SR 77 Near Summit
Slope Management
Project Objectives

- Reduce maintenance costs
- Improve safety
- Manage slope erosion
- Slope stability
Design Challenges

- 160 ft height of cut slope
- Maintenance of traffic during rock excavation
- Control scope to keep costs in check
- Blasting excavation required
- Steep slope below roadway – 300 ft from top of slope to creek bottom
- Limited work zone – two lane roadway with no shoulders and 5 ft cut ditch
About 300 ft from top to bottom
Slope erosion undermining roadway
Embankment slope erosion
Rockfall
Geologic History

- Mescal Limestone – Deposited 1.4 billion years ago in sea floor. Sedimentary, horizontally bedded at time of creation.

- Diabase – Intrusive igneous rock. 1.05 billion years ago intruded, lifted and metamorphosed (Heated) limestone into marble when close.
Mescal Limestone and Diabase

Massive, blocky limestone/marble

Diabase sill and intrusions into highly fractured, altered limestone/marble
Diabase Intrusion/Heating Limestone

Fractured, altered Limestone/marble

Diabase intrusion

Diabase
Construction Challenges

- Safety of public
- Contractor safety
- Traffic disruption/delays
- Waste rock disposal
Slope excavation in series of benches
Bench width safety
Drill hole collars – 130 ft above road
Drilling and hardness of rock - $$$$
Blast sequencing and timing

SR77 Shot 24 timing map
Surface timing only add 500 ms to get actual firing times except row A

Not to scale
Explosive Products Utilized

- Detagel Presplit – Packaged 1.25 inch diameter
Explosive Products

- Senate Magnafrac – Packaged 2 inch diameter
Explosive Products

- ANFO – Ammonium Nitrate Fuel Oil
Time of use explosive delivery
Pre-split blasting operation
Clear the roadway each shift
Safety of travelling public
Completed small cut first to store future blast rock
Contractor stacking waste blocks
Mitigating erosion problem
Culvert extension – Slope stability
Slope plating – Long term stability
Fisher Industries proposed to line slopes with waste vs haul away
Rock fill compaction – Method Spec
Typical Section – 12 ft wide Ditch for maintenance access and containment
Modified SD 1.02
Rockfall containment ditch
Completed slope
Pre-construction shoulders and sight distance
Lessons Learned
Rock Excavation Quantity Overrun

- Contractor access benching required more width
- Unexpected vertical fractures in rock mass were encountered from Station 3314+00 to 3317+00
Measurement of rock quantity

- Utilized LIDAR survey before and after construction to determine quantity
- LIDAR was effective and recommended for future slope excavation projects
- LIDAR should have been utilized in design phase
Environmental

- Pre-construction clearance of additional areas outside project footprint to allow for contractor’s innovation/partnering
- Kept project limits out of nearby BLM lands
Project Team

- Contractor - Fisher Industries
- Norm Bessler Sponsor, Brian Teskey
  Superintendant
- Construction Administration – Globe District
  Mindy Teague Senior RE, TC Fish RE
International Partnering Institute Award

- 2018 John L. Martin Partnered Project of the Year - Sapphire

Board of Directors

- 2018 John L. Martin Partnered Project of the Year - Sapphire

Dear AZ SR 77 Near Summit Project Team,

Congratulations! AZ SR 77 Near Summit Project Team has won a 2018 IPI Partnered Project of the Year Award.

The Partnered Project of the Year Award recognizes teams who distinguish themselves by implementing IPI's best practices and by fostering high-trust and collaborative relationships on their projects. Your team has demonstrated an ongoing commitment to the partnering process, achieved excellent results and delivered an outstanding project.

All applications were judged based on pre-established criteria by a select panel of impartial judges renowned for their understanding of construction partnering.

The Award level for the AZ SR 77 Near Summit Project will be revealed at the IPI's Awards Ceremony luncheon on Friday, May 18, the culminating event of our two-day conference, Collaboration 2018.

Your application includes 2 all-access tickets to Collaboration 2018, so please take a moment to send me the names of your two attendees and I will be happy to register them right away.

We hope you will bring your entire project team to be recognized!

Congratulations again on your demonstrated commitment to partnering! Your team plays an invaluable role in the movement to change the culture of construction. We look forward to the honor of celebrating with your team.

Best Regards,

Rick Mayfield
Executive Director, IPI
In Dedication to Nick Priznar
1952 to 2014