EVALUATION OF ROCK REINFORCEMENT AT BARRON MTN., WOODSTOCK, NH.

Phase I – Completed

Phase II – Pooled Fund Study
New York DOT
Connecticut DOT
New Hampshire DOT
Cross Section of Barron Mtn. Rock Cut
Pre-stressed Rock Bolts
Passive Tendons
Rock Reinforcement Evaluation – Phase 1

- Assessment of Corrosion Potential
  - Ground water
  - Weathered rock
- Assessment of Rock Reinforcement
  (Nondestructive Testing performed on 22 rock bolts and 20 tendons)
  - Electrochemical Tests (half cell potential, polarization current)
  - Mechanical Tests (impact, ultrasonic)
PHASE 1 Findings

- Corrosive Environment
- 30% of sampled rock bolts loss of pre-stress
- 10 to 15% loss of cross section
- Tendons better condition than rock bolts
- Quality of cements grout along tendons more consistent than resin grout along rock bolts
- Remaining service life of rock bolts 15 years and tendon 20 years
Rock Reinforcement Evaluation – Phase 2

- Invasive Testing (verify the results of NDT)
  - Lift-off tests
  - Physical, chemical and metallurgical testing of steel and grout samples retrieved from exhumed reinforcements (5 bolts, 2 tendons)
- GRANIT integrity test (type of NDT impact)
- Additional NDT testing on other elements
Phase 2 Work Schedule

- GRANIT Test
- Scaling
- Drilling replacement holes
- Assemble and install rock reinforcement
- Grout
- Lift-off Test
- NDT testing of rock reinforcement above slide area
- Over-coring & exhuming bolts and tendons
- Testing retrieved reinforcement and recovered grout
GRANIT NDT TESTING

27/9/2004
REMOVAL OF UNSTABLE BLOCK
BOULDER BUSTER

The better solution in rock breaking.

The Boulder Buster™ is a compact, cost effective and portable piece of equipment which is extremely useful in the splitting and breaking of rocks, boulders as well as the demolition of concrete structures. The sheer convenience of operation and low operating costs make the Boulder Buster™ the first choice in standby rock breaking equipment.

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<tr>
<th>Advantages</th>
<th>Applications</th>
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<tr>
<td>Soft and simple to operate</td>
<td>Secondary breaking in mines and quarries</td>
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<tr>
<td>Energy efficient</td>
<td>Civil construction</td>
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<td>No damage to structures and equipment</td>
<td>Demolition</td>
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<td>Very low consumption</td>
<td>Site clearing</td>
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<td>Insufficient scale gases</td>
<td>Swimming pool excavations</td>
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<td>Low velocity fly rock and very little scatter</td>
<td>Trench digging</td>
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<td>No blasting licence required</td>
<td>Excavating operations</td>
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<td>Light weight and compact</td>
<td>Dimensional stone dressing</td>
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<td>Cost effective</td>
<td>and sizing</td>
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Drilling Holes for Replacement Bolts and Tendons
Preparing Tendons
Preparing Rock Bolts
Installing Rock Tendons
Installing Rock Bolt
NDT Testing above slide area
Lift-off Test on Existing Bolts
Proof Test on New Rock Bolts
Drill Rig for Over-coring Rock Reinforcement
Recovered Rock Bolt
Resin Grout on Rock Bolt
Recovered Resin Grout
Corroded Rock Bolt
Acknowledgment

• Researcher - McMahon & Mann Consulting Engineers, P.C., Buffalo, NY

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• Rock Bolt Specialty Contractor – JANOD Contractors, Quebec, Canada