

# ELEVATE

Geoprofessional Value



2023  
FALL CONFERENCE  
OCTOBER 17-19

**GBA** GEOPROFESSIONAL  
BUSINESS  
ASSOCIATION



## Selway Slide Emergency Repair

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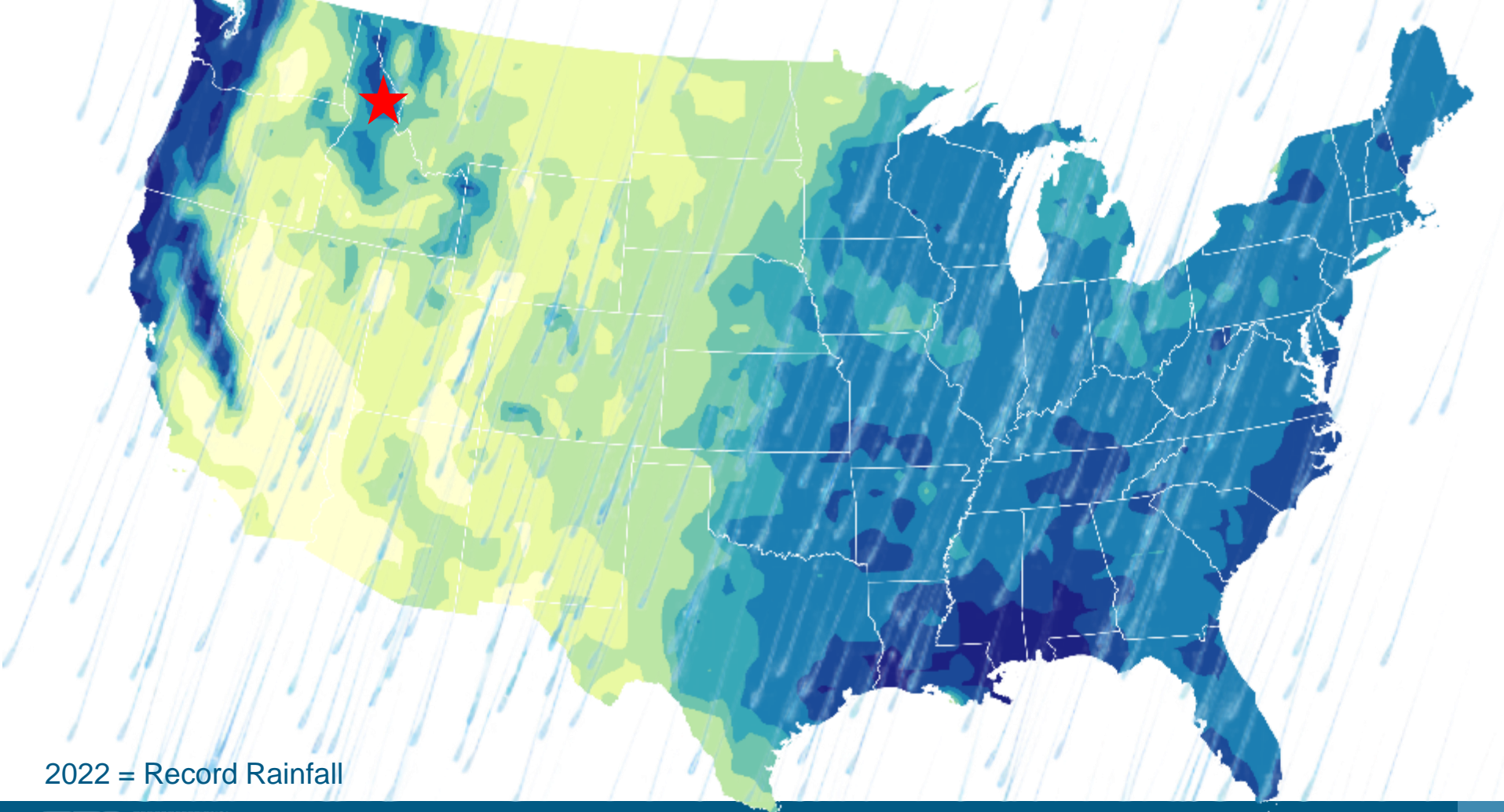
*GeoProfessional Innovation Corporation*



# Selway Wilderness Recreation Area







2022 = Record Rainfall

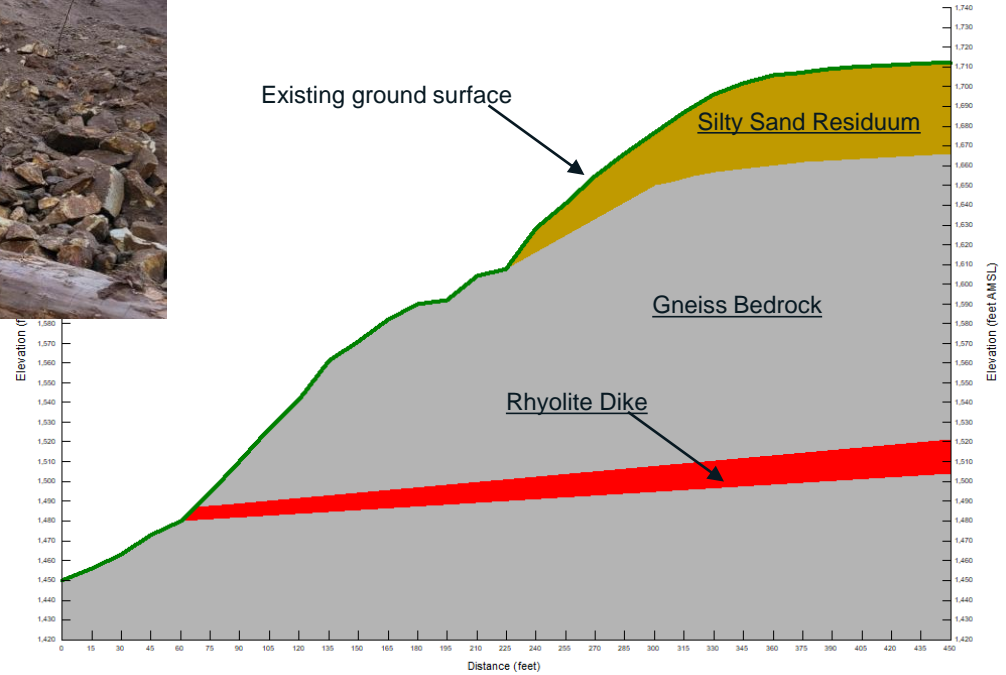
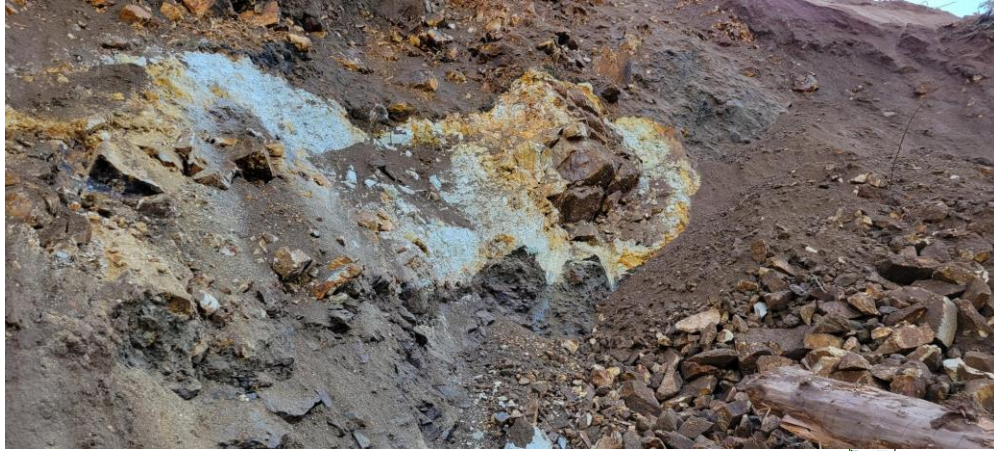




# July 15, 2022 Landslide

- 30' debris field on roadway
- 500' of blocked roadway
- 90,000+ yd<sup>3</sup> soil and rock
- Blocked critical access for firefighting, material supplies, public & private access

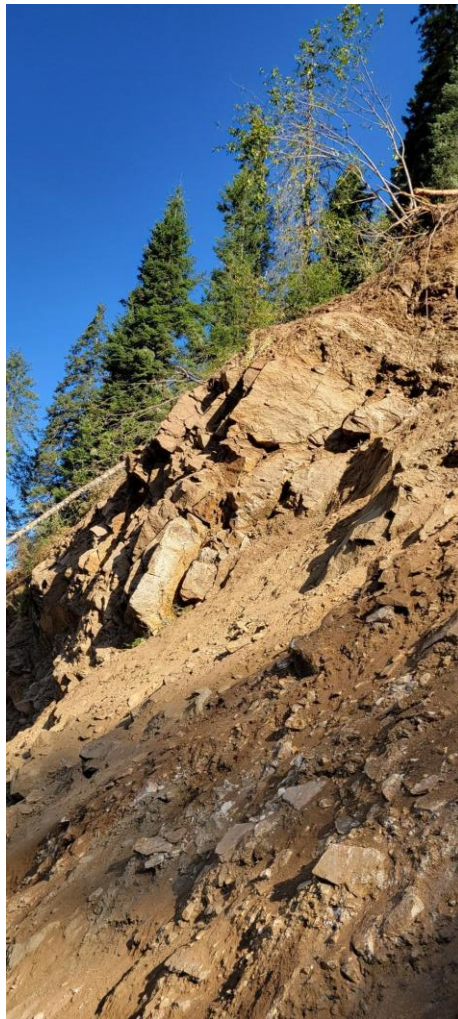




The Culprit: Rhyolite Dike



- Vertical scarps in areas
- Wedge failure planes dipping towards roadway
- Progressive plane shear failure
- Instigated circular failure in residual soil



# The Primary Stakeholders

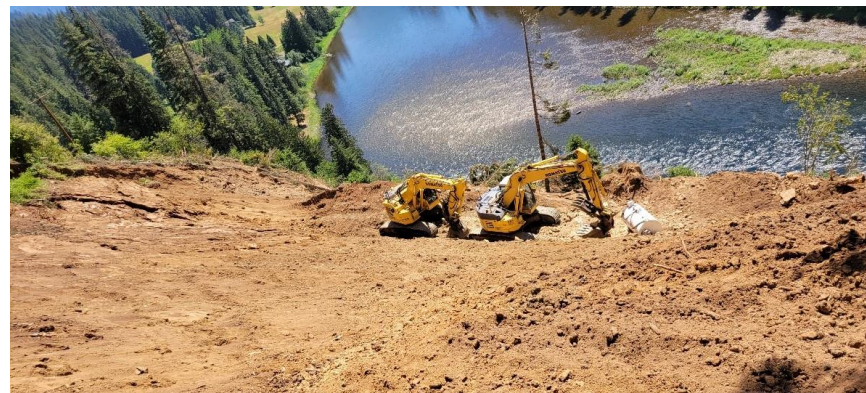


- Kidder Harris Highway District (KHHD)
- United States Forest Service (USFS)
- Local Highway Technical Assistance Council (LHTAC)
- Federal Highway Administration (FHWA)
- Debco Construction
- GeoProfessional Innovation Corporation (GPI)





Aerial topography of landslide extents



Staged equipment just prior to secondary soil slope failure

Stakeholders aligned quickly on:

- Risk tolerance
- Vetting repair concepts
- Funding
- Disturbance limitations
- Environmental requirements



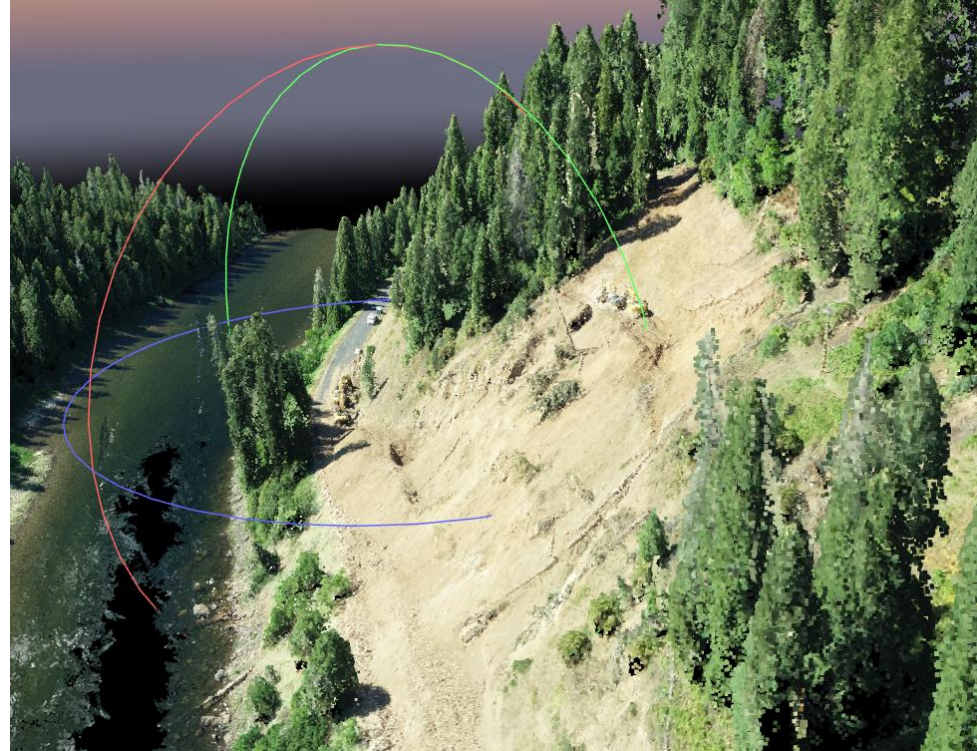
Progressive Design-Build implemented to accelerate repairs:

- Meetings every 2 weeks
- Technical memorandums
- Provided real time updates
- Agency involvement



# Risk Strategy

- Risk: No Time/Access for Exploration
  - Used drone
  - Index texts
  - Back analyses
  - Seasonal water table
- Risk: Emerging and Emergency Situation
  - Required speed and committed resources
  - Remote location
  - Funding
- Risk: Needed Temporary Access
  - Pressure to facilitate
  - Public safety
  - Ongoing slope movement



## Collaborative Evaluation

- Evaluated FOS requirements
- Repair concepts provided to contractor
- Rapid FHWA and LHTAC reviews and RFIs
- USFS updated daily
- Robust information exchange

## Technical Deliverables

- Landslide failure mechanism characteristics
- Improved understanding of the landslide mass
- Established temporary passage
- Concepts to mitigate future failure



### MEMORANDUM

To: Mr. Lonnie Simpson, Debco Construction  
From: Mr. Travis Wambeke, P.E. and Mr. Andrew Abrams, P.E.  
Date: August 1, 2022  
Subject: Selway River Slide

On July 28th, 2022, GPI visited the Selway River slide, which is approximately 1.5 miles south of the Selway River confluence with the Lochsa River along the Selway River Road in Idaho County, Idaho. We met with representatives from the Kidder Highway District and Debco Construction (Debco) on site to review the historic conditions at this roadway alignment as well as review the slide mass and recent experiences by Debco as they attempt to clear it. Collectively, we traversed the toe of the landslide along the roadway as well as evaluated the conditions at the landslide crest. The center of the slide mass was actively moving during our visit and was too steep to safely access. Our observations and preliminary repair concepts are outlined in the following text.

### SITE OBSERVATIONS

Approximately 300 linear feet of the existing roadway alignment is completely blocked with rock and soil landslide debris mixed with isolated logs and vegetation. Landslide debris has not been substantially manipulated by Debco and has been deposited to approximately 12 to 15 feet high above the Selway River Road surface by at the midpoint of the failure. A few large boulders reached the Selway River estimated to be 50 feet below the road grade. However, no visual evidence of toe bulging or sub-road grade failure was evident at the time of our site visit.

Photograph 1: From Existing Roadway, South Flank



The undisturbed section of the roadway is relatively straight with a shallow grade (2% to 3%). The outboard (west) roadway slopes are steep, 1H:1V (horizontal to vertical) fills down to the Selway River. The inboard (east) side of the roadway expose ¼H:1V to ½H:1V rock cut slopes over 100 feet in height. Exposed bedrock comprised moderately to highly weathered, medium to coarse grained, biotite granodiorite weathered and metamorphosed to gneiss and schist that was moderately fractured with smooth to rough, block-type joint patterns. Reference the Geology section of this memorandum for a more detailed discussion of the mapped geology in the slide area.

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# Slope Remediation

## Mechanical anchorage at toe

- Time consuming, costly
- Lead time

## Mass excavation to remove failure and flatten slope

- Large waste volume (400k CY)
- Time consuming, costly

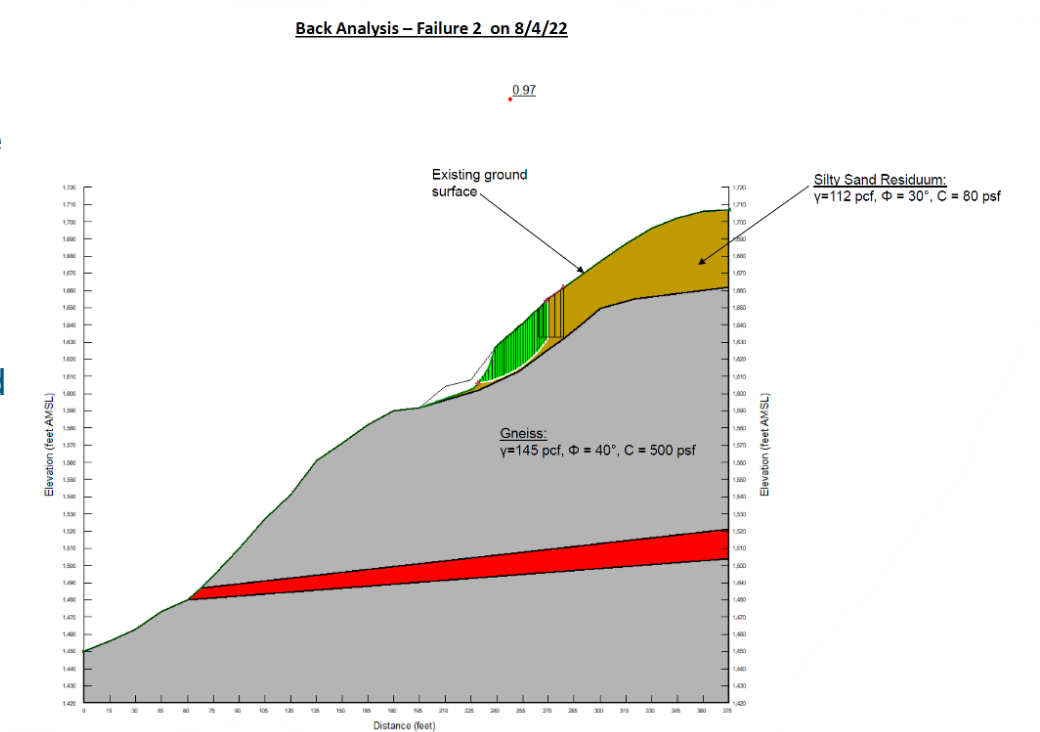
## Limited mechanical anchorage combined with rock scaling and toe buttress

- Reduced excavation = steeper soil slopes
- Reduced waste/haul off
- Quickly implemented
- Buttressed toe
- Anchored the soil failure
- Erosion measures



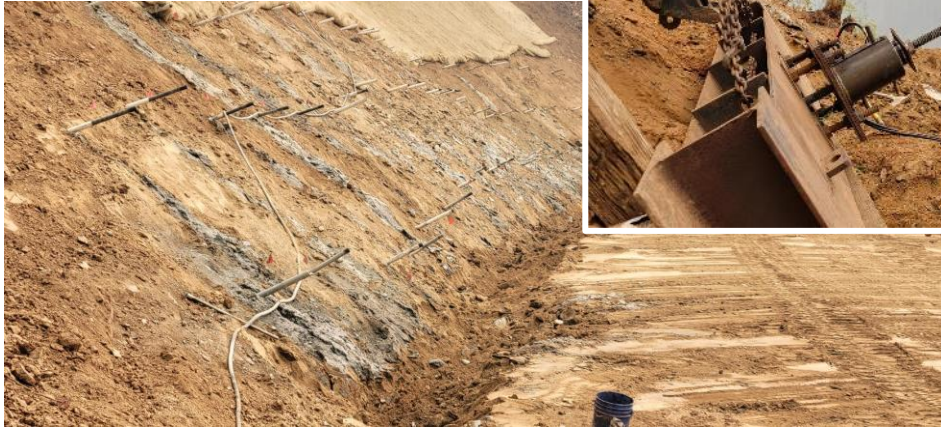
## Technical Analysis

- Preliminary repair design
- Analyses conveyed a level of confidence in the design characteristics
- FHWA and USFS sought to increase soil slope stability and improve FOS during wet/seismic conditions
- Contractor vetted product availability and pricing

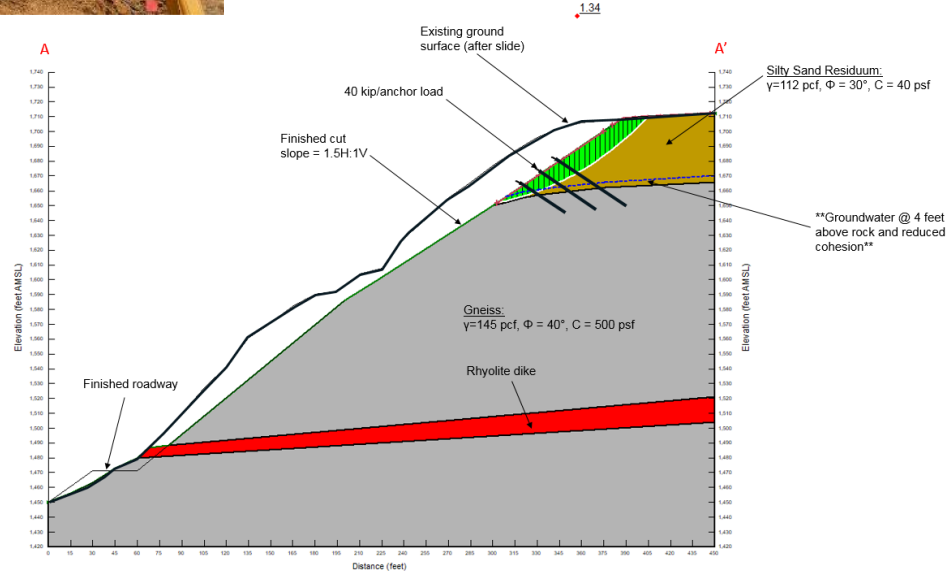




# Anchors



- Improved resistance at toe of soil slope
- Improved FOS to meet standard of care
- Titan hollow bar anchors (52x26mm) installed between 15 and 25 degrees
- Anchors grouted into bedrock
- Active load applied to anchor plate over TECCO® steel wire mesh





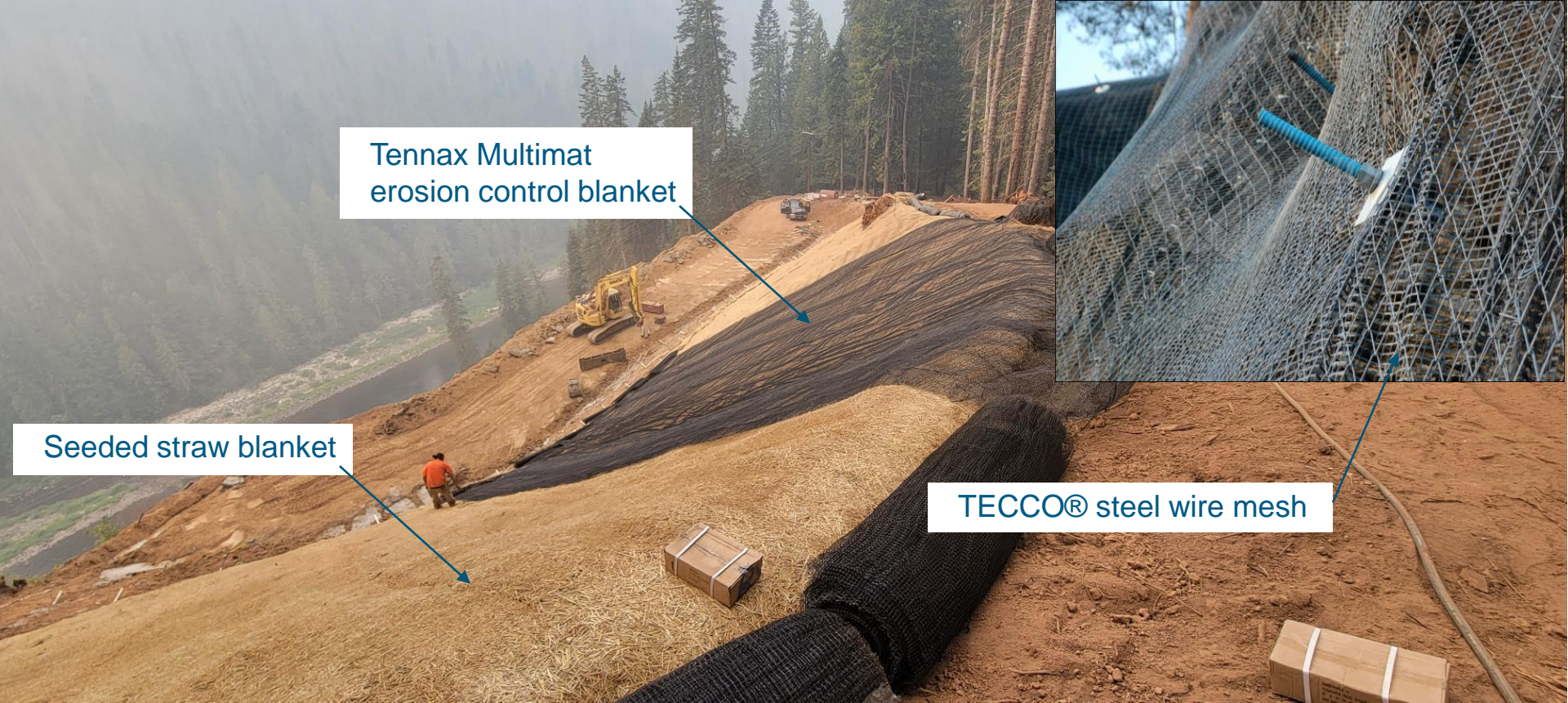
430' of relief



Very steep slopes

Working above and below to expedite access





Tennax Multimater  
erosion control blanket

Seeded straw blanket

TECCO® steel wire mesh







# Summary

- Awards
- Risk Discussions
- Synergy with public entities, federal to local was key to success
- Private sector (residents, contractor, consultant)
- When there's a serious problem, dedicate your best and brightest to solving it
- Woody always professed and preached these virtues of risk engagement with clients:
  - Communication
    - ✓ Geologic impacts
    - ✓ Scope + funding
    - ✓ Limitations
- GBA promotes these virtues in everything it does!



# QUESTIONS?



Cancel

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