# Winter construction practices for site stabilization, erosion prevention and sediment control

## Winterization planning

Projects that will either extend more than one season or will still be active during the winter months need to take special considerations when planning for winter shutdown or an active winter construction season. A winter construction plan should be developed to specifically address shutdown procedures or active construction plans. Projects that plan to continue construction during the winter seasons should sequence construction events such that areas having high potential for erosion and sedimentation be fully constructed and stabilized prior to the presence of frozen conditions whenever possible.

## Shutting down construction sites for winter

All winter shutdown activities should be performed before frozen conditions are present and must be completed within 14 days (7 days in some cases depending on construction stormwater permit requirements) following the end of construction for the season. Winter shutdown activities should be completed prior to snowfall whenever possible.

* Seed all proposed vegetated areas to ensure germination.
* Stabilize all slopes no later than October 15th with either rock, permanent or temporary vegetation, straw mulch secured with netting (slopes less than 15%), erosion control blanket (slopes 15% or greater). Vegetated slopes that have not germinated with at least 70% cover should be augmented with another method in these areas.
* Stabilize all areas of bare soil (not including road, parking and staging areas) with a dormant seed mix and straw mulch crimped into the soil.
* Apply temporary seed and mulch stockpiles of soil materials with mulch at twice the normally recommended rate, with a minimum thickness of 3 inches having 80% to 90% cover.
* Install all sediment barriers with adequate area to allow access for inspection and maintenance. Install vertical markers every 100 feet to identify their locations during melt conditions.
* All road, parking and staging areas that have not been fully constructed prior to winter shutdown should be stabilized with a minimum of 3 inches of a sand and gravel mix with a gradation such that less than 12% of the sand passes the number 200 sieve.

## Active construction during winter

Construction during the winter months presents many additional challenges that require modifications to traditional construction practices in order to continue with work. Typically, a winter construction plan should be followed once the ground begins to freeze. Frozen ground can cause equipment slippage during operation, make excavations difficult or impossible with the available equipment, and material stockpiles can freeze, which hinders the ability to achieve adequate compaction or uniformly distribute materials. Fertilizer, liming materials, and soil additives should never be applied to frozen ground. These activities can resume after spring snow melt is complete.

Winter construction plans typically include the following provisions:

* Reset limits of construction for winter work and install BMPs necessary for winter construction prior to the ground freezing and significant snowfall.
* Ensure that 25-foot clear buffers and all perimeter controls are maintained to be free of obstructions and more than 2 inches of snow around for maintenance purposes.
* Designate protected snow storage areas and access routes.
* Widen, lengthen and stabilize access points to the site(Sediment control practices - Vehicle tracking BMPs).
* Stabilize areas where construction traffic is anticipated with stone (10-20 feet wide for vehicles).

As winter construction progresses, there will be additional needs for stabilization, which cannot be addressed with traditional methods.

* Limit snow pack on construction roads to increase frost penetration in areas with frequent vehicle traffic.
* When equipment cleaning is required, it should be performed with compressed air instead of water.

More specifically, MnDOT provides the following recommendations for best management practices during winter construction activity. Good housekeeping practices should be considered throughout the project to meet permit requirements. Additional information can be found in [MnDOT](http://www.dot.state.mn.us/environment/erosion/erosion-prevention.html)’s *Winter Guidance* and *Winter BMP Guidance 2*.

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| **Practice** | **Winter guidelines (MnDOT)** |
| Winter site preparation | Practices include smoothing rough grading, frost tillage and harrowing. |
| Winter seeding/snow seeding | Apply seed over snow so that it melts into the snow surface during winter months. Seed will melt to the soil surface for germination after snow melt. All permanent and most temporary seed mixes can be snow seeded. Application on soft snow or during a sunny day is ideal. |
| Dormant sodding | Dormant sodding should be conducted between November 1st and soil freeze up. Winter sod cannot be placed within 10 feet from the shoulder of a road or in areas that require salt tolerant sod. |
| Mulching on bare frozen soils | Perform on bare frozen soils when temperatures are above 20 degrees Fahrenheit. If temperatures are below 20 degrees, delay mulching and perform snow mulching once ground is covered in snow.  |
| Mulching on snow | Apply mulch over snow (any depth) at a rate of 1.5 to 1.75 tons per acre, or about an 80-90% cover. Sunlight will melt the straw into the snow to melt onto bare soil in the spring. Practice is not applicable to conveyance systems.  |
| Winter erosion control blanket/turf reinforcement mats/snow blanket installation | Install practices over bare frozen ground or snow (no deeper than 2 inches) using appropriate anchors. If necessary, remove snow before placing erosion control blanket. Practices are useful for conveyance systems and other areas where mulching practices are not applicable. There are no limits to the application locations for snow blanketing except in known wildlife habitat areas. In these areas, use natural netted blankets.  |
| Winter exits and street sweeping | If proper winter exits are not present, it may be necessary to sweep after each vehicle exits the site. Daily maintenance of exit should occur to determine if adjustments are needed. BMPs include creating an ice/snow road, installing mud mats, drivable base mats, slash mulches or timber pads, and use of proper depth crushed aggregate over geotextile separation fabric. |
| Ice/snow road | Remove snow cover to allow the soil and road to freeze solid to support every equipment hauling. Mud mats, drivable base mats, slash mulches or timber pads can be installed. BMP can be used to create a proper winter exit. |
| Winter inlet protection | Must be installed prior to any land disturbance on site. Winter inlets should be cleared daily of any ice or snow to ensure their full functionality. BMPs include removable inserts, filter logs, sediment moats and rings, oil and heavy metal trap logs. Most inlet protection BMPs should be removed once contributing erosion is properly stabilized. |
| Winter perimeter control | Should either be a temporary BMP or a BMP that is heavy enough to remain in place during melt conditions. Rebar and other sharp devices are not allowed. BMPs include snow berms, filter logs, geotextile wrapped straw bales, clean and washed filter rock, and riprap or rock berms. |

### Snow management and storage

Prepare a snow management plan for the site to account for adequate storage of cleared snow through the winter and control of meltwater. Snow storage locations should be placed down slope of all disturbed areas, but not located within stormwater treatment BMPs that are designed for infiltration or filtration or within natural wetlands. Snow mixed with significant amounts of soil should be stored in separate locations that are designed to handle larger volumes of sediment. Storing sediment-laden snow in stormwater treatment BMPs may increase the need for maintenance due to high levels of sedimentation following melt. See the management approaches section under [cold climate impact on runoff management](https://stormwater.pca.state.mn.us/index.php/Cold_climate_impact_on_runoff_management) for additional recommendations.

### Earthwork on frozen soils

Many earthwork operations can continue through the winter months on frozen soils with specific modifications. Occasionally, it may be necessary to relocate frozen or saturated soils to continue with construction.

* Frozen topsoil stripping should only be completed by equipment capable of accurately stripping topsoil to the appropriate depths. If topsoil cannot be separated from subsoil without mixing, stripping operations should cease until soil conditions improve. It may be necessary to precede the grader or dozer with a ripper mounted machine to achieve the appropriate depth penetration. Multiple stripping passes are preferred over a single pass to achieve full depth for stripping operations in order to prevent subsoil mixing.
* Minimize the amount of open trench to limit the amount of trench snow to be removed and to minimize freezing of backfill materials.
* Do not backfill trenches with frozen materials. Frozen surface stockpile materials may need to be removed from stockpiles to access materials that are not frozen.
* Do not spread frozen or saturated topsoil and do not fill excavations with frozen or saturated soils.
* If topsoil cannot be properly spread, the finished subgrade work should be significantly roughened and stabilized with mulch that is either spread directly on top of the soil and either disked or crimped in or spread on top of snow and likewise crimped into the snow. Final restoration can then take place in the spring when soil conditions allow.
* During construction, if mid-winter melts occur over frozen soil, the saturated soil may be removed on access drives and stored in snow storage locations. Additionally, during trenching and excavation operations, frozen soil may be removed and stored here as well to access the unfrozen subgrade.
* Shallow drainage paths with a minimum width of 2 feet should be placed within a soil stockpile areas to direct runoff to treatment BMPs for sediment control and prevent mixing with surrounding runoff.

### Winter maintenance

Regardless of whether or not a construction site has been shut down for the winter, all installed BMPs must be monitored and corrective actions taken as necessary. Gravel, sandbags, erosion blankets, and mulch should be kept on site to address any immediate repair needs. Repairs to BMPs should be made immediately and any accumulated sediment should be remove upon each inspection.

Inactive construction sites:

* BMPs should be inspected periodically during the winter months to ensure their function. If inspections are suspended during frozen ground condition, they must resume within 24 hours of runoff occurring on the site or when construction resumes, whichever comes first (Construction Stormwater General Permit Section 11.10).
* Inspect BMPs within 24 hours of a rain event over ½ inch in 24 hours or when runoff occurrs as a result of snowmelt conditions.

Active construction sites:

* BMPs should be inspected weekly or within 24 hours of a rain, heavy snow, high wind event, or melt. Minnesota General Construction Stormwater Permit Section 11.2 requires that the entire construction site be inspected once every seven days or within 24 hours after a rainfall event greater than ½ inch in 24 hours.
* BMPs within unstabilized areas should be inspected at the end of each day.
* Ensure that all areas of disturbed soil are adequately protected ahead of a forecasted melt event.
* Snow should not be piled against silt fence. A 25-foot snow-free area should be maintained around all perimeter controls and upgradient of any silt fence.
* Keep all equipment travel areas as free of snow as possible to increase frost penetration.
* Keep drainage structures open. Check for and remove snow and ice dams to ensure function during construction.

### Spring thaw conditions

During spring thaw, it may be necessary to suspend construction activities until soils are no longer saturated. Keeping vehicle travel areas free of snow at night and covered with snow during the day can help to maintain frost penetration in the ground. It is extremely important that all BMPs are being actively monitored and promptly maintained during the spring thaw period.

See [cold climate impact on runoff management](https://stormwater.pca.state.mn.us/index.php/Cold_climate_impact_on_runoff_management) for recommendations for controlling snowmelt runoff.

## References

Alaska Department of Environmental Conservation, 2011. Alaska Storm Water Guide. Alaska Department of Conservation, Division of Water, Anchorage, Alaska.

Caraco, D. and R. Claytor, 1997. Stormwater BMP Design Supplement for Cold Climates. Center for Watershed Protection, Ellicott City, Maryland.

New Hampshire Department of Environmental Services, 2008. New Hampshire Stormwater Manual, Volume 3: Erosion and Sediment Controls During Construction. Section 4.3 Winter Weather Stabilization & Construction Practices. New Hampshire Department of Environmental Services, Concord, New Hampshire.

Minnesota Pollution Control Agency, 2018. Authorization to Discharge Stormwater Associated with Construction Activity Under the National Pollution Discharge Elimination System (NPDES)/State Disposal System (SDS) Program MNR100001. Minnesota Pollution Control Agency, Saint Paul, Minnesota.

Stenlund, Dwayne, 2015. Winter Stabilization Practices Guidance Document: Conversion from summer to winter & winter construction, Version 2. Minnesota Department of Transportation, Office of Environmental Stewardship, Saint Paul, Minnesota.

Vermont Department of Environmental Conservation, n.d. Winter Construction and the Vermont Construction General Permit: A Planner’s Guide. Vermont Department of Environmental Conservation, Water Quality Division, Waterbury, Vermont. <https://dec.vermont.gov/sites/dec/files/wsm/wetlands/docs/wl_VTWinterConstructionGuide.pdf>

Vermont Department of Environmental Conservation, 2006. The Low Risk Site Handbook for Erosion Prevention and Sediment Control. Vermont Department of Environmental Conservation, Waterbury, Vermont.