

“Will you settle a bet for me?” the caller said, “My friend thinks that ranchers put these tall fences out there for their cattle to shelter behind and I think the Highway Department puts them up to keep snow off the road.”

While cattle do shelter behind snow fence, it is not their primary function. Not sure where the caller was from, but it goes to show that after using snow fence to protect the roadways in Wyoming for over 100 years, people are still not sure what those free standing, big fences are doing in that field.

There are photos dating from 1908 showing a snow fence in use along roadways in Wyoming. If railroad use is included, that date can be pushed back to 1868. Its use remained popular until snow removal equipment became more prevalent. Once snow removal equipment became more powerful, the then



Highway Department focused on what the work “active” equipment could do and not the “passive” work of snow fence. That all changed in the 1970’s when the snow fence research performed by Drs Ronald Tabler and Robert Jairell for the US Forest Service was repurposed and applied to the highways in Wyoming.

At the time, the Wyoming Department of Transportation (WYDOT) was trying to open a 77 mile stretch of Interstate 80 but Mother Nature was not having it.

The road opened to traffic in the fall of 1970, but three months later snowdrifts up to 16’ encroached the traffic lanes in 27 different locations. It took seven D8s working seven days a week to keep this road open that first winter. Truckers soon started calling this section of I-80 “The Snow Chi Minh Trail”.

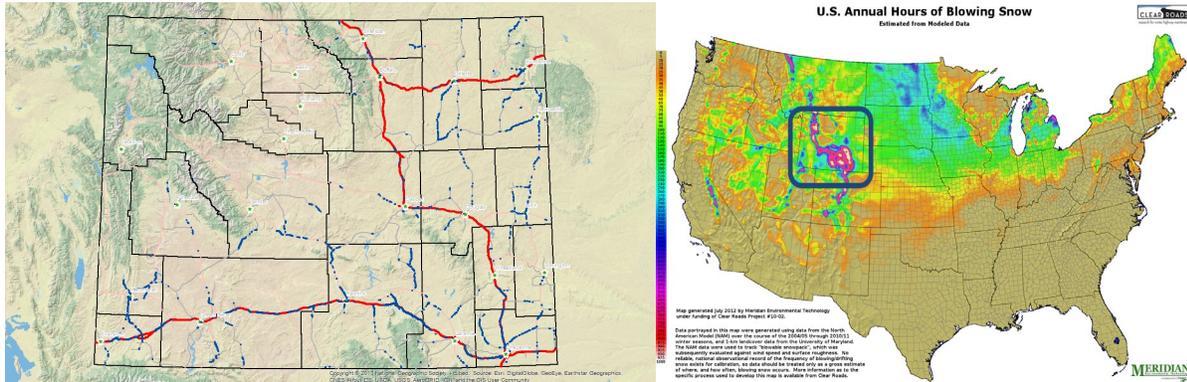


WYDOT hired Dr. Tabler that winter and he continued his research while working with WYDOT; studying all aspects of blowing snow from particle physics to evaporation, and setting up models to study blowing and drifting snow using the open range of Wyoming as his laboratory. The first fences based on Dr. Tabler’s research were built along I-80 the summer of 1971. The culmination of his research is

published in NCHRP 20-7(147), *Design Guidelines for the Control of Blowing and Drifting Snow* and it has been the handbook on blowing snow for transportation agencies worldwide. Dr. Tabler continued his

research and work with WYDOT through 2005, when the Winter Research Services group was created within the Department to continue his work.

Over the years, with vehicle miles increasing and more businesses are relying on just-in-time trucking, WYDOT has expanded their use of snow fence from 105 miles of snow fence in 1932, to over 450 miles of snow fence today (blue dots). As a state with over 1000 hours of blowing snow annually, snow fence is a vital part of the State's winter maintenance plan.



The following is a quick synopsis of the primary snow fence types used by the DOT in Wyoming.

The oldest fences found in Wyoming are known as Swedish fences. Their porosity is usually less than 50% and they are approximately seven feet tall. The reason the top third slants into the wind is unknown. They were the standard fences used by WYDOT until 1971 when Dr. Tabler's research was implemented.

The predominant type of snow fence found in Wyoming is the Wyoming fence. The Wyoming fences are designed to be 50% porosity, downwind inclination of 15°, and can be anywhere from 4 to 14' tall. They are anchored, primarily, by rebar embedded a minimum of four feet into the ground. However, the winds of Wyoming are strong enough to rock these fences from their anchoring causing twisting and panel failure. Because of this, WYDOT has started moving towards vertical fences.





Although not the earliest use of vertical fence in the state, starting in 2008, the Wyoming Department of Transportation started building vertical fences. WYDOT has built three types of vertical fence: wood face boards on wood posts, polymer strap on steel I-beam, and polymer strap on 12" round posts. These fences are 6 to 12 feet tall depending on placement. While they can be expensive to build, maintenance is reduced due to the lack of anchor failures.

Wyoming is an energy state and as such, is crisscrossed with underground pipelines and utilities. However, leaving large "holes" in a snow fence can create areas of drifting and icing of the road. To protect the road and the integrity of the underground utilities, WYDOT has designed a "floating" fence that allows for complete snow fence coverage. These panels have a sturdier and longer sill plate (the board that sits on the ground) that allow them to support the reinforced concrete weight. In all other aspects they are a Wyoming fence.



While Wyoming is not known for its forests, there is over 40 miles of living snow fence protecting its roads. The living fences are planted in coordination with the State Forestry Division and the local conservation districts. The location and design of the fence is done by WYDOT. The plant selection, fencing, and planting are done by the conservation district. It takes a while for the living fences to become effective so many of them have a Wyoming fence in front or behind them.

The above larger fences are used to retain snow from the "fetch", or the open ground that contributes to blowing snow, but near snow can continue to be a problem. "Near" snow is the snow that blows from a barrier, such as a snow fence, and the road. To capture the near snow, vertical slat fences, are often attached to the right-of-way fence but they can also be free standing. Because of their height they can be placed closer to the road than structural or living fences, but they will fill and drift the roadway if they are the only fence protecting the road from a large fetch.



Snow fences can come in many shapes and sizes and there are important design parameters that need to be considered when placing them. Snow fence should be designed for adequate snow storage capacity -- they work best if they are long, tall and porous. They should be perpendicular to the prevailing winds when possible, however if the angle that wind to the roadway forms is greater than 35° fences built parallel to the road provide better protection. Many DOTs use the vertical slat fencing, nevertheless horizontal rails with a bottom gap (the gap between the ground and the lowest face board) of approximately 10% of the fence height is better for storage and prevents burial of the fence by snow.

Snow fence is not limited to wide open spaces. Much can be done with height, porosity, and bottom gap if the terrain near the roadway is built up or snow storage is limited. With a cost savings of approximately 100 to 1, snow fence can be a cost effective tool in any snow fighting budget. If you have additional questions, please do not hesitate to contact the author at kahlenius61@gmail.com

All photos courtesy of WYDOT