

Aggregate Resource Industries



ADAM ANDERSON
OFFICE PROJECT
ENGINEER



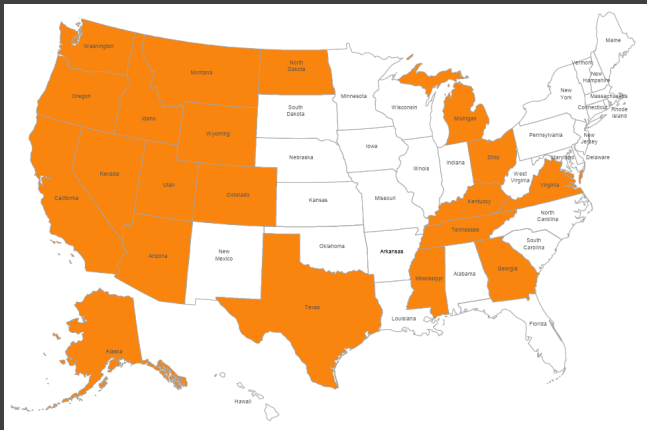
ALEX COTE
LEAD PROJECT
ENGINEER



BLAKE SEUBERT
MINING ENGINEERING

About ARI

- Aggregate Resource Industries, Inc. “ARI”
- Mining Services Contractor- Rock Drilling, Blasting, Crushing & Rock Sales
- Family owned and operated since 1978
- Headquarters: Springfield, OR
- Drilling & Blasting work extends throughout the United States



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Basics

- Pattern=burden x spacing
- Burden
- Spacing
- Volume=pattern x drill feet
- Powder factor = (lbs of explosives)/(Cubic yards of rock)
- Subdrill – depth drilled below designed floor level
- Stemming



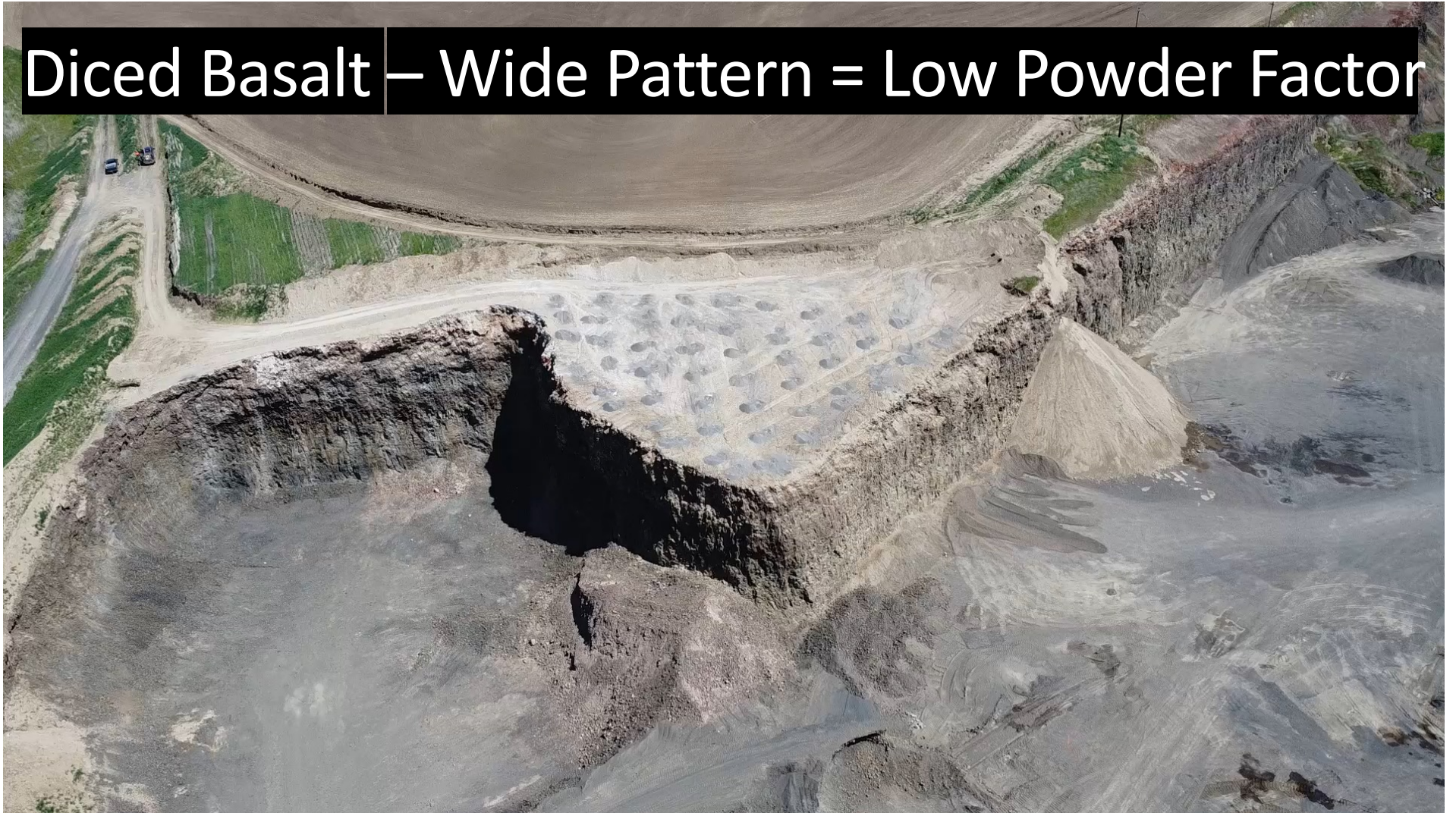
Selecting a pattern

- Rock type & geology
 - Diced (Highly Fractured)
 - Massive (Moderately Fractured)
 - Soft Composition
- Powder factor
- Cut depth
- Effect on Cost
 - Drill Footage
 - Labor
 - Explosives Type/Quantity



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Diced Basalt – Wide Pattern = Low Powder Factor



Massive – Moderate Pattern and Powder Factor



Sandstone – Tight Pattern = High Powder Factor



Quarry Management

- Benching
 - Height
 - Width
- Floor
- Stockpile area
- Haul roads
- MSHA Compliance



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Drilling and Blasting Process

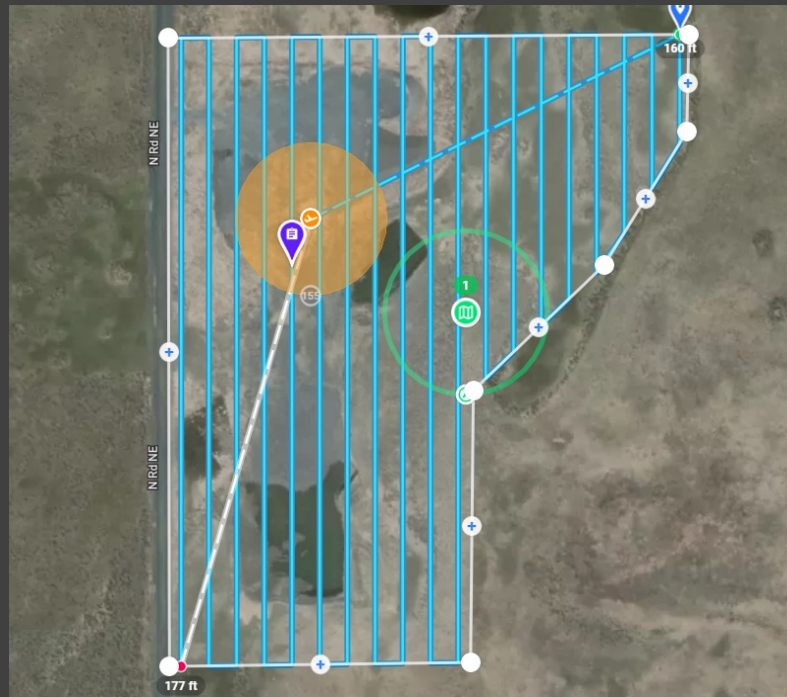
1. Site Survey
2. Quote Project
3. Design Drill Pattern
4. Layout Pattern
5. Drill
6. Post Drill Surveying
7. Blast
8. Blast Analysis and Reporting



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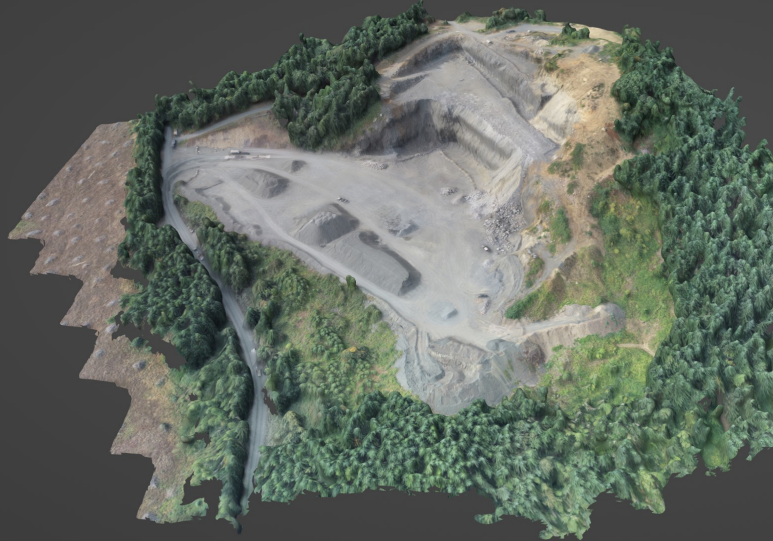
Pre-Drill Drone Flights

- Dronelink
 - Software to create Drone Flights
- Ground Control Points (GCP's)
 - Taken using a GNSS Receiver



Strayos – Creating a Digital Twin Model

- Modeling software used to design and optimize drill patterns
- Keeps a record of old shots to help improve future blasts



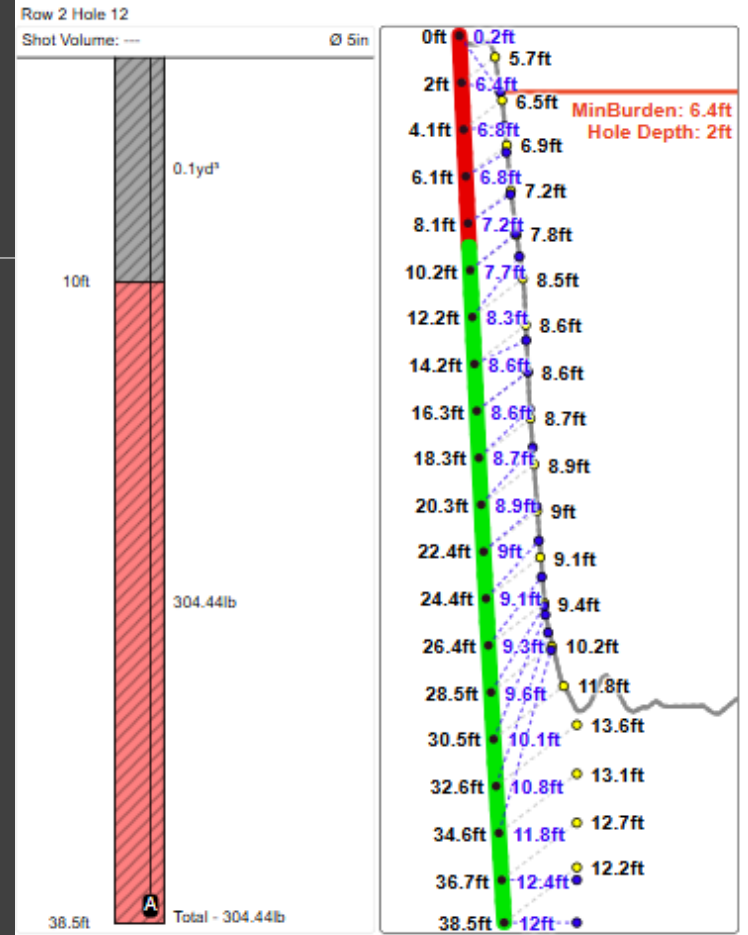
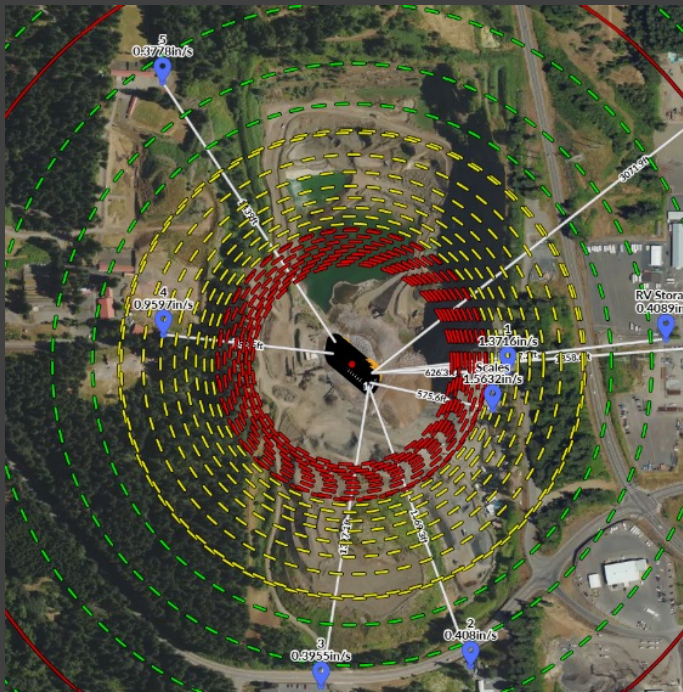
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Strayos – Drill Design



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Strayos – Blast Design



Strayos – Blast Design (Timing)

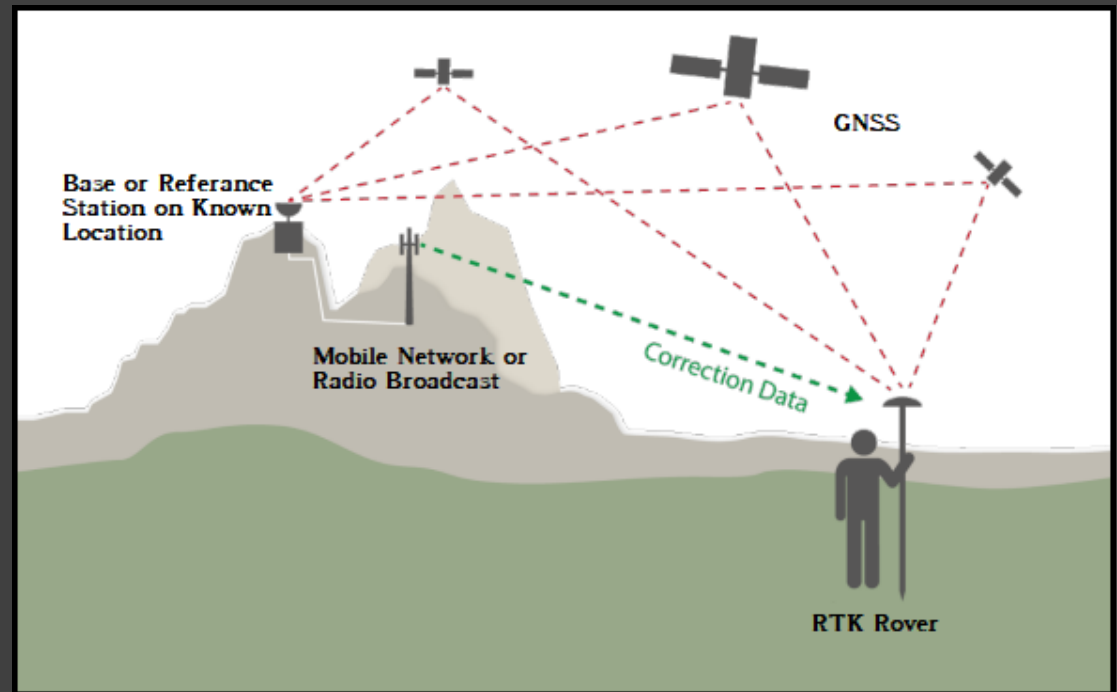


Commercial Quarry



Layout

- Traditional Layout (Tape Measure)
- Modern Layout (GPS Rover)



Drilling

➤ Drill Types

- Top Hammer
- Down the Hole Hammer

➤ Machine Control

- Some drills can measure depths and angle holes
- Our Epiroc drills are equipped with a Trimble GPS system that will tell the driller where and to what depths and angles to drill



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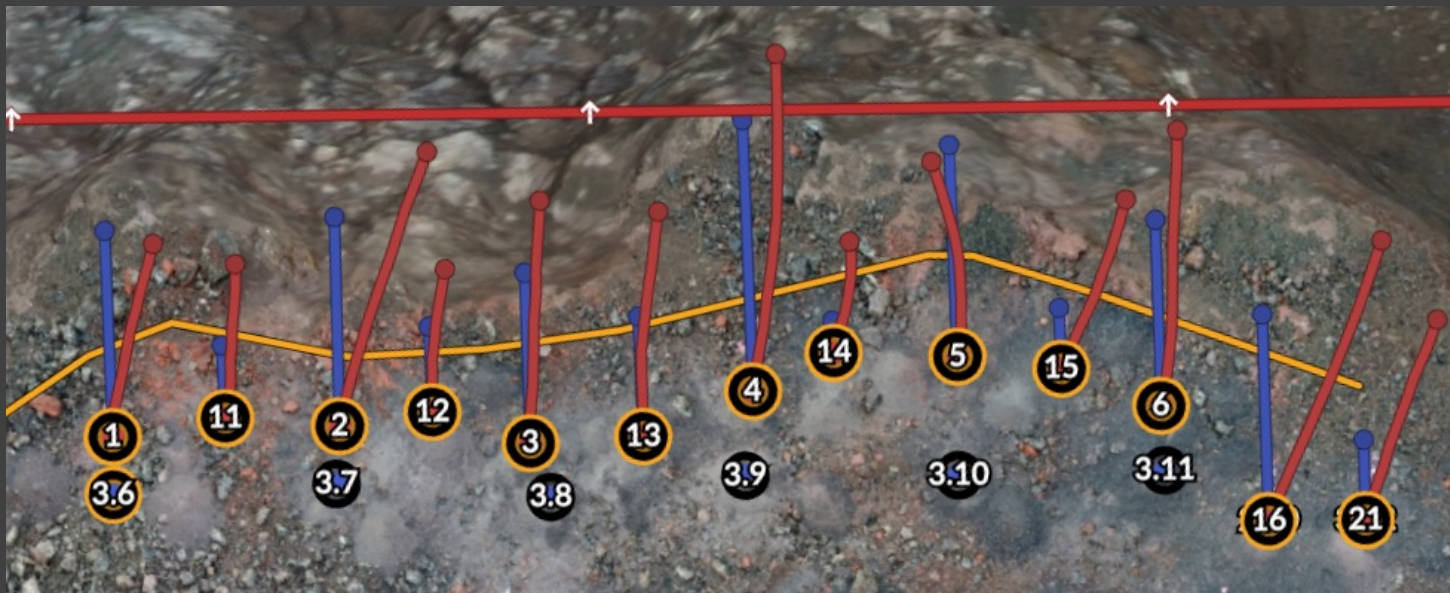
Post Drill Surveying

- Drone Flight
- BORETRAK
- Checking Hole Depths



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BORETRAK Results



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Blasting

➤ Detonator types

- Electric
- Nonelectric
- Electronic

➤ Blasting agent types







- ANFO
 - WR ANFO
- Emulsions
- Packaged
- Dynamite



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Blast Results and Reporting

- Blast Report
- Blast Video
- Drill Log
- Vibration Reports
- SharePoint Sites

 Name ▾	Modified ▾
 01 - Drone Flight Strayos Links	Yesterday at 7:01 PM
 02 - Drill Logs	Yesterday at 7:01 PM
 03 - Blast Report	Yesterday at 7:01 PM
 04 - Blast Video	Yesterday at 7:01 PM
 05 - Vibration Data	Yesterday at 7:01 PM

Specialty Blasting

- Auger Drilling
- Road Development
 - New Construction
 - Reconstruction
 - Widening
- Trenching
- Development Work



New Road Construction



Road Reconstruction



Road Widening – Landslide Remediation



Trenching



Development Blasting



Q&A

