CHAPTER 30
CONSTRUCTION IN COLD CLIMATES
SECTION 139 – SNOW ROADS

3001. **General.** Snow roads are rapidly built, but they need constant maintenance and may be blocked by blizzards, drifting or sudden thaw. Under snow cover frozen ground tends to remain frozen, but unfrozen ground may not freeze and it may become treacherous. Compaction of snow allows deeper frost penetration, but it also speeds up the effect of a thaw.

3002. **Types of Snow Road:**

a. **Dragged Roads.** Suitable only for traffic loads up to $2\frac{1}{2}$ tons gross weight.

b. **Compacted Snow Roads.** Properly processed surfaces (see para 840) will normally carry medium tractors and $2\frac{1}{2}$ tons trucks. In windy locations, raise the surface with compacted layers of snow to minimize drifting.

c. **Rutted roads.** Formed by traffic action. In low temperatures ruts become iced, and will support heavy loads. Narrow rut roads are used only by sledges. Iced wide rut roads will carry heavy tracked tractors and 6-ton trucks. Artificial icing takes about 3000 gallons of water per mile, for a 3-in ice thickness on a wide rut road.

Figure 30-1: Variety of Drags

Figure 30-2: Dragging by Caterpillar Challenger 95E

Figure 30-3: Dragging by caterpillar D-7 bull dozer with Sheep Foot

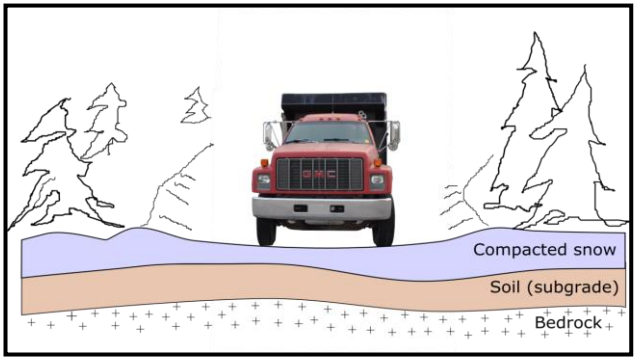

Figure 30-4: Compacted snow road

Location and Design

3003. **Curves and Gradients.** Wheel traction is extremely poor on snow and ice surfaces near melting point. All curves and gradients should be as gentle as possible. Camber and cross fall are undesirable.

3004. **Cut and Fill.** Cuts upset the thermal balance and encourage drifting, especially in side-hill cut. Fill should be built up of compacted layers of snow.

3005. **Drainage.** Any necessary ditches or culverts should be deep and narrow. The flow of water can be maintained by making a dam and allowing the water to build up until frozen over. Cover the ice with a layer of snow and remove the dam. The wate level will drop leaving an insulting cover over the drain.

Construction

3006. **Compaction by Agitation.** Agitation increases snow density and improves cementation. Harrows, rotary snow ploughs and pulvimixers are used.

Figure 30-5: Pulvimixer

3007. **Compaction by Rolling.** Snow must usually be processed by harrows or light drags, allowing time for re-cementation, before it will support a roller. Large diameter light rollers are used next. Heavy small diameter rollers are suitable only on dense snow. Smooth or ribbed drum-type rollers should be used. Sheepsfoot rollers are unsuitable.

Compaction by traffic strengthens the surface progressively.

3008. **Processing Stages.** Three treatments at intervals of 4 hours, give the same results as 10 successive treatments. The normal sequence is:

a. Agitate by harrow or light drag.
b. Allow 4 hours for re-bonding and hardening.
c. Break the surface with a harrow and roll with a large diameter light roller.
d. Allow a 4 hour interval.
e. Again break the surface and roll with a heavier roller.
f. Allow 4 hours before accepting traffic.

Maintenance

3009. Constant maintenance is vital:

a. To restore surfaces cut up by tracks, or by vehicles using chains.
b. To deal with freshly fallen snow.
c. To skid-proof the surface, especially on slopes and curves.

3010. Provided that a firm base has been established, continual rolling will restore and improve the surface.

3011. It is always better to compact fresh snow than to attempt to clear it but soft fluffy snow is difficult to incorporate and usually has to be cleared.

Rolling with tractor-drawn rollers should start as soon as 3-ins of snow have fallen, and must continue throughout the snowfall. In periods of heavy snowstorms, shift working is essential to prevent the formation of drifts too deep for quick clearance.

3012. Skid-proofing is often a more excavating task than the clearance or compaction of snow. It is best done by spreading cinders fine gravel or slag or coke screenings. Sand is less effective, except when the snow is very thoroughly compacted.

Stockpiles of abrasive material must be maintained near critical points. If mid-day sun temperature caused thawing, following by night freezing of the wet surface, large scale gritting by trucks will be necessary.