

Remote avalanche control system kept Berthoud Pass open all winter

Colorado Department of Transportation calls first year using Gazex system a success, mulls expanding to other slide-prone highways

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Avalanche debris never once buried U.S. 40 on Berthoud Pass last winter, even though snow on the pass piled up deeper than average.

And it didn't take firing hundreds of bombs from a WWII-era Howitzer into the avalanche-prone Stanley slide path.

Instead, French-made Gazex exploders — five in the snow loading zones that feed the massive Stanley and 11 positioned above the Seven Sisters slide paths on the east side of Loveland Pass — did the big gun's work, keeping roads open, saving money and limiting crew exposure to dangerous explosives.

The first season of using Gazex was so successful that the Colorado Department of Transportation hopes to expand the program next winter to more of the 278 slide paths that threaten Colorado's mountain roads.

Last winter, CDOT and Colorado Avalanche Information Center forecasters ran 37 control missions on slide paths hanging above U.S. 6 on Loveland Pass, compared to an average of 32. Instead of using the explosive-hurling Avalauncher cannon, they sat in warm trucks and clicked computer keyboards to remotely trigger the Gazex exploders they installed last fall. The solar-powered Gazex systems use propane to spark blasts of compressed air from hook-shaped cannons mounted in avalanche starting zones.

Every winter over the last five years, crews fired about 471 \$200 Avalauncher rounds on Loveland Pass. Typically, one in four of those shots triggered a slide. For the 2015-16 season, crews fired the Gazex exploders 229 times and triggered a slide 57 percent of the time. Total snow accumulation reached 235.3 inches, about 105 percent of average.

The slides did cover the road, but the consistent Gazex blasts kept the debris light and crews were able to clear the highway more quickly, limiting the length of road closures.

"We saw a huge increase in the effectiveness of our missions," said Tyler Weldon, the CDOT engineer in charge of the Gazex project. "It's tremendous when you can make that big a leap."

Crews ran 19 missions on Berthoud Pass, compared with the five-year average of 12. They triggered 78 Gazex blasts, versus firing a typical 91 105mm bombs into the snowpack. The small avalanches triggered by the Gazex exploders never reached U.S. 40, which twice traverses the Stanley slide path as it climbs toward Winter Park.

While CDOT closed U.S. 40 during mitigation, there were no extended closures despite snowfall that was 120 percent of average. Avalanches didn't hit the highway in 2014-15 either, but before that, no one can remember a year when the Stanley didn't close U.S. 40 for long periods. Those closures wreak havoc on the businesses in the Fraser Valley.

"Berthoud Pass is no longer a deterrent to accessing the Fraser Valley," said Steve Hurlbert, a spokesman for Winter Park ski area, which paid \$75,000 of the \$225,000 Grand County government and businesses chipped in for Gazex. "The snow never reached the road. That's exactly what we were hoping for. It worked to perfection."

CDOT now is amassing piles of data from each Gazex location with an eye toward expanding the program, perhaps to the west side of Eisenhower/Johnson Memorial Tunnel above Interstate 70 and above the 80s slide path on the west side of Berthoud Pass, Weldon said. Both would require review by the U.S. Forest Service.

"We are learning about different designs and how we can build a design that never hits the road," he said. "We really learned a lot this past year and there's more to come."

There are more than 2,000 Gazex exploders around the world and the systems protect highways in Washington, California, Wyoming and Nevada. While this is the first publicly funded system in Colorado, the owner of Wolf Creek ski area uses Gazex to remotely trigger avalanches in the area's harder-to-reach terrain.

Weldon said the return on investment last winter was immediate, with CDOT saving an estimated 640 man hours using the Gazex system, which takes about 10 minutes to prep, rather than an hour for the Avalauncher or Howitzer.

The Gazex system also limited workplace risk — in March 2014 a CDOT explosives expert and an avalanche forecaster were injured when a round blew up inside the Avalauncher barrel.

"Being able to fire things remotely certainly puts the operator at a further distance from the explosive itself," said Brian Lazar, the deputy director of the Colorado Avalanche Information Center. "You are not going to have the same incidents like what took place two years ago."

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Ground crews are installing the pipes for Gazex Avalanche System at Loveland ski area.
(*Hyoung Chang, Denver Post file*)