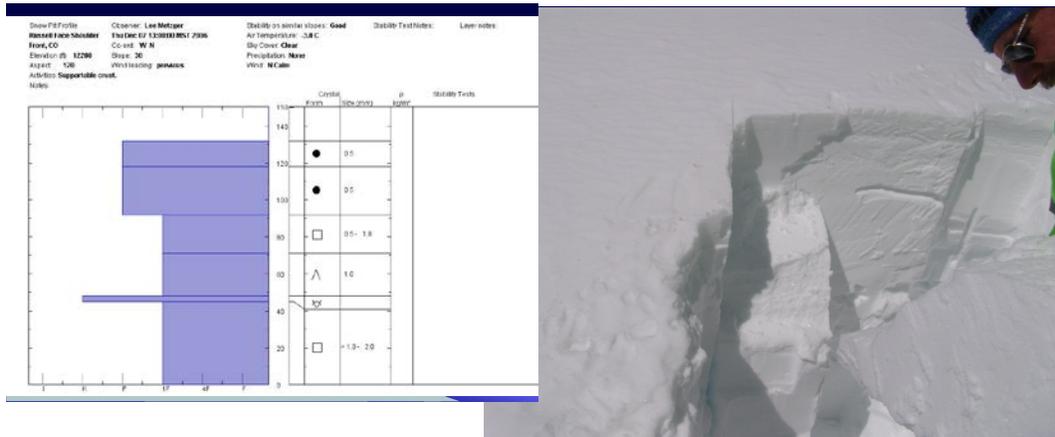


# What is an avalanche and are there any on Berthoud Pass? By Ray T. Mumford and photos provided by The Colorado Department of Transportation

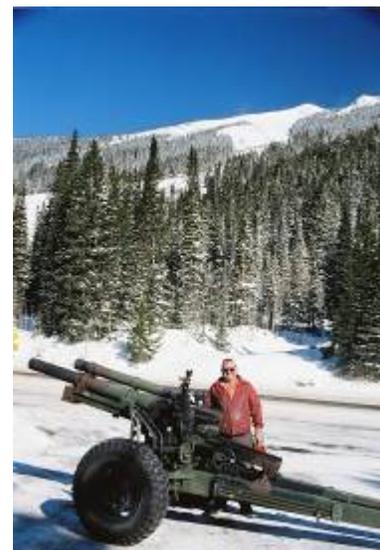
## THE FORMATION OF AN AVALANCHE

A winter's snow pack is a series of layers formed by each individual storm. Each layer varies in strength ranging from weak layers caused by dry, cold, low density snow to stronger layers formed by a wetter, heavier snow. A layer of very dense, heavy snow formed by blowing snow is called a slab. When a weaker layer is buried by a heavier snow layer, it can not support the weight and it collapses or becomes an avalanche.

Another kind of avalanche can occur when a layer of snow forms during a dry period with warm, sunny days and cold nights. This layer that is formed becomes an ice crust on the surface. When this ice crust is buried by more snow, the new snow will not bond to the ice crust below and depending on the slope angle, it will avalanche when the weight reaches a certain point.



A trigger is required to set an avalanche in motion. It can be a natural trigger such as a heavy snow fall or wind deposited snow. An animal crossing the avalanche area can be a trigger. Human triggers, which are common, can be a skier, snowboarder or snowmobiler. Explosives used by the Colorado Department of Transportation trigger avalanches in controlled conditions for public safety.



## THE CDOT/CAIC AVALANCHE PROGRAM

In 1992, after the death of a CDOT worker caused by an avalanche on Red Mountain Pass, the Colorado Avalanche Information Center (CAIC) entered into a working relationship with the Colorado Department of Transportation (CDOT). CAIC's primary job is to study the snow pack and forecast the avalanche hazard. CAIC hired seven avalanche forecasters to work with CDOT to oversee avalanche danger on different CDOT highways.

There are two avalanche forecasters assigned to the Front Range I-70 Corridor in which Berthoud Pass is included. On Berthoud Pass, the forecasters gather information from a weather station that is located at the top of the pass. The information includes the relative humidity, temperature, the average wind speed, the peak wind gust and the wind direction. The weather station updates every hour. Also located at the top of the pass is a snow study plot.

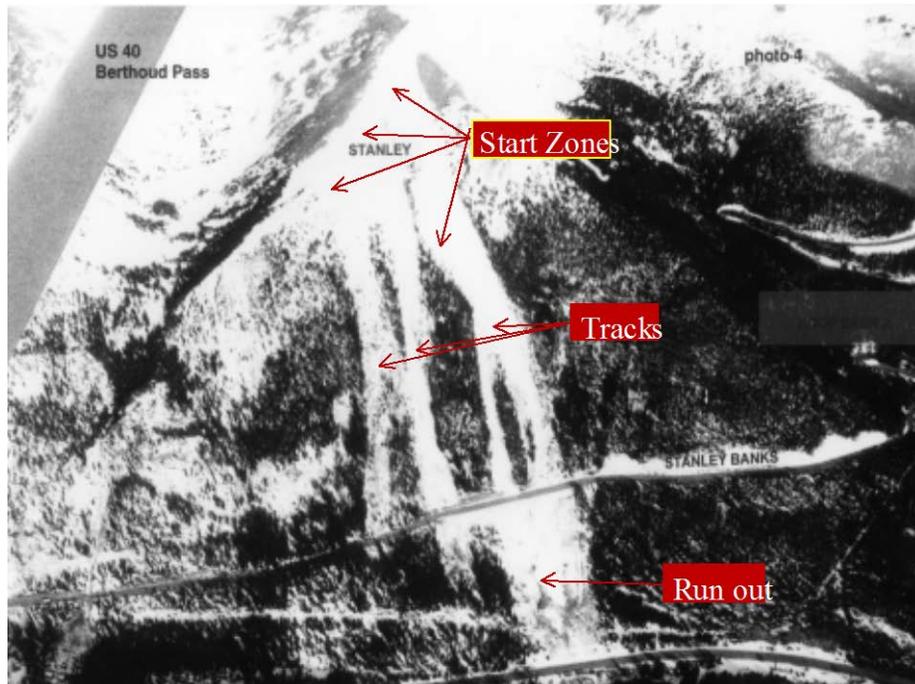


Three stakes are located at the study plot; one is the base stake which shows the snow pack depth for the season; there are two other storm stakes, one of these measures the snow fall during the last 24 hours and is cleaned every day. The second storm stake is left undisturbed for the duration of the storm and this one records the settlement of the snow. At least once a day, the avalanche forecaster will go to the study plot and measure both the new snow amount and the weight of the snow that has fallen in the last 24 hours. This measurement will show how much water is in the snow. The weather station and the snow study plot have been used uninterrupted since 1951. The forecasters will take the historical information from the stations, the daily weather station information, study plot's measurements along with weather forecasts supplied by CAIC and issue an avalanche hazard for the avalanche areas that affect the highway on Berthoud Pass. They will make recommendations for avalanche control work for the avalanche areas that could slide and impact the highway. The CAIC also provides avalanche safety training to the CDOT workers assigned to the Pass.



## THE CDOT AVALANCHE CONTROL PROGRAM ON BERTHOUD PASS

Because of the high volume of traffic on Berthoud Pass, CDOT has to be very aggressive with the avalanche control. From early in the morning to late at night and especially on weekends and holidays, it is a good bet that there will be a vehicle under the avalanche paths on Berthoud Pass. Because of this, if an Avalanche Forecaster feels that snow can be moved from one of the paths even though it will not be large enough to reach the highway, control work will be set up, especially if a weekend or a holiday is approaching. Moving any amount of snow from the start zone will reduce the hazard and also removing weak layers that could fail and cause larger and more destructive avalanches in the future. Releasing avalanches on a smaller scale will also minimize the impact on the traffic because of the time required to clear any debris from the highway.



There are times that conditions are such that the avalanche hazard rises to the point that the highway has to be closed until avalanche control work is conducted. It is hoped that by getting the avalanches to release on a more frequent and smaller scale the highway can get through most of these periods without a closure.

## **AVALANCHE SAFETY ON BERTHOUD PASS**

Every effort is made to minimize the risk of an avalanche on Berthoud Pass, but history will show it is impossible to control any force of nature whether it is floods, wild fires, mud and rock slides and of course avalanches. Many avalanche areas are easy to recognize, the big bowls above timberline and the steep narrow gulleys are good examples. They are well signed, they are named and they have stories behind them. The smaller avalanche areas and the cut banks are not as easy to recognize. These areas are still capable of putting several feet of snow on the highway and if someone is out of their vehicle or the windows down they could be in serious trouble. The following is a list of rules to follow while traveling on any mountain highway in the winter:

1. Keep windows up under any avalanche and steep cut bank areas.
2. Do not stop under avalanche and steep cut bank areas.
3. Learn to recognize safe areas near avalanche paths. Something as simple as a band of trees that meets the highway could give the protection needed if one has to exit the vehicle.
4. Do not exit the vehicle unless it is in a safe area.

A more detailed description of the individual avalanche areas is written at the mile post where the avalanche is located.