Let It Snow
How the railroads cope with all that white stuff...

OK, yeah, it’s a Photoshop. Still entertaining...

Thanks, Larry Sloane
Overview

• My interest in snow...
• Prevention
  • If possible, it is better for the railroads to keep snow from becoming a problem in the first place...
  • Since they can’t change the weather, what CAN they do to prevent it from becoming a problem?
• Remediation
  • OK, the white stuff is piling up on the tracks. What now?
  • Get rid of it!

My personal experience with snow goes back to growing up in MN, shoveling quite a number of driveways, learning to ski, and eventually drive in it, and overall, not having too bad an experience with it. I even moved from CA to MI later in life, where shoulder-high drifts somehow didn’t scare away my Taiwan-born future wife! (and where it subsequently snowed on our wedding day, MAY 17!)

The railroads, on the other hand, would probably prefer to not have to deal with it. They’re not interested in recreation, nor do they care about aesthetics. They are interested in moving freight (and occasionally passengers) from one place to another.

So, what is the railroad’s interest in snow?
First, Prevention. If at all possible, the railroads will prefer to at least mitigate the effects of snow in advance. If the railroads can prepare for snow in advance, and minimize its effects, at least it’s a fixed cost they can amortize over the overall expenses of running the railroad.

Of course, since they can’t stop the stuff completely, it WILL start getting on the tracks. What then? Get rid of it, of course.
Prevention

• Snow Fences

Snow fences keep snow from blowing and drifting onto the tracks, especially in the areas of cuts that might rapidly fill in. These images are along UP tracks in Wyoming.

Note that the fences are not solid (or they would easily be damaged/blown over by high-wind storms), but have enough wide sections to provide a block to snow (and snow rapidly drifts behind them)
I had some difficulty finding a photo that actually showed the snow piled up against a fence, likely because when that has happened, access is... challenging.

West of Otto, on the Sherman Hill portion of the mainline in Wyoming.
May, or may not, be snow-related, but when I saw mention made of this in Model Railroad Planning 2016, it seemed appropriate to include.

D&RGW took a slightly different approach on Big 10 Curve... built a temporary track sometime between December 1971 and early 1973, rolled in 20+ old hoppers filled with dirt and cement, then left them there to combat winds that can reach 70 mph. Source I found describing this mentioned this was possibly done, not because of snow, but because of derailments of high-clearance cars on the curve.
In areas where avalanches and extremely high snowfall are common, snowsheds were common to protect the tracks.

Dual purposes- keep snow from falling (and to some extent drifting) onto the tracks, and help protect against avalanches. Because of that, they need to be built TOUGH. BIG timbers, spaced CLOSE together.
Notice the scale of those beams, and how close they are together. Necessary to support not only the static weight of the snow, but also the dynamic force of an avalanche.
A modern take on the same concept.
Prevention

• Wellington, WA concrete show shed (Great Northern)

And a little more local.
Prevention

- Just so long as everything goes well...
Prevention

Cumbres, NM
In earlier years, a covered turntable.
In later years, a portion of the wye.

Snow sheds have even covered more-significant infrastructure, to protect them from the elements.
Prevention

- Covered turntables on the Southern Pacific, too.
- **From the Norm Sayler Collection**
  A snowshed and turntable at Emigrant Gap east of Donner Summit.
Prevention

- Donner Pass, Norden, CA
- Hey, that’s one way to disguise an old Atlas turntable!

A little modeling advice?

Snow sheds, unfortunately, are typically fairly-enclosed... need to keep the snow from drifting back onto the tracks (whether falling from the sky, or FALLING down the hill.) If you’re a wooden-building modeler, perhaps a challenge, but not good for seeing our trains running through.
Once the snow starts coming down, it will eventually need to be removed. While we may start thinking plows right away, we can still talk infrastructure, and even see a modeling possibility.
Remediation

- Switch heaters
  - Gas, Oil, or Electric
  - Blow hot air onto places that must be kept clear, such as switch points

LIRR Jamaica complex, and diagram of a typical remote installation
Now we start getting into the rolling stock. I thought I would start out, still in the yards, but with something Just A Little Different.

A snow melter constructed by the Finnish engineering company Saalasti in 2004. Dual-purpose- ballast cleaner in summer, and ice/snow vacuum/melter in winter.
It’s not a new concept, though. Union Pacific had one too...

(Personal note: this article, from the UPHS Streamliner, lay the initial germ of an idea for this clinic.)

The augers up front obviously dig into the snow, which is moved up the conveyor belt and into the tank, where it is melted for storage during the work (on average, snow melts down 10:1 or even 13:1 by volume.)
Remediation

- Powered by either 4-10-2 #5020 or a Challenger! (3710, possibly 3707)

Work started by filling the tank w/ 4000 gallons of water, heating it to boil while moving to the area to be cleared, then digging in! The conveyor carried snow from the front into the tank; the locomotive supplied both motive power and steam... lots and lots of steam. One pound of steam melts about eight pounds of ice (I trotted out my H.S. physics to get that...)

1949 delivery photos show the front car (originally a F-50-11 flatcar) with the equipment mounted, but no walls/doors/windows, exposing the diesel motor and a variety of tanks. As they probably got covered by snow rapidly, they had been enclosed by these 1951 pictures.
Remediation

- Detail view of UP3010 showing additional steam piping.

UP 5020 (4-10-2) and UP 3010 (4-6-6-4) are known to have had modified piping permanently applied, as shown here, to supply steam. The previous photo showed 3710 (4-6-6-4), which may have been pressed into duty with temporary piping due to a heavy snowfall.
Locomotive plows are the first response. They are found in a variety of shapes and sizes, typically related to just how much snow the railroad expects in the normal operating areas.

This one, seen in 1941, at Telluride, CO, clearly expects more than just a dusting....
Remediation

• English Electric Type 1

The English don’t just get rain and fog...
Locomotive plows can have a variety of sizes, depending on the expectations. UP 518 and 539 have fairly-large-sized plows...
While others are more-petite. The Milwaukee unit looks like it wishes its snowplow were a little bigger...
Aside from simply punching through the snow, there are other facets of snow control that have been addressed on the locomotives.
Cowl units were one response to habitability; instead of having to fight their way along perhaps-slippery walkways, the crew could move inside the body. There is a clear loss of visibility to the rear, though, leading several Canadian models to have the “Draper Taper” built in. We can see it just behind the Engineer’s side of this C40-8M. Improved, albeit not complete, visibility to the rear.

Kaslo Resin Shops has made a resin SD60F shell, along with SD40-2F and M420 for those looking for a real conversation-piece locomotive.
Snow Shields, or Winterization Hatch

These capture some of the warm air from the radiators. Recirculates the warm air inside the locomotive, where it can be blown out by the ventilation system to help warm components like the water pumps internally, helps keep the locomotive from running too cool (thermodynamic efficiency is based on difference in temperature between “Hot” (cylinders) and “Cold” (exhaust), and finally, helps keep the cooling system from freezing under low usage conditions (like, at idle or drifting downhill).

This is a common detail to be added aftermarket.
Remediation

- Classic SP snow train
- Rotary wipers
- Icicle breakers
- Snowplow
- Along with typical SP light package

The rotary wipers are common on snow-working equipment; reduces chances of buildup on the edges of the wiped area (although the rest of the window will likely be caked solid).

Icicle breakers were often used on passenger locomotives to protect the windows of dome cars; still common on high-clearance trains such as intermodal.

SP modelers get LOTS of practice at adding extra parts, like that big light up front.
A Washington-related site, now. Boeing transports 737 fuselages from the factory in Wichita to final assembly in Renton, WA. Since they need to pass through some cold areas, there is the possibility of encountering ice, and so one of the purposes of the structures at the front of each car is as an icebreaker, to protect the relatively-fragile aluminum skin of the fuselages.
One of the reasons I love Southern Pacific, apart from playing somewhat of an “Eternal Underdog” role to ATSF and UP in the west, was their attitude of “Just about anything can be resolved by engineering.”

Too much grade and snow? Build tunnels and snowsheds.

Now, the crew of the locomotives are getting smothered by smoke/steam? Effectively, build new Articulated Consolidations to run “backwards”.

Remediation
Further, to the modern era, locomotives are now having difficulties in tunnels and snowsheds because of hot near the ceiling? Suck it in from lower-down, creating the Tunnel Motors.

Notice the cooling intakes located much lower compared to the Kodachrome SD45-2 behind it.
Remediation

- Youtube video, “CN Train 406 West at Salisbury, NB”
- https://www.youtube.com/watch?v=Yja2VmZOfdA

Only play about the first 50 seconds.

This has been making the rounds on FB lately, but still impressive. What JUST a locomotive (with a train behind it) can get through... probably a foot of snow on the ground.
We’re now arriving at the “big guns” of snow fighting. One thing to keep in mind... the railroads really would prefer not to have money wasted on equipment that is used only once in a while. Over the past decade, plows and snow blowers have not been needed every year, even on the most-Northern of the US railroads.

If possible, the railroads prefer to use multi-purpose equipment as much as possible. A good example of this is the flanger/spreader. During clement conditions, they can be used to regulate the shape of the ballast along the right-of-way using their “wing” blades. When winter rolls around, though, they can be used as a plow as well.
1885 D&RGW flanger (typically towed BEHIND the locomotive... loco still needed a plow)
Maine Central Plow & Flanger
A particular style is the “Jordan Spreader”. Here are two modern versions, on DM&E and BN.

Oswald F. Jordan was a Canadian road master on the Canada Southern Rwy, a branch of the NYC. He designed the first spreader at the St. Thomas CS shop around 1900, and then formed the O. F. Jordan Company to build them for other railroads.

Usable to remove snow, build banks, clean/dig ditches, form the embankments.

Originally powered by air, these two have been re-powered to carry a diesel engine, and operated hydraulically.
This looks like BN; This is basically a Jordan Spreader with a significant plow on the front.

And this... something... was photographed in a Swiss yard.
February 2011; Rebuilt Jordan Spreaders on Donner Pass. Yes, they are labelled SP!!!!!

First pass through 1:00 shows they’ve got one at each end of the train, sandwiching two SDs; As the lead SD passes, note the overhang installed (by SP before the merger) to help keep some snow off the walkways... another example of adapting the locomotive to help the crew. from 1:00 on shows how they are clearing two lines by moving in the opposite direction. (end < 2:00)
Remediation

• LIRR

Are they trying to SCARE the snow off the rails?
IC/CN, east of Freeport, IL. Plows were sometimes built out of outmoded cars, such as this gondola. Whatever the source of running gear, it was important to be able to ballast the car to high weight in order to help keep it on the rails.
Or this one, apparently built out of an old switcher? Tenders were another common source, as steam engines were retired.

Single-sided plows are used along double-track lines. The plow will be oriented to push the snow to the outside of the double-track. It must either be turned, and run back along the same line in the opposite direction, or there must be a “right-handed” version of the same plow heading in the same direction.
Remedation

• Double-ended for branchline service

In case you don’t have a wye/turntable at the far end...

Note: This plow is available from a seller on Shapeways.com, done via 3D printing.
Finally, we get to The Big Guns.

Rotaries have the greatest capabilities of all the snow-moving equipment the railroads have. They are also single-purpose, expensive to operate, and somewhat fragile. Thus, they are only used in the most-extreme circumstances these days.

Originally powered by steam engines (note the tender on this OSL example), subsequently many were converted to electric or diesel power.
NP Rotary #10, at the Snoqualmie Rwy Museum
Remediation

• Variation on a theme

A Swedish blower
And a French one. That’s scary, with multiple impellers and blades!
Somewhat foreshortened view- not sure what photographer did. After conversion to electric, many blowers were powered by re-purposed F-B units, such as this SP unit.
Remediation

Built new by UP as recently as 1971. Diesel-powered.
Remediation

• CN Snowplow footage
• https://www.youtube.com/watch?v=uvbgq2Ni2uE

Hard to tell if same plow, but a similar CN plow in action.

First 10 seconds: CN “gondola” plow
1:10 – 1:30: SP plow made out of old whaleback tender
2:00 – 2:50: flanger, looks European, and later on see one of the wings being pulled in for a crossing
4:15 – 5:50 or so: BN snow blower. Can’t see the blower all that much... LOTS of snow! Impressive drift at ~5:45
The Chicago Transit Authority is prepared for some SERIOUS snow. Snow blower at front, snow broom to sweep the tracks at the rear, and both third-rail, or diesel propulsion where that's not available.
Remediation

- Desperate times call for Desperate measures...
- https://www.youtube.com/watch?v=AAes7fFpgeY

Go to about 0:55 seconds to see I actually blowing.

Yes, that’s a jet engine mounted on a rail vehicle. Used in blowing out yards.
Questions?
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