Case Study: Microtunneling for a Large Diameter Watermain

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AGENDA

• Zone 3 Watermain – Project Overview
• Railway Crossing Details
• Typical Design Considerations
• Compliance and Regulatory Procedures
• Conclusions
ZONE 3 WATERMAIN – PROJECT OVERVIEW

- **Scope:** 4 km of trunk watermain (900mm diameter and 1200mm diameter CPP)

- **Purpose:** support population in approved growth areas and improve security of water supply in North Oakville and Milton
• **Construction:** largely open cut -- bridge over Bronte Creek -- microtunnel under railway

• **Location:** Dundas Street in Burlington / Oakville from Appleby Line to Bronte Road
RAILWAY CROSSING DETAILS

• Alternatives considered:

Pipe Ramming

- Challenge to keep liner on grade
- Excessive vibration / noise
- Potential for surficial heave

Jack & Bore

- Challenge to keep liner on grade
  (auger head must be one pipe diameter behind liner face)
Microtunneling

- Ward & Burke Microtunneling Ltd.
- 1500Ø concrete casing / jacking pipe
- 900Ø watermain
- Entry Shaft: 7m diameter
- Exit Shaft: 5m diameter
RAILWAY CROSSING DETAILS

- Shaft Construction
  - Caissons
  - 2.5 metre high, poured-in-place concrete segments
  - Tremie concrete in the base
  - Dewatered after installation
TYPICAL DESIGN CONSIDERATIONS

- Subsurface Conditions
  - Groundwater
  - Stiffness
  - Consistency
  - Gravel / Cobbles / Boulders

- Length of Drive
  - Typical range for microtunneling is 50 – 500m
  - Shorter = less cost competitiveness
  - Longer = increased friction and jacking forces
TYPICAL DESIGN CONSIDERATIONS

- Spatial Constraints

Entry Shaft and Control Unit

Separation System

Pipe Storage
• Railway Approvals
  • Reviews by Rail Authority and their geotechnical consultant
  • Settlement Monitoring Plan required
  • Flagging is conducted by a Rail Authority representative
  • Refer to Rail Authority guidelines
CONCLUSIONS

• Benefits Realized in Zone 3 Watermain Railway Crossing
  • Minimal Dewatering
  • Tolerance for mixed subsoils
  • No delays / additional costs
  • Minimal Settlement
  • Timely completion (~1 month)