Snow Management

Definition and Purpose
Snow management involves the relocation of snow by transporting, plowing, dozing, and/or blowing snow to locations where erosion impacts are less likely to occur during melting. This BMP can be used in conjunction with snow fences.

Appropriate Applications
This BMP is appropriate when construction projects extend through winter months and at locations (such as high mountain areas) where snow accumulation can be significant.

Limitation
This BMP may not be appropriate in areas with little snow accumulations and where access is limited.

Design Guidelines and Considerations
- Utilize snow blowers, snowplows, or other equipment to remove snow or move snow to less erosionally sensitive areas with proper drainage.
- Modify existing snowplow operations so snow is not piled in erosionally sensitive areas.
- Remove heavy snow accumulations from around temporary structures such as culverts to minimize ice jamming and structure failure during freeze-thaw cycles.
- Place snow in areas where soil/cover is stable and snowmelt will have a less significant impact.

Maintenance, Inspection, and Removal
- Remove or move snow as needed to reduce melt impacts.
- Inspect snow placement areas during the thaw cycle.

BMP Objectives
- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management
Snow Accumulation Management 

**Definition and Purpose**

At construction sites, snow can accumulate on disturbed areas and in drainages prior to cover being established. The Snow Barrier BMP involves the installation of snow barriers to reduce the amount of erosion on disturbed areas. Temporary Snow Barriers are most commonly constructed from synthetic materials; however, boards, hay bales, rocks, and other similar materials can be used as well.

**Appropriate Applications**

In areas where snow drifts of 1.5 to 3 meters (5 to 10 feet) in depth can occur, snow fences can be installed to prevent snow from accumulating on sensitive areas. This practice will minimize erosive snowmelt runoff and ice blockages. Snow fencing can be used in conjunction with Preservation of Existing Vegetation (SS-2) and Wind Erosion Control (WE-1).

**Limitation**

Snow fences are difficult to install on steep slopes and rocky surfaces. Snow fences may not be cost effective when large areas need to be protected from snow accumulation. Removal at the end of the project is manpower intensive.

**Design Guidelines and Considerations**

- Install snow barriers adjacent to disturbed areas, perpendicular to the prevailing wind direction, and “upwind” of disturbance area.

- Fences in moderate snow areas should be 1.2 to 1.8 meters (4 to 6 ft) in height. Two or more parallel rows of snow fence may be used in areas of heavy snow accumulations.

- Synthetic fence density (the ratio of the solid area to the area of the fence) should be between 40% and 60%.

- Fences should be placed, if practical, at a distance of 15 to 20 times the fence height from the area to be protected.
Maintenance, Inspection, and Removal

- Inspect snow barrier materials and installation throughout the winter to make sure they are functioning properly.

- Remove snow barriers when the areas to be protected have been stabilized.
SNOW ACCUMULATION MANAGEMENT (SN-21)

SNOW ACCUMULATION BARRIERS PROVIDE AN AREA OF REDUCED WIND VELOCITY WHICH ALLOWS SETTLING OF SNOW. MAXIMUM REDUCTION OF WIND VELOCITIES OCCUR IMMEDIATELY DOWNWIND OF THE SNOW BARRIER, GRADUALLY DECREASING FURTHER DOWNWIND.

SNOW FENCING IS ONLY EFFECTIVE FOR DRIFT CONTROL FOR APPROXIMATELY 15-20 TIMES THE HEIGHT OF THE FENCE. SNOW FENCE IS REQUIRED TO BE A PREFABRICATED COMMERCIAL PRODUCT MADE OF NOVEL, FOLIOXYLENE, AND UV-RESISTANT MATERIAL WITH A POROSITY OF 50-90%. SNOW FENCING IS MOST PROTECTIVE IN A DIRECTION THAT IS PERPENDICULAR TO THE WIND DIRECTION. SEVERAL PARALLEL FENCES CAN BE USED IN AREAS OF HIGH SNOW ACCUMULATION OR HIGH WIND CONDITIONS. SECURE FENCING TO APPROVED POSTS WITH FOLLOWING MANUFACTURE RECOMMENDATIONS.

MAINTAIN SNOW FENCING AS NEEDED OR AS SPECIFIED BY THE ENGINEER. REMOVE SNOW ACCUMULATIONS FROM FENCING ONCE LEVELS HAVE REACHED THE BOTTOM OF THE FENCE.

Preliminary

REFERENCE DWG. NO.
STANDARD SPEC.
SECTION 208
SNOW ACCUMULATION MANAGEMENT
SN-21

ALL DIMENSIONS ARE MILLIMETERS
("") UNLESS OTHERWISE NOTED.

CDM Camp Dresser & McKee Inc.
Freeze Reduction

Definition and Purpose
Snow and ice accumulations in structures such as ditches and culverts can lead to plugging and subsequently to significant water flows across disturbed areas causing erosion. Frozen culverts can cause water to flow over roadways destabilizing them. Ice blockage in channels can increase water levels in the channels causing flooding and potentially resulting in significant damage. The freeze reduction BMP involves the use of oversized culverts, dual culverts, elevated culvert outlets, and heat trace to reduce the impacts of freezing weather on culvert effectiveness.

Appropriate Applications
Generally, ice blockage occurs during the winter months in Montana and proper slopes and proper installation of standard hydraulic structures reduce freezing. However, in areas where failure could cause significant damage, conservation methods such as the ones described in this BMP may be necessary.

Freeze reduction BMPs are appropriate in areas where heavy frost and snow may cause unacceptable failure, such as at or near environmentally hazardous sites, or in locations where failures could be a health hazard or cause unacceptable problems.

Limitation
Areas with limited access and space to install oversized and/or dual hydraulic structures. Elevated culvert outlets in streams should be avoided if fish migration is a concern. Heat trace may not be appropriate for remote areas with limited access to electricity.

Design Guidelines and Considerations
- Install oversized culverts to allow for some freezing.
- Install dual culverts with one culvert raised higher in elevation than the other culvert. This will allow water passage through the upper culvert if the lower culvert freezes.
- A vertical drop of approximately 0.6 meters (2 feet) at a culvert outlet may reduce water freezing within the culvert.

BMP Objectives
- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management
• Install channel freeze protective measures as shown in the Freeze Reduction (SN-3) Detail Drawing.

**Maintenance, Inspection, and Removal**

• Inspect temporary structures during freezing conditions and prior to spring thaw to assure that they are properly functioning.

• Disconnect and remove any electrical components when no longer required for freeze reduction.
Freeze Reduction Details:

Freeze reduction details are used to ensure that critical culverts do not freeze during the winter months. Use heat trace in culverts to prevent freezing. All engineering approaches to conditions in double culvert system may be used. With this system if one culvert freezes a second, higher or lower, culvert will contain runoff.

All electrical work to be completed by a licensed electrician in accordance with national electrical codes and submittal specifications. Heat cable is intended for continuous operation in the winter and cannot be used to thaw frozen culverts.

Pre-Liminary

Reference: Submittal Spec. 208-37
Section 209

Freeze Reduction (SM-31)

CDM Camp Dresser & McKee Inc.