictions, and erosion failures. This can be for either native or general seed mixtures. If hand raking of seeding is specified, indicate as incidental.

2. *Seed Mixture (Spec 2575, 3876)*

   MnDOT is increasing the use of native species on the roadsides. The 2X-XXX series (composed of primarily non-native species) will continue to be utilized on regularly mowed areas such as in-slopes (e.g. top 8-15ft) and residential and commercial areas. The 3X-XXX series (composed primarily of native species) were designed to protect and enhance natural resources, promote biodiversity, support pollinator habitat, display native vegetation, introduce travelers to the regional physical or biological character of the native landscape, and enhance visual quality by using vegetation to frame or screen views to and from the roadway corridor.

   The seed mixture will depend on location (within project or region of the state), functional outcome, and soil type. Seed mixes are formulated to provide quicker cover initially while the longer term species establish. The seed mix application rates are based on Pure Live Seed (PLS) and the seed mix number provides information about the use and content of the mix. This numbering system can be used to guide the designer in choosing the right mix for a given site on the project.

   See Attachments 1 & 2 for general seed recommendations. For specific composition of a seed mix refer to the MnDOT Seeding Manual. If the project has unique seed requirements (such as wetland restoration, Areas of Environmental Sensitivity, etc.) consult with OES for guidance.

   a. Temporary Seed Mixtures (3876) - see Attachment 1

Provide a seed pay item for temporary seeding purposes when seeding contiguous areas larger than 2.0 acres. Seed mixture 21-xxx is for short term stabilization of 1 season and 22-xxx is for longer term stabilization, 2 or more seasons.

b. Permanent Seed Mixtures (3876) - see Attachment 2
It will become more common to have projects with both native mixes and non-native mixes. An example would be to have native mixes (3X-XXX series) on the back-slope and ditch bottom, while the in-slope and/or median may be a non-native mix (2X-XXX series). The use of native seed mixes are often required along Prairie Passage Routes (see below), adjacent to public lands (E.G. parks and forests under federal or state jurisdiction), or used to mitigate impacts regulated by other agencies.

This is a standard condition of the DNR General Permit to MnDOT for repair or bridges and culverts (GP2004-0001). The DNR may also require that native vegetation be utilized when projects run through or adjacent to DNR managed lands such as Wildlife Management Areas, Scientific & Natural Areas, Public Access, State Parks, State Forests, etc.

Native vegetation suitable to the local habitat is also recommended when projects run through or adjacent to areas that include rare species, in areas identified as a Site of Biodiversity Significance, or in an Area of Environmental Sensitivity (AES). The DNR is not alone in these requirements. Use of native vegetation can come up by request from adjacent landowners or in other regulatory compliance measures (see environmental documentation and permits).

For ADA projects, use the seed mixes or sod types recommended for frequently mowed areas in the SEED section of attachment 2.

Prairie Passage Routes
In 1993, the FHWA gave funding to departments of transportation in Minnesota, Iowa, Missouri, Kansas, Oklahoma and Texas to develop a prairie passage. The goal of the prairie passage is to protect native grasses and wildflowers along the roadside right-of-way; plant native grasses and wildflowers along the roadside right-of-way; and promote the awareness of prairie related natural and cultural resources.

District 8 has four roads designated as part of the prairie passage. Projects constructed on these roads shall use native vegetation
- US highway 75 from I-90 north to the junction of TH 30 at Pipestone
- TH 23 from Pipestone northeast to the junction of TH 212 at Granite Falls
- TH 212 from Granite Falls northwest to Montevideo
- The shared route of TH 7 and US highway 59 from Montevideo NW to Appleton

Secondary routes that should be planted with native vegetation include:
- TH 12 from Kerkhoven to Willmar
- TH 14 from Lake Benton to the Brown County Line
- TH 23 from Granite Falls to Willmar
- TH 75 from the Rock County Line to Lake Benton
- TH 75 from Madison to Ortonville
- TH 71 from Morton to Olivia

TH 212 from Glencoe to Granite Falls is designated as a Minnesota State Wildflower Route. The corridor should be planted with a native mix.

Projects constructed on these roads shall use native vegetation, specify native seed mixes and prairie mulch (type 7 mulch).

3. Sod (Spec 2575, 3878)

Sod should be used in areas where it can be maintained as necessary for instant erosion control. Areas where sod may be considered are residential lawns, urban areas, and areas of concentrated flow where erosion is a concern. It is important to specify the correct type of sod (Lawn, Mineral, or Salt tolerant) for the area. Lawn Sod is appropriate for residential use; Mineral Sod is appropriate for granular, sandy soils; Salt-tolerant Sod is appropriate for high traffic areas at boulevards, road edges, and medians where salt use is expected.

Stabilizing Covers (Spec 2575)

All projects will have one or more of the following stabilizing covers to limit erosion and aid in plant germination, identified in Attachments 1 & 2.

1. *Mulch (spec 3882)*

   MnDOT recommends that all projects use Type 3 Mulch, but it is not a standard. Type 3 Mulch is a clean grain straw, certified to be free of noxious weeds by the Minnesota Crop Improvement Association.

   NOTE: Use Type 1 or Type 3 mulch in areas that are 2 acres and larger and/or widths greater than 8 feet.

   a. *Type 1 Mulch:* Use as an alternative to Type 3 Mulch with the temporary or Non-native seed mixtures. Provide disk anchoring for this item.

   b. *Type 3 Mulch:* Use in areas that specify native seed mixes. Provide disk anchoring for this item.

   c. *Type 4 Mulch:* Use in areas where crimping is difficult and on slopes without ravine drainage (specify either Type 1or 3 Mulch, depending on seed mixture).

   d. *Type 5 Mulch:* made from ground-up grubbed trees, can be used in combination with silt fence in ditch bottoms to provide flow control and nutrient adsorption, traction on clay soils, tree root protection, slash mulch for slopes, and temporary access roads.

   e. *Type 6 Mulch:* Use in Landscape beds

   f. Type 8: specified to enhance an existing prairie, or to create a new one. Not to be relied on solely for seed.

   g. Type 9: Should be specified as filter aggregate as a toe guard for silt fence, filter berms around inlets, or diversion berms against curbs or as a landscape rock.

2. *Erosion Control Blankets* (Spec 3885)*

   The netting is available in several forms and categorized by degradation type (synthetic or natural) and function.
   All ditches that discharge water off the site should have additional quantities of blanket for the last 200 feet for temporary conditions associated with all stages of the project. Most soil or compost filled riprap will require a blanket to aid in germination and soil protection during flow conditions. In critical areas, specify as a note in the Statement of estimated quantities or tabulations that maintenance on the blanket is required.

   a. *Category 0:* Short lived, rapid degrade. For areas <1:3 with regular mowing. This includes areas where turf grass seed is specified.

   b. *Category 3**:* For slopes 1:3 to 1:2 and channel grades $\leq$ 3%.

   c. *Category 4**:* For slopes between 1:2 and 1:1 and channel grades<5%. Typically specified with erosion stabilization mats for seed germination.

   d. *Category 6: Semi* Permanent surface stabilization. Not soil filled. For channel grades <7%.

   ***NOTE:** Include the standard detail sheet for the head trench and stapling pattern when blankets are specified in the plans.

   ****NOTE:** Category 3 & 4 control blankets now have the suffix P or N as a pay item. P is for synthetic netting and N is for natural netting. These suffixes must be identified in pay item tabulations. Synthetic netting (3P or 4P) may be prohibited due to adjacent landowner requests, mow areas, permit requirements, or rare species. Check environmental review documentation and permits prior to selecting this item. Natural netting (3N or 4N) or other methods of mulch protection should be specified for these situations. Provide a note in the statement if estimated quantities or tabulation sheets if wood fiber is desired.

3. *Hydraulic Erosion Control Products (3884)*

   Hydraulic matrix products can be used both for temporary conditions and permanent turf establishment**.**

   a. Use Hydraulic mulch for short term temporary cover such as stockpiles and slopes that do not receive concentrated flow. Use a 3x-5x multiplier of the permanent turf areas for each construction season. This also can be used as an alternate to Type 1 Mulch on flat lawn areas.

   b. Use Hydraulic Bonded Fiber Matrix for difficult access locations with safety concerns and without concentrated storm water flows. May prevent rapid seedling establishment.

c. Use Hydraulic Reinforced Fiber Matrix for longer term temporary cover for erosive soils and for over wintering conditions. This also can be used as an alternate to erosion control blanket for permanent turf establishment, except in ditches.
d. Use Hydraulic Compost to supplement weak sandy soils and act as an erosion control mat for use on slopes less than 1:6.

Poly Coverings (Spec 3888)

Alternatives to temporary seeding or Rapid Stabilization consider using temporary poly covering in areas adjacent to rivers, bridge abutments, and other steep slope. The contractor will be able to 'open and close' this cover every day while completing the work. Include a pay item 2575.518 temporary poly covering.

Provide a note in the statement of estimated quantities or tabulations which poly covering is required, if any. Woven geotextile type V; reinforced poly tarp; or reinforced polyethylene sheeting.

Turf *Reinforcement Mats (Spec 3885)*

All turf reinforcement mats (TRM's) are soil filled with Sandy Clay Loam Topsoil Borrow. The TRM should be designed based on bed shear. Categories 1-3 provide a range of bed shear stabilization between 2.1 and 8lbs/ft^2. Category 4 is for steep slope surface stabilization where high tensile strength is required. When a TRM is called for in the plan, provide the appropriate category of erosion control blanket (typically Cat 4) as a separate pay item.

NOTE: Provide special installation details in the plan that includes head and check trenching, overlap, and stapling, pin, rod or some other attachment. Contact OES for these details.

Watering (Spec 2575)

For areas where it is critical to obtain good turf cover water is a must. For watering slopes adjacent to infiltration areas and ponds provide a watering pay item. For watering of Turf Reinforcement Mats, steep slopes, RSS walls provide temporary irrigation/water by special provision. Contact OES for watering provision guidance.

Vegetation establishment and Weed Control (Spec 2575)

Identified as Step 5 'Establishment' in Attachment 2

1. *Mowing*

   Provide a mowing pay item on projects with seeding and duration of more than three months. The suggested quantity in Attachment 2 is an average and may need to be adjusted based on the project.

   NOTE: Provide the following in the construction notes:
   - *Mowing schedule (to the extent possible within the time frame of the project):*

     Mow after seeding and starting when the majority of vegetation is 12"-18" high. Set mower to a height of 6" – 10".

     Mow non-native seeding areas once or twice to control weeds.

     Mow native seeding areas approximately 3 times at 1-month intervals in the first growing season after planting, and 2 times at 1-month intervals in the second growing season.

2. *Weed Spraying*

   Include weed spraying and weed spray mixture pay items on all projects. Attachment 2 shows an approximate quantity to use as well as a general herbicide recommendation. This herbicide will control most noxious weeds but not all. Noxious weed locations can be obtained from district maintenance staff. If specific noxious weed issues are known during the design phase, contact OES Roadside Vegetation management Unit to for more site-specific recommendations.

   NOTE: Provide the following in the tabulation notes:
   - *Weed spraying to be done throughout the project to control and prevent the spread of weeds. Submit a pesticide application record to the engineer for each application. Weed spraying will be measured by the area covered or area spot sprayed by herbicide and successfully applied as indicated by dead noxious weeds. Weed spray mixture will be measured by volume of herbicide furnished and used.*

Attachment 1: Temporary Erosion Control Recommendations
Attachment 2: Permanent Vegetation Establishment

Attachment 1: Temporary Erosion Control Recommendations

These recommendations are for general temporary erosion control general. Select the appropriate items at each step. To address different conditions within a project, it is likely that more than one item from each step (or pairings between steps) will be required for your project.

Step 1:

SEED MIXTURES					
ITEM NO.	DESCRIPTION	RATE	UNITS	Notes	
2575.502	SEED MIXTURE 21-111	100 LBS/ACRE	LB	less than 1 year, spring/summer seeding	
2575.502	SEED MIXTURE 21-112	100 LBS/ACRE	LB	for less than one year, fall seeding	
2575.502	SEED MIXTURE 21-113	110 LBS/ACRE	LB	for less than one year, use on poor soils	
2575.502	SEED MIXTURE 32-241	38 LBS/ACRE	LB	for 1-5 years, where native mixes will be used for permanent establishment	
2575.502	SEED MIXTURE 22-111	30.5 LBS/ACRE	LB	for 1-2 years	where turf or introduced mixes will be used for permanent establishment
2575.502	SEED MIXTURE 22-112	40 LBS/ACRE	LB	for 3-5 years	

Step 2:

FERTILIZER				
ITEM NO.	DESCRIPTION	RATE	UNITS	Notes
2574.508	FERTILIZER TYPE 1	200 LBS/ACRE	LB	according to soil test or 10-10-20

Step 3:

STABILIZING COVERS					
ITEM NO.	DESCRIPTION	RATE	UNITS	Notes	
2575.511	MULCH TYPE 1	2 TONS/ACRE	TON	Slopes ≤1:3	Where 2X-XXX mixes will be used permanent
2575.511	MULCH TYPE 3	2 TONS/ACRE	TON	Slopes ≤1:3	Where3X-XXX mixes will be used for permanent
2575.519	DISK ANCHORING		ACRE		
2575.56	HYDRAULIC MULCH		LB	Stock piles, slopes <1:6	
2575.562	HYDRAULIC STABILIZED FIBER MATRIX	3000 lbs/ACRE	LB	Season of construction	Use on slopes ≤1:3 , stockpiles
2575.562	HYDRAULIC BONDED FIBER MATRIX	3500 lbs/ACRE	LB	Season of construction	Use on slopes ≤ 1:1
2575.562	HYDRAULIC REINFORCED FIBER MATRIX	3900 lbs/ACRE	LB		Use on slopes ≤ 1:1, over winter
2575.570	RAPID STABLILZATION METHOD 2	NA	ACRE	For areas up to 2 acres; use on slopes < 1:3 within 200 feet of surface waters. (min ½ acre)	
2575.571	RAPID STABLILZATION METHOD 3*	6MGAL/acre	MGAL	For areas up to 1.5 acres; use on slopes <1:3, within 200 feet of surface waters (min ½ acre unit area application)	
2575.572	RAPID STABLILZATION METHOD 4*	NA	SQ. YD.	Fore areas up to 800 sq yd; use on slopes 1:3 – 1:2, ditches <4%, within 200 feet of surface waters.	
*Modify seed mix as a note in the Statement of estimated quantities or tabulations if permanent vegetation establishment is considered.					

Attachment 2: Vegetation Establishment Recommendations

These recommendations are for general vegetation establishment. Select the appropriate items at each step. To address different conditions within a project, it is likely that more than one item from each step (or pairings between steps) will be required for your project.

Step 1:

SOIL PREPARATION				
ITEM NO.	DESCRIPTION	RATE	UNITS	Notes
2574.575	SUBSOILING	NA	ACRE	Use on all projects
2574.578	SOIL BED PREP	NA	ACRE	Use on all projects

Step 2:

SEED *					
ITEM NO.	DESCRIPTION	RATE	UNITS	Notes	
2575.501	SEEDING	NA	ACRE	Use on all projects	
2575.502	SEED MIXTURE 35-241	36.5 LBS/ACRE	LB	For backslopes, dry ditches, areas not regularly mowed, or areas above stormwater and riparian plantings	For non-sandy soils
2575.502	SEED MIXTURE 35-221	36.5 LBS/ACRE	LB		For sandy soils
2575.502	SEED MIXTURE 33-261	35 LBS/ACRE	LB	Stormwater and riparian plantings: within 10' of open water (retention pond edges, streambanks, etc) and on bottom (including 3' up from bottom) of infiltration ponds and wet ditches.	
2575.502	SEED MIXTURE 25-141	59 LBS/ACRE	LB	For general use on in-slopes (e.g. top 8-15ft) and regularly mowed areas	For non-sandy soils
2575.502	SEED MIXTURE 25-121	61 LBS/ACRE	LB		For sandy soils
2575.502	SEED MIXTURE 25-151	120 LBS/ACRE	LB	Use in frequently mowed residential areas	
2575.505	SOD TYPE LAWN	NA	SQ YD		
2575.502	SEED MIXTURE 25-131	220 LBS/ACRE	LB	Use in frequently mowed commercial areas and on boulevards	
2575.505	SOD TYPE SALT TOLERANT	NA	SQ YD	Use in high traffic areas where salt use is expected (boulevards, road edges, and medians)	

***** Native Vegetation (3X-XXX seed mix series) may be required due to adjacent landowner, permit requirements, rare species, Prairie Passage Routes (D1,D4,D6,D7,D8), or Areas of Environmental Sensitivity (Check Environmental Review documentation and permits).

Step 3:

FERTILIZER				
ITEM NO.	DESCRIPTION	RATE	UNITS	Notes
2574.508	FERTILIZER TYPE 3 (slow release)	200 LBS/ACRE	LB	Use with 2X-XXX seed mixes near water and for sod; 22-5-10
2574.508	FERTILIZER TYPE 3 (slow release)	350 LBS/ACRE	LB	Use with 2X-XXX seed mixes; 22-5-10
2574.508	FERTILIZER TYPE 3 (slow release)	200 LBS/ACRE	LB	Use with 3X-XXX seed mixes in areas away from water; 22-5-10
2574.508	FERTILIZER TYPE 4 (natural based)	180 LBS/ACRE	LB	Use with 3X-XXX a near water; 18-1-8 for loam & clay loam, 17-10-7 for sandy soils

***** These fertilizer analyses and rates are general recommendations. For best results the analysis and rates should be based on a soil test.

Step 4:

STABILIZING COVERS					
ITEM NO.	DESCRIPTION	RATE	UNITS	Notes	
2575.526	COMPOST BLANKET	NA	SQ YD	Use on boulevards with poor soils	Use on slopes ≤ 1:4
2575.511	MULCH TYPE 1 (clean straw/hay)	2 TONS/ACRE	TON	For 2X-XXX seed mix series	Use on slopes ≤1:3
2575.511	MULCH TYPE 3 (certified grain straw)	2 TONS/ACRE	TON	For 3X-XXX seed mix series	
2575.519	DISK ANCHORING	NA	ACRE	Always use with straw mulch (type 1 or 3)	
2575.511	MULCH TYPE 5 (wood slash)	NA	TON	Slash mulch from onsite clearing and grubbing. Typically used up with temporary erosion control measures. Though if available, use for tree or shrub protection.	
2575.511	MULCH TYPE 6 (woodchips)	NA	TON	For Landscape beds and plantings	
2575.511	MULCH TYPE 8 (prairie hay)	NA	TON	Rarely used, typically only when source is adjacent to project	
2575.511	MULCH TYPE 9 (aggregate mulch)	NA	TON	For landscape beds	
2575.523	EROSION CONTROL BLANKET, CATEGORY 3N (natural netting)	NA	SQ YD	Use on slopes ≤ 1:2, or ditch grades	
2575.523	EROSION CONTROL BLANKET, CATEGORY 3P (synthetic netting)	NA	SQ YD	Use may be prohibited due to adjacent landowner, permit requirements, or rare species. (Check Environmental Review documentation and permits)	Use on slopes ≤ 1:2, or ditch grades
2575.523	EROSION CONTROL BLANKET, CATEGORY 4N (natural netting)	NA	SQ YD	Use on slopes ≤ 1:1, or ditch grades	
2575.523	EROSION CONTROL BLANKET, CATEGORY 4P (synthetic netting)	NA	SQ YD	Use may be prohibited due to adjacent landowner, permit requirements, or rare species. (Check Environmental Review documentation and permits)	Use on slopes ≤ 1:1 or ditch grades
2575.560	HYDRAULIC Compost	3000lbs/ACRE	LB	Add for poor soils.	
2575.560	HYDRAULIC Mulch	2100lbs/ACRE	LB	May be used for permanent vegetation establishment in flat areas. Typically utilized for temporary erosion control.	
2575.560	HYDRAULIC Stabilized Fiber Matrix (SFM)	3000 lbs/ACRE	LB	Low strength fiber matrix, for use on slopes ≤1:3	
2575.560	HYDRAULIC Bonded Fiber Matrix (BFM)	3500 lbs/ACRE	LB	Medium strength fiber matrix, for use on slopes ≤1:1	
2575.560	HYDRAULIC Reinforced Fiber Matrix (RFM)	3900 lbs/ACRE	LB	Stronger fiber matrix, for use on slopes ≤1:1	

Step 5:

ESTABLISHMENT				
ITEM NO.	DESCRIPTION	RATE	UNITS	Notes
2575.541	MOWING		ACRE	Use on projects lasting more than three months. Include 2 acres of mowing for each acre seeded
2575.545	WEED SPRAYING	0.5	ACRE	Use on all projects. Include 0.5 acre of spraying for each acre seeded
2575.547	WEED SPRAY MIXTURE	0.5 GAL/ACRE	GALLON	Use on all projects. 2,4-D amine labeled for both aquatic and right of way use and formulated at 3.8lb acid equivalent per gallon