



CDOT Avalanche Safety Program

Avalanche Mitigation Projects for Capital Development Committee Consideration



COLORADO
Department of Transportation
Division of Maintenance & Operations



CDOT Presenters

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- Michael Chapman, Winter Operations Program Manager
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Topics for Discussion

- CDOT Avalanche Program Overview
- Mitigation Methods
- Howitzer - Phase Out
- Near-term Avalanche Safety Projects
 - I-70 Vail Pass
 - I-70 Loop Road
 - I-70 - Bethel Avalanche Zone
 - US 160 - Wolf Creek Pass
- Questions





Colorado Avalanche Safety Program

Mission:

- To reduce the risk of avalanches to people and property on Colorado and Federal Highways
 - Risk reduction accomplished with an avalanche forecasting and mitigation program
 - Partnership with Colorado Avalanche Information Center (CAIC) for decades
- Goals
 - Safety for travelling public and CDOT personnel
 - Use latest technology to improve safety and effectiveness of avalanche mitigation operations
 - Howitzer Phase-out - Reduce dependency on projectile/artillery based systems



Avalanche Mitigation Tools

Hands On



Projectile-based

- Howitzer
- Avalauncher



Air/Ground Charges

- Hand/Case Charge
- Helibombing

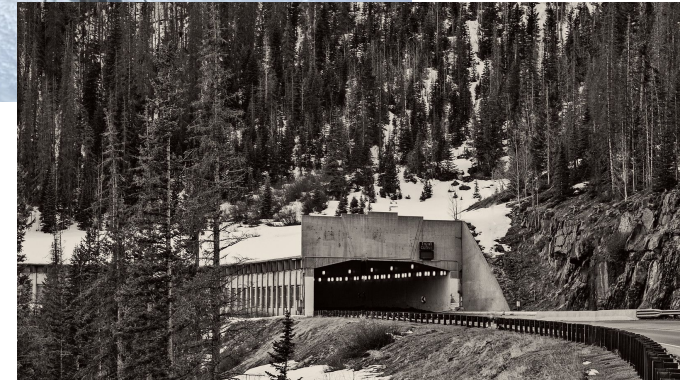


Avalanche Mitigation Tools

Passive

Passive Avalanche/Snow Control

- Snow Supporting Structure
- Snow Fence
- Snow Shed
- Road Closure





Avalanche Mitigation Tools

Remote

Remote Avalanche Control Systems (RACS)

- Installed near start zones
- Radio or Cell Comms
- Remote detonations
- Detonation triggered from computer or phone
- Safer solution





Avalanche Mitigation Tools

US Army Howitzer

M101 A1 105mm Howitzer

- Leased from the US Army
- 8-lb explosive projectile
- Range - up to 7 miles

History

- Some type of artillery system has been used since the early 50s
- Current tool - 105mm Howitzer since early 90s
- Military has instructed all users to begin transition away from it as an option

Safety

- Hands-on solution that puts CDOT personnel at greater risk
- Unexploded Ordinance also a safety risk





Avalanche Mitigation Tools

US Army Howitzer

M101 A1 105mm Howitzer

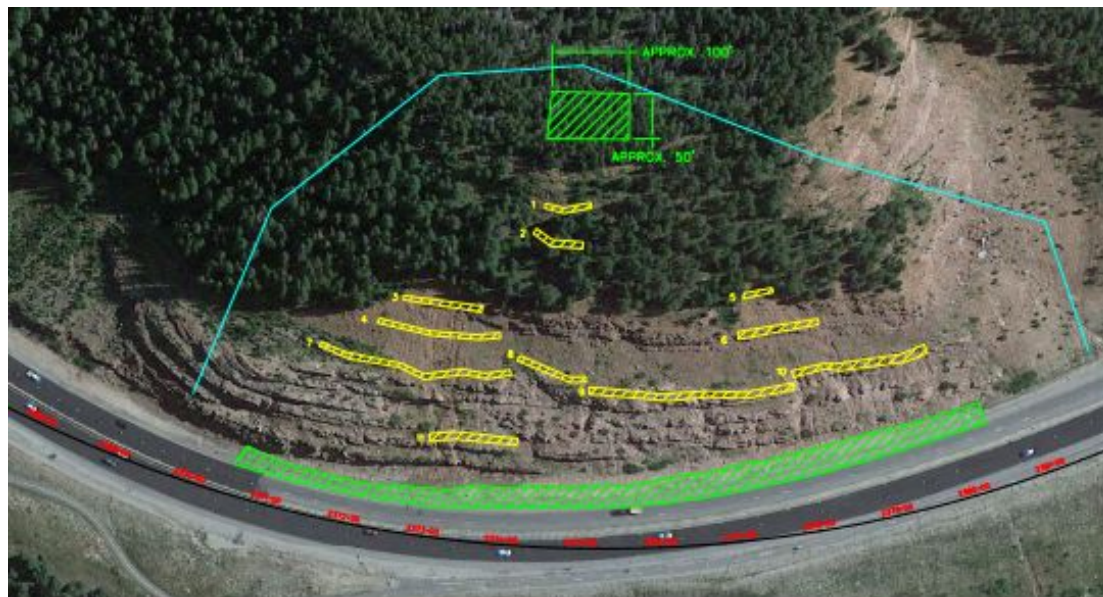
- Currently use 7 Howitzers - Statewide
- Locations
 - I70 (Bethel)
 - US160 (Wolf Creek Pass)
 - US550 (Coal Bank/Molas)
 - US550 (Red Mountain Pass)
- Phase Out
 - Bethel (2025) - Eliminate howitzer on I70!
 - Wolf Creek (2026/27)
 - Coal Bank Molas (2028/29)
 - Red Mountain (TBD)





Vail Pass Update

Vail Narrows Project



1450 Linear Feet (up from 150ft)

Out to Bid: 11-2-23

Closing: 12-14-23

Start (Approx.): Spring '24

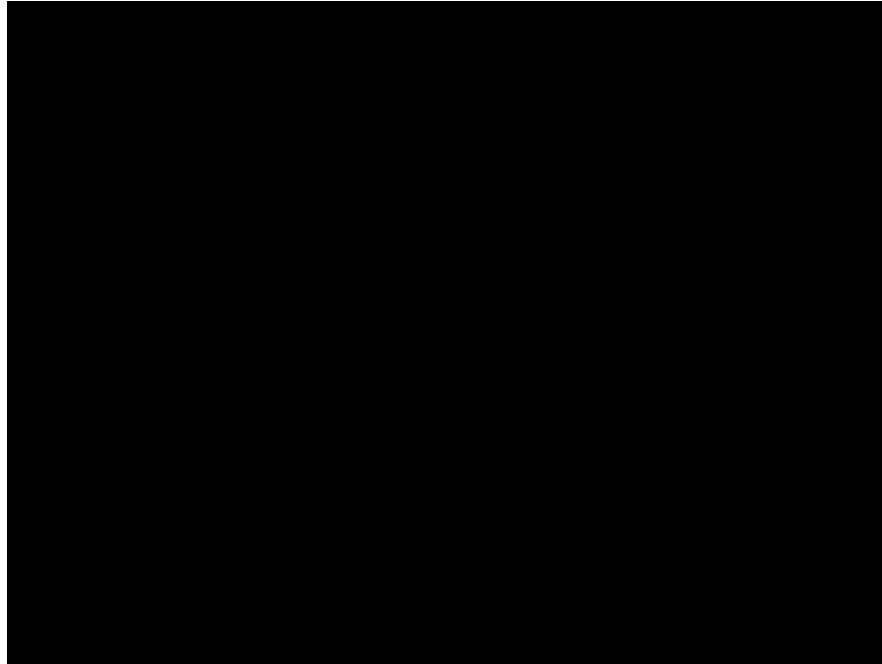
End (Approx.): Fall '26/Spring '27



Howitzer Phase-out Solutions

Project #1 - Bethel Avalanche Zone

Last remaining Howitzer Path on I70!





Howitzer Phase-out Solutions

Project #1 - Bethel Avalanche Zone Last remaining Howitzer Path on I70!

- 2 of 7 Howitzers eliminated
- Solution:
 - 4 Magazine-driven Exploders
 - Fully Remote when deployed
 - Helicopter installed and resupplied
 - Relatively inexpensive to maintain
 - Can be completed by Fall 2025
 - Project Cost - \$1.4M





Howitzer Phase-out Solutions

Project #2 - Wolf Creek Pass Avalanche Zone

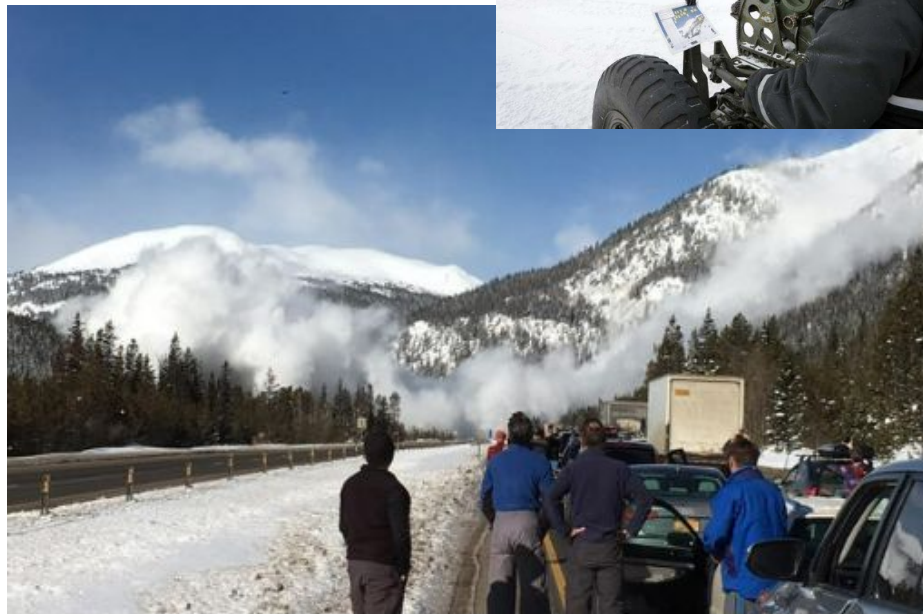
- Last remaining Howitzer Path on US160 (Busiest W-E Highway in Southern CO)
- 2 of 7 Howitzers eliminated
- Solution:
 - 15 Magazine-driven Exploders
 - Fully Remote when deployed
 - Helicopter installed and resupplied
 - Relatively inexpensive to maintain
 - Project Cost - \$5M





Howitzer Phase-out Plan

Howitzer Phase Out Project



Phase 1 ('25) - I 70 @ Bethel

Phase 2 ('26/'27)- HWY 160 (Wolf Creek)

Phase 3 ('28/29)- HWY 550 (Coal Bank/Molas)

Phase 4 ('29/'30)- Red Mountain Pass

*CDOT could potentially be howitzer-free by the end of the decade



Howitzer Phase-out Plan Summary

- Project #1 I70
 - Bethel Avalanche Zone
 - 4 RACS Systems
 - Eliminate Howitzer on I70
 - \$1.4M
- Project #2 US160
 - Wolf Creek Pass
 - 15 RACS Systems
 - Eliminate Howitzer on US160
 - \$5m
- Funding these two projects with significantly improve safety and efficiency over these two highways



Questions?

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