

Winter Stabilization Best Management Practice Guidance Document.

Version 1. November 14, 2010

Minnesota Department of Transportation

All exposed soils must be prevented from causing a nuisance and stabilized within the NPDES permit specified time-frames, regardless of season. This document describes and illustrates means and methods for permit compliance.

1. **Winter Site Preparation.** Smooth rough grading, frost tillage and harrowing
2. **Winter perimeter controls.** Applying berms of soil, wood slash, rock or snow, tubular filter logs, or combinations of geotextile wraps and bales.
3. **Exit/Street sweeping.** Developing stabilized winter and spring thaw exits, sediment track prevention and rapid street cleaning
4. **Snow mulching.** Applying straw or hay mulch over frozen ground or over snow
5. **Snow Seeding.** All MnDOT seed mixtures may be dormant applied except oats.
6. **Snow blanketing/Pin Anchoring.** Applying erosion control blankets over snow cleared soils and pin/washer anchoring into surface.
7. **Dormant Sodding.** Applying sod to properly prepared frozen soil surface. If the sod can be cut from the sod producer, it can be placed.
8. **Poly/geotextile covers.** Applying covers on frozen slopes, drainage corners, stockpiles
9. **Snow rock.** Applying rock and riprap as exit control, field and culvert inlets, filter berms
10. **Hydromulching** on frozen ground. Specialized formulations that can withstand curing and desiccation. Equipment management required.
11. **Ice/snow Roads.** Removing snow to allow deep freezing of soils to allow heavy equipment hauling. May include specialized mats and pads.
12. **Good housekeeping practices.**

Relevant Standard Specifications: 2575

A4 Early Winter Season

Early winter season work shall consist of the erosion control operations necessary to protect the site through the following spring snowmelt conditions. Early winter season is defined as the period where soil temperatures are such that seed will not germinate and normal plant rooting does not occur. The soil may be cold and friable, frozen or lightly snow covered.

A4a Dormant Seeding

Dormant seeding shall be defined as seeding done on exposed cold soils so that normal seed germination does not occur until the following spring. Dormant seeding shall occur after October 20 and when soil temperatures at a depth of 25 mm (**1 inch**) are at or below 4 °C (**40 °F**).

In wind swept areas, exposed sites, and areas where dormant seeding does not typically establish well, temporary mulch may be ordered by the Engineer in lieu of dormant seeding.

Snow seeding shall be defined as seeding over the top of snow so that the seed melts through the snow and germinates upon warm up in the spring. Snow seeding can be done during the thawing days in February and March.

A4b Winter Mulching

Snow mulching shall be defined as mulch material spread over the top of snow so that the mulch melts through the snow and sticks to the site. All mulch materials listed under specification 3882 may be placed as snow mulching.

Frozen ground mulching shall be defined as mulch material spread over frozen ground. Mulch materials Type 4, 5, 6 and 9 that do not require disc anchoring into the soil may be placed without modification. Mulch Types 1, 7 and 8 may be anchored with Type 1 or Type 6 hydraulic soil stabilizers or may be "frozen" to the soil by applying water over the mulch. Applying water at the rate of 19 m³/ha (**2000 gallons per acre**) can be used as a direct substitution for disc anchoring.

A4c Dormant Sodding

The Contractor may place sod at locations at least 3 m (**10 feet**) from the shoulder, on slopes, and in ditches as dormant sodding after November 1 when all of the following conditions are met:

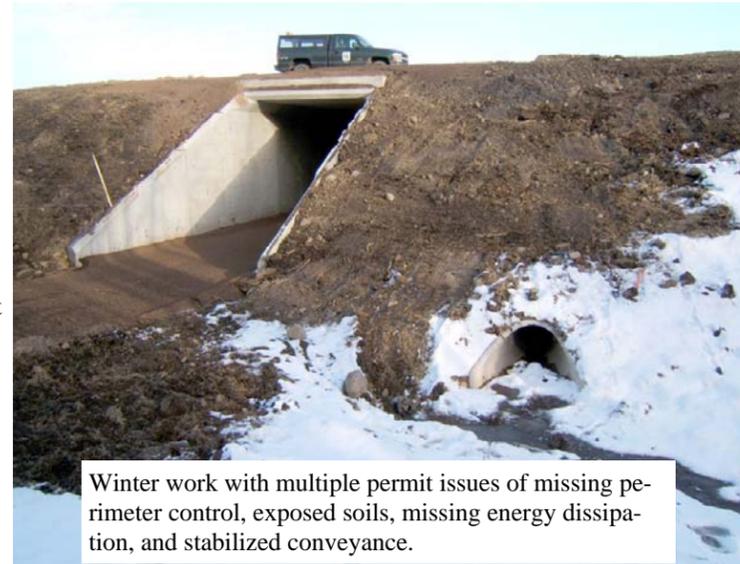
- (a) The Engineer authorizes dormant sodding.
- (b) The soil is prepared for sodding, either frozen or unfrozen.
- (c) The sod on slopes and in ditches is pegged or stapled.
- (d) The sod is watered to saturation immediately after placement.
- (e) The sod is watered a second time, or receives 25 mm (**1 inch**) of rain, 7 to 10 days after placement. The Engineer may also accept a heavy snowfall instead of the second watering.

A4d Winter Erosion Control Blanket Installation

Erosion control blankets may be installed over frozen ground. However, 150 mm (**6 inch**) long nails with washers can be used to anchor the blanket in lieu of staples.

A4e Application of Commercial Fertilizer

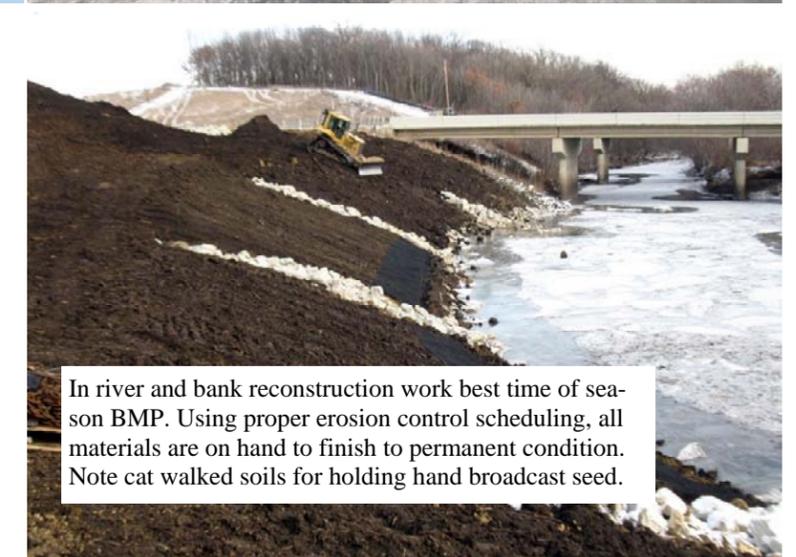
Commercial fertilizer shall not be placed over frozen ground or snow. The application of fertilizer shall occur after the runoff from spring snowmelt has ceased.



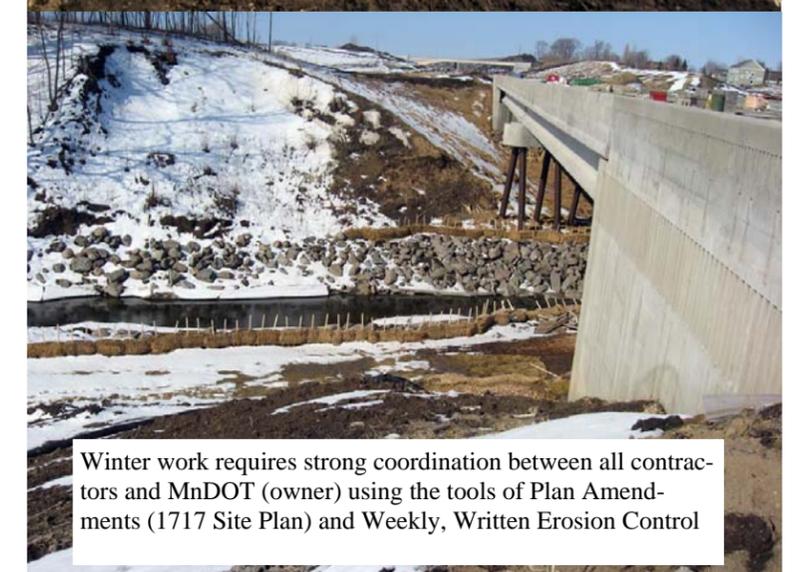
Winter work with multiple permit issues of missing perimeter control, exposed soils, missing energy dissipation, and stabilized conveyance.



Addressing safety for winter recreation



In river and bank reconstruction work best time of season BMP. Using proper erosion control scheduling, all materials are on hand to finish to permanent condition. Note cat walked soils for holding hand broadcast seed.



Winter work requires strong coordination between all contractors and MnDOT (owner) using the tools of Plan Amendments (1717 Site Plan) and Weekly, Written Erosion Control

Frozen Ground and Snow Seeding

All MnDOT seed mixtures can be seeded in every season of the year, with the exception of oats (use winter wheat in the fall, dormant and winter periods).

There are two basic methods of winter seeding:

Broadcast

1. Hand
2. Sling
3. Drop
4. Hydroblast

Drill

1. Interseeding

Seed bed preparation onto frozen ground. Soil can be in any condition for temporary seeding of MnDOT 100 type mixtures. For permanent seeding, soils must be worked to remove soil clods and rills larger than 3 inches. All trash and other debris, including rocks must also be removed from seed bed. Frozen ground tillage can be performed with any of the following equipment and implements:

Dozer and backhoe ripping

Solid tine aeration aerators

Harley box rake or other solid tine cultivators

Fine soil preparation can be performed with various skidsteer and tractor implements. For soft soil preparation, use a dozer or tracked machine pulling a chainlink fence harrow.

Expect to interseed or hydroseed certain areas by May 20 of the following year if a poor seed catch occurs (unusual winter of poor snow cover, protracted freeze to thaws). Compost grouting and seeding of slope rills is an excellent punch-down method.



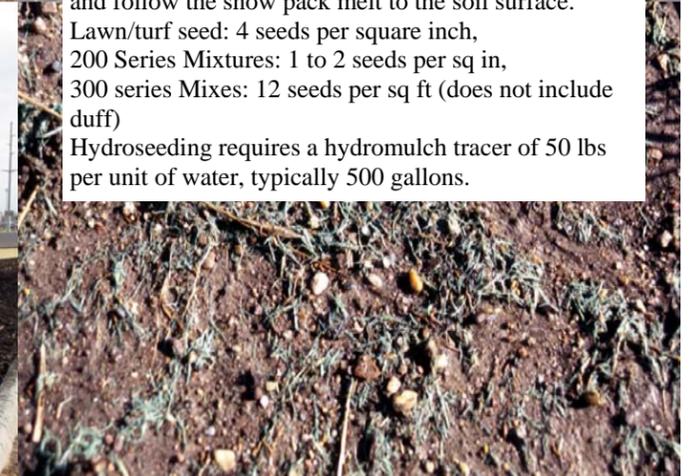
Frozen soil preparation. Strong coordination and timing between grading and the seeding contractor must occur



Hand broadcast seed onto snow will melt in as shown, and follow the snow pack melt to the soil surface.
Lawn/turf seed: 4 seeds per square inch,
200 Series Mixtures: 1 to 2 seeds per sq in,
300 series Mixes: 12 seeds per sq ft (does not include duff)
Hydroseeding requires a hydromulch tracer of 50 lbs per unit of water, typically 500 gallons.



Solid tine aerator will penetrate any soil condition



Decompaction or frost ripping using a dozer



Weighted disc tillage on frozen ground will require multiple passes to break surface and loosen clods.



ATV seeding a native mixture.



Sling seeding over mulch and snow



Fine tillage surface preparation dragging recycled chainlink fence.

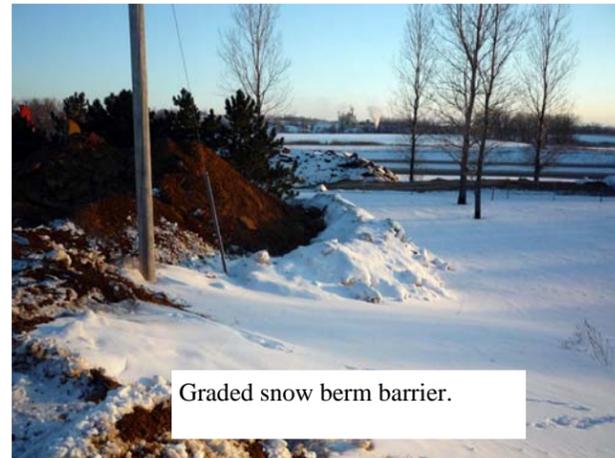


Hand seeding on fresh dozer prepared soils

Winter Perimeter Control BMPs

BMPs for perimeter control are short duration, or heavy enough to remain in place or melt down with the snow pack. Tight coordination between land disturbance activity and installation of materials and anchors is required. No rebar or other sharp anchor devices are allowed. All perimeter control practices must be combined with erosion control BMPs.

1. Snow berms
2. Filter Logs, Type Compost, Rock, and Wood Fiber
3. Geotextile wrapped straw bales
4. Clean and washed filter rock
5. Riprap/rock berms



Graded snow berm barrier.



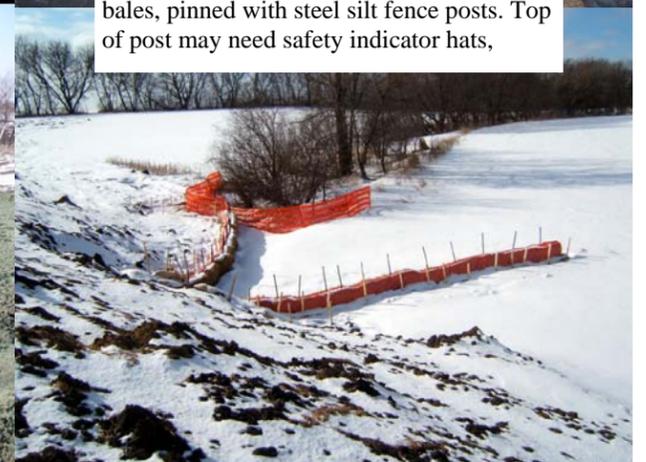
Combination of geotextile wrap and straw bales, pinned with steel silt fence posts. Top of post may need safety indicator hats,



Hydromulch applied to fresh exposed soils, and straw biolog perimeter.



Permeable filter sand check dams in access haul road.



Silt fence supported by safety fence, and toe held in place by wood fiber logs



Rock filter check placed on frozen soil and water to melt in-place



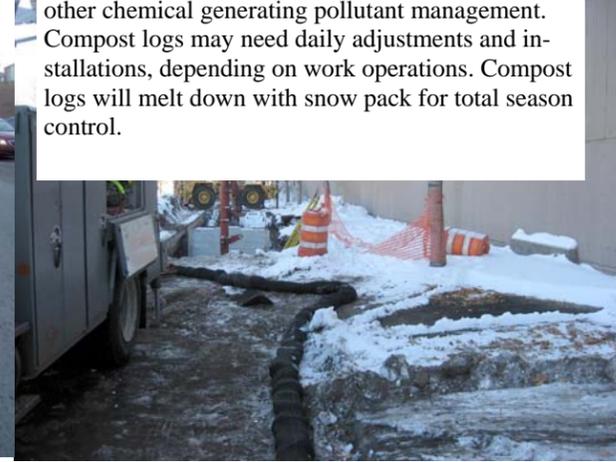
3897 Filter logs, type compost as movable perimeter control for slopes, temporary stockpiles, and other chemical generating pollutant management. Compost logs may need daily adjustments and installations, depending on work operations. Compost logs will melt down with snow pack for total season control.



Clay and silt free (washed) clean rock



Silt curtain installed on ice to melt in place as spring melt water interacts with creek



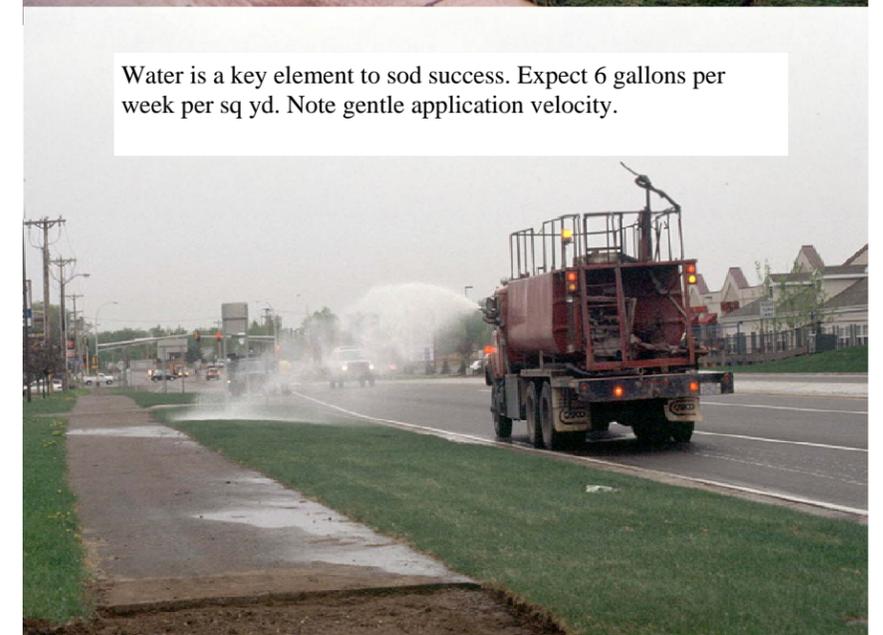
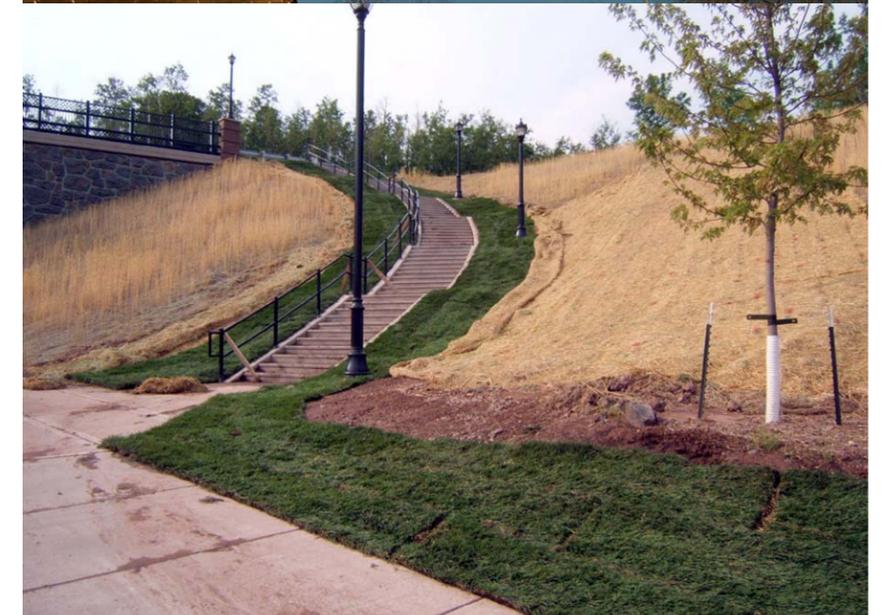
Dormant Sodding (<40 degree soil temp)

If it can be harvested, it can be installed

1. Soils must be prepared for a sod bed
2. Soil must be prepared for edge and other surface transitions
3. Sod must be rolled into soil surface
4. Sod must be anchored
5. Sod must be watered until total freeze-up.

Spring watering must resume once soils reach 40 to 50 degrees
Dead sod due to salt or harsh winter can be slit seeded with additional turf grass seeds.

In boulevard and other edge areas with expected high de-icing agent applications, temporarily stabilize the first 10 feet with straw, hydromulch or combinations of mulch and sod later in spring.



Winter Inlet Protection

Inlets pollutant prevention devices must be installed prior to any land disturbing or chemical activity, for all seasons of construction. Inlet protection works by using the area (including the road surface) as a sediment trap). Safety is a primary concern during winter. Inlet devices will require daily installation and removals, depending on weather conditions. All winter inlet devices are high maintenance.

The goal is to keep the upgradient area perpetually stabilized (at the end of each day's activity) and keep the inlet fully functional for storm and melt water drainage.

Winter Inlet BMPs include

1. Removable inserts
2. Filter logs of compost, wood chips, and rock
3. Sediment moats and rings
4. Oil trap logs
5. Heavy metal trap logs



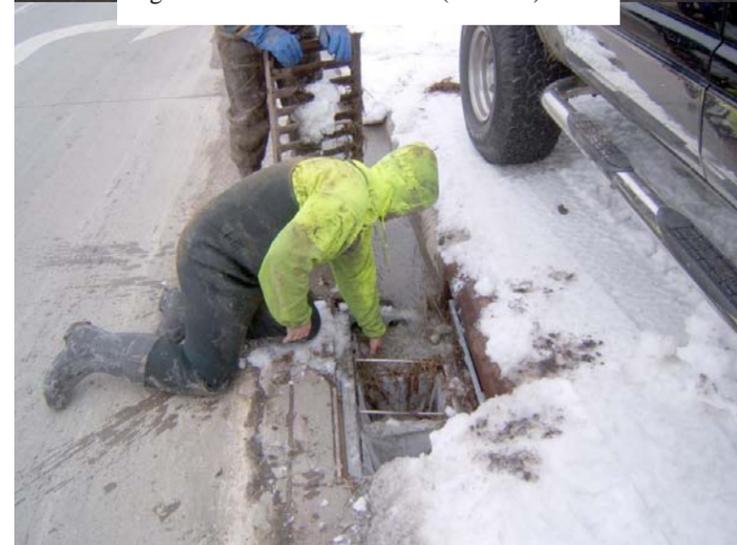
High maintenance inlet inserts (reusable)



Inlet filter logs (rock and compost)



Field inlet riser attached to grate, with seal provided by wood and rock logs. An oil boom was placed inside to riser to trap oily residues.



High maintenance inlet inserts (reusable)



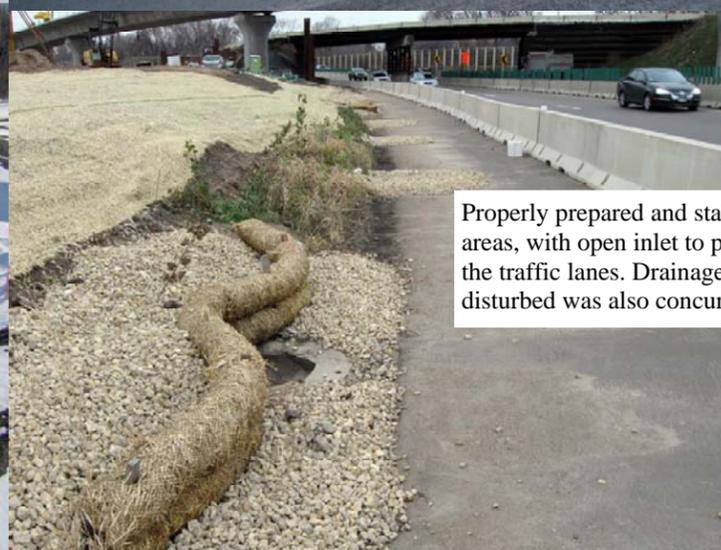
Inlet filter logs (rock and compost)



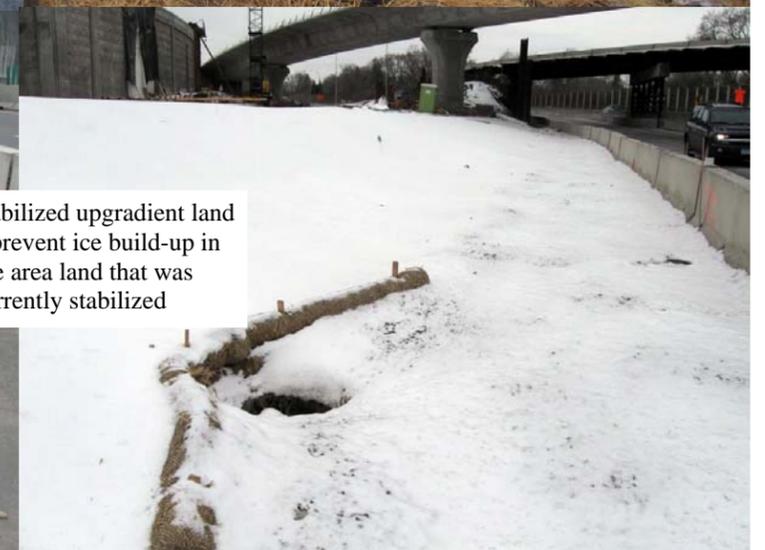
Inlet geotextile filter cage with wood-chip log toe seal (partially buried in snow), combined with temporary erosion control mulch



Sediment trap moat around active storm drain inlet. Reflective cone for snowmobile visibility (not supposed to be within construction limits)



Properly prepared and stabilized upgradient land areas, with open inlet to prevent ice build-up in the traffic lanes. Drainage area land that was disturbed was also concurrently stabilized



Snow Mulching

Process of machine or hand spreading hay or straw onto frozen or snow. The intent is to cover the snow sufficiently enough to allow sunlight to melt the mulch into the snow surface. The snow pack melt will bring the mulch to the soil surface in the spring. To prevent wind loss of mulch during application process, disk anchoring or snow storm planning may be required. Snow mulching is not intended for conveyance system stabilization (use blankets).



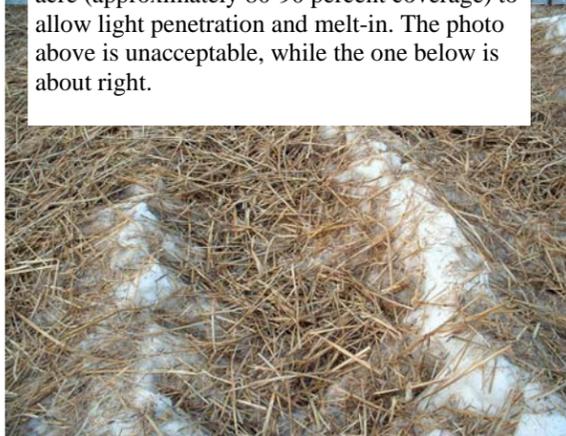
Mulch blowing equipment



Mulch crimped into the snow surface to prevent blowing prior to the next storm. Contractor used conventional crimping disk machine.



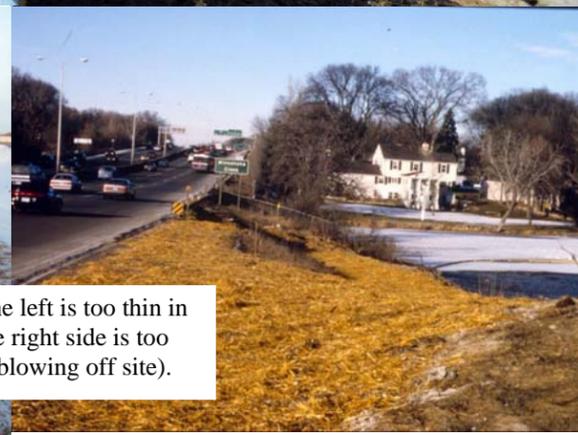
The rate of application is 1.5 to 1.75 tons per acre (approximately 80-90 percent coverage) to allow light penetration and melt-in. The photo above is unacceptable, while the one below is about right.



Various examples of snow mulched projects.



The photo to the left is too thin in spots, while the right side is too thick (ends up blowing off site).



Frozen Ground Hydromulching

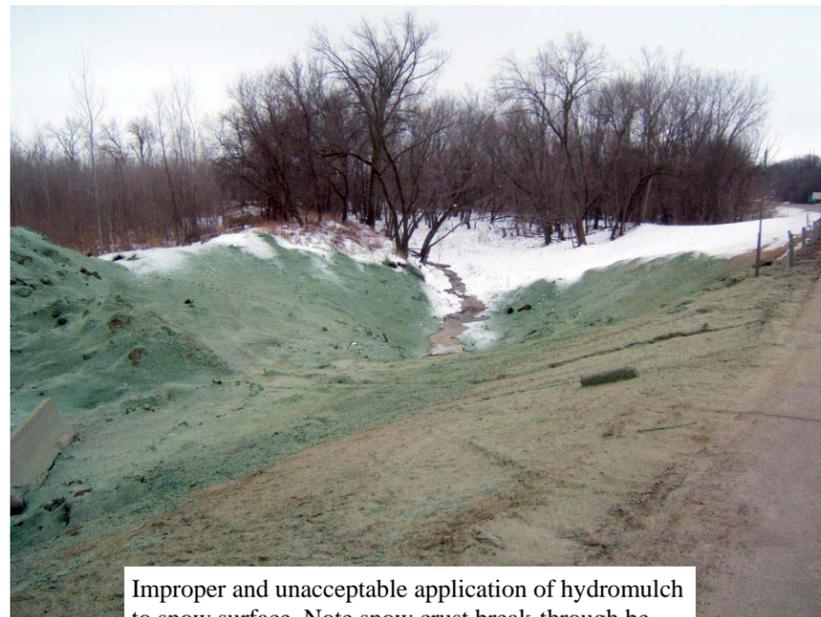
Process requires exposed soils, and a high performance mechanically bonded fiber matrix (mBFM, a new MnDOT HSS Type 9). There are only two approved products that can be placed during winter conditions due to chemistries that will still form a proper matrix if frozen. Always seed the area.

The rate is as recommended by the manufacturer, but generally is between 2500 and 4200 gallons per acre. When properly installed, the product will last through the spring season. No hydromulch is capable of withstanding typical conveyance system shear forces of spring melt waters. Install erosion control blankets or natural nettings in all ditches, flumes, and other conveyance areas.

No hydromulch will perform as intended when applied to a snow surface, as there is no linkage to soil during the snow melt.



Area properly cleared of snow (dozer) prior to application of mBFM.



Improper and unacceptable application of hydromulch to snow surface. Note snow crust break-through below.



Snow Blanketing

Process of applying erosion control blankets to conveyance systems. Blanket must be anchored with pins, staples or frozen in place (wood fiber only). There are no limits to the application locations except in known wildlife (turtles, snakes, baby ducks) habitat areas. In these situations, switch to natural netted blankets.



Blanket rolling machine on top of temporary seeded area (note tracer)

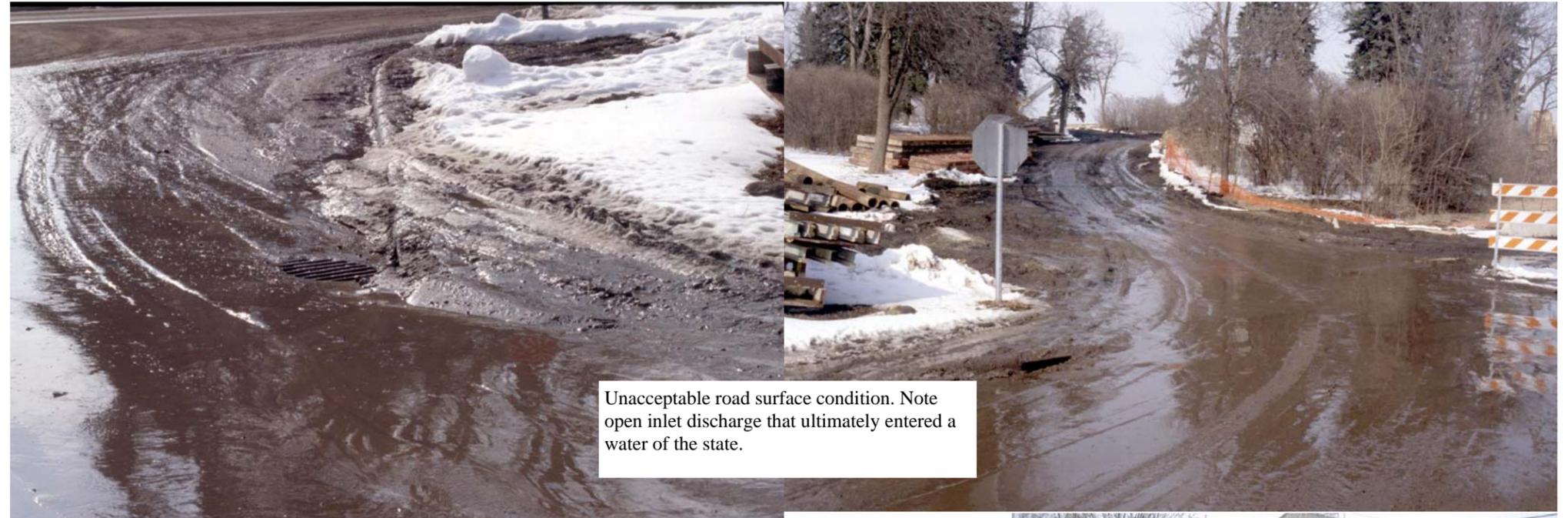
Anchor nails. Photo on the left is a spike holding a temporary blanket on side slopes of a haul road, while the photo on the right is a permanent installation using a pole barn nail and washer.

Winter Exits and Street Sweeping

Due to safety concerns and spring melt or heavy winter hauling, trackout control is a primary issue for winter construction. Strong planning and daily maintenance is required. In areas with uncontrollable sediment discharge, the contractor shall either stop all contributing operations, or install a tire washoff system.

Additional BMPs

1. remove snow cover to freeze solid the road.
2. Install mud mats, drivable base mats, slash mulches or timber pads.
3. Use proper depth crushed aggregate over geotextile separation fabric.
4. Program active sweeping following every vehicle departure.



Unacceptable road surface condition. Note open inlet discharge that ultimately entered a water of the state.



Snow removed to freeze down the soils for winter haul roads and staging area exits.



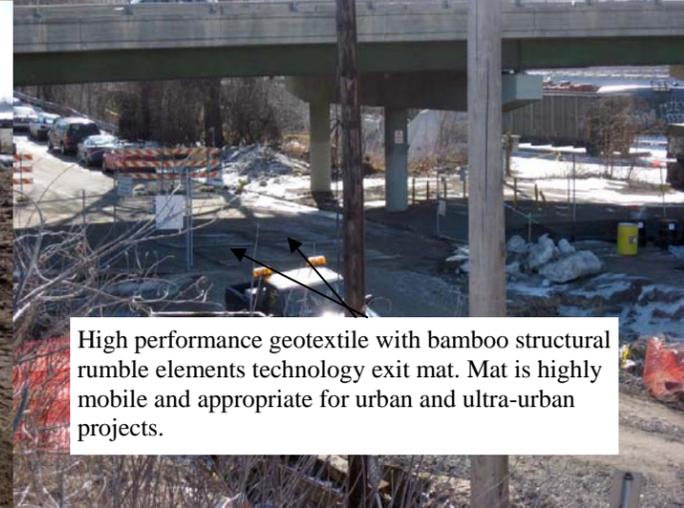
Aggregate crushed rock exit on filter sand base.



During spring soil frost layer change, active street sweeping is required, including every vehicle exit followed by sweeper.



Geotextile and slash mulch exit



High performance geotextile with bamboo structural rumble elements technology exit mat. Mat is highly mobile and appropriate for urban and ultra-urban projects.



Tire washoff system. Every truck operator washes own vehicle, from freeze protected waters ((RV antifreeze) and sump system provided by prime contractor.

Additional Winter BMPS

