

### Widtsoe #3

At Widtsoe #3 SNOTEL, there has been some influence of snow creep causing an overweigh on the old snow pillows (and I mean old, steel pillows, these are original hysel pillows at this site - maybe the last in the system) when you have very high snowpacks. The pillows were stable at most snow levels but in 2005, had a significant overweigh, about 20% to 30%. The slope on which the site had been installed was higher than the standard 10% or less recommended. As per other sites where creep has been observed, we have modified the site.



Original installation, note the steel pillows (2) in the center with about a 2 foot flat area on the margins, drainage ditch and then a steep cut slope followed by the original slope. The bottom of the pillow set is where the slope gets steep quickly as you can see by the steps in the fence.



Closer view of the slope and pillows.

We removed the upper fence panels and brought in a small track hoe, took all the material on the upper slope and moved it in 2 directions: 1 - made the pillow pad on the down hill direction about 4 feet larger, right next to the sectional steel fence and 2- placed a berm on the uphill side to act as a key or a dam in the snowpack to anchor it in place.



We excavated about 10 feet and placed what did not go to the bottom as the berm on the top which is about 2 feet high in most places. So now we have the berm on top, then about a 3 to 4 foot segment of original slope, then the cut bank and then 10 or more feet of flat area to finally get to the edge of the pillow. The pillow remains on the original surface it was prior to the site modification. We then re-installed the fence and as you can see, it is pretty level around the top portion of the pillow pad. The fence is now actually in limestone bedrock.



From this vantage point you can see the extension on the bottom as well as on the top and after a little raking and smoothing, it looks pretty good. The bottom extension is necessary to help prevent the snowpack below the site from pulling pressure onto the pillow and on the top side, to prevent gravity creep onto the pillow. Notice the bottom fence section to get a good idea just how steep this slope was, the pillow had 59 inches of head in the shelter which was just to the right of the precip can. The bottom of each fence section is 24 inches off the ground and level. We now have a pillow pad that is nearly 30 feet of level ground from edge to edge. We don't expect to see dramatic changes in accumulation due to this modification as the vegetation around the meadow opening was not altered. We may see a change because we replaced the steel pillows with hypalon although it does have a white cover. Another thing we will watch closely.

We did this site mod: excavation, fence removal and re-installation, pillow replacement, shelter replacement, re-plumb all lines, etc in one long day.

We hope to have far more stable data from this site in critical high snowpack years.

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