

Client Contact:

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Services Provided:

- **Recommendations and Design for Stabilization of a Talus Slope**
- **Engineering Consultation and Oversight During Construction**

Project Summary:

Cesare, Inc. (Cesare) provided recommendations and design for stabilization of a talus slope along the new roadway alignment as part of the Main Street Extension project in Black Hawk, Colorado. The new roadway cut through the toe of the talus slope, which brought about the need for stabilization.

The talus slope has a slope height of over 300 feet, a maximum width of approximately 200 feet, and a slope angle of approximately 35 degrees. Slope stability analyses indicated that the slope would have a factor of safety against failure of less than one after construction of the cut. Stabilization of the slope would be required to achieve an acceptable factor of safety for the slope. Several approaches to stabilization were considered; including minipiles, soil nailing, tensioned ground anchors, and removal of the talus mass. Due to the substantial cutting required of the toe of the slope, minipiles would not be adequate. Soil nailing could be used, but would require a dense nail pattern. Excavation would create a substantial scar on the slope, and access for safe excavation was an issue. Tensioned ground anchors could be constructed readily and safely and would provide the required degree of stabilization in a cost effective manner.

The resulting design for stabilization of the talus slope consisted of a pattern of bundled seven strand cable anchors anchored into competent bedrock below the talus. Anchors ranged from 50 to 70 feet in length. Support for the slope was provided by 8-foot square reinforced concrete anchor blocks in a uniform pattern consisting of seven horizontal rows of anchors. Because of the critical nature of the location, all anchors were tensioned to 100 percent of design load. Cesare provided engineering consultation and oversight during construction in order to determine that compliance with the design intent was met.

