REAAA Roadshow 2010

Use of Variable Quality Basalt in the SH20 Mt Roskill Motorway Extension Project

Presenter: Prisca Tang
Presentation Outline

- About the SH20 project
- Objectives
- Problem
- Variability of basalt (3 types)
- The excavation sites
- Ways to deal with variability
- Conclusion
SH20 Mt Roskill Facts

- Part of the Western Ring Route
- 4km long, four-lane motorway
- Seven bridges
- Cycleway parallel to motorway
- Completed mid 2009
- Estimated physical works valued at $201M
- Smoothest Road in NZ! NAASRA count 24 (25-30 is excellent)
The Players…

- Client: NZ Transport Agency (NZTA)
- MSQA Team: Opus Consultant,
- Leading Contractor: Fulton Hogan
- Leading Designers: URS
Objectives

- Original projection of cut material is 650,000m$^3$
- 2/3 was cut to fill and 1/3 was cut to waste
- Out of the cut to fill, 114,000m$^3$ was made up of basalt rock
- Original objective was to convert 80% of basalt to high value aggregate (20% scalping)
Problem...

- Basalt found to be variable during excavation and alternative processing and use needed...

(otherwise will increase cut to waste vol = $$$)
Types of Basalt Found

- **High Value Basalt**
  - Slightly weathered
  - Moderate to non-vesicular
  - Good rock properties

- **Scoriaceous Basalt**
  - Highly – moderately weathered
  - High proportion of voids
  - “honeycombed” texture

- **Overburden/Rock**
  - Mainly overburden with large chunks of basalt rock
• Excavation from Dominion Rd West off-ramp to Roma Pond
• Scoriaceous Basalt near cone
• Non-vesicular basalt near May Road – Roma Pond
• Undulating interface of ash/basalt
Ways to deal with rock variability

- Excavation
- Processing
- End Product
- Use
High Value Basalt

Excavation:

Processing:
- crushed twice with mobile crushers (600-800t/day)

Jaw Crusher
GAP300

Hammer Mill
GAP65
High Value Basalt

Uses:
• GAP65 material
• 300mm subgrade improvement layers (SIM)
• Subbase material
• Drainage aggregate
Scoriaceous Basalt

**Excavation:** Using a 100T Excavator
Scoriaceous Basalt

**Processing:**
- Mobile Crusher
- Production: 1000t/day
- Broken down by compactor & dozer
Scoriaceous Basalt

End Product:
• “quasi granular fill”
  (100mm “all in” dirtier granular fill)

Uses:
• Lower subgrade construction
• Embankment fill
• Haul road
Overburden/Rock Material

**Excavation:**
- Excavate easily with an excavator

**Processing:**
- Screen Plant
- Separate boulders (>150mm) from overburden
- 600t of fill/day (60%)
- 400t of rock/day (40%)
- High operational cost

**End product and use:**
- Boulders convert to high value basalt (GAP65)
- Overburden to Engineered and Landscape fill
To Conclude…
Conclusion

Results and Achievements

• Multiple processing methods allowed greater useable basalt volume than originally projected
• Decision was made to process the overburden/rock despite higher cost to win more material
• Original projected volume = 114,000m$^3$
• Resulting Volume Total $\approx$125,000m$^3$
  ✓ 62,000m$^3$ was scoriaceous (50%)
  ✓ 52,000m$^3$ was high value basalt (40%)
  ✓ 11,000m$^3$ was overburden/rock (10%)
• Able to use all scoriaceous and high value basalt on site thereby minimising additional cut to waste cost
Thank you!

Questions?