Current And Future Tunnelling Projects in Ontario

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TAC Ontario Director
February 23, 2017
Overview

Current Tunnel Projects

– Eglinton Crosstown LRT (East & West)
– Mid Halton Zone 1 Watermain
– West Trunk Sewer
– Hanlan Feedermain
– Twining of West Trunk – Contract 2
– Hwy 50 Sanitary Sewer
– Trafalgar / Derry rd.
– West Whitby Trunk
– Ottawa CSST
– Other....

Future Tunnel Projects

– Ashbridges Bay Treatment Plant Outfall
– Hwy 401 Rail Tunnel
– Burnhamthorpe Watermain project
– Don River and Central Waterfront Project - Coxwell Bypass Tunnel, City of Toronto
– Upper York Sewage Servicing (UYSS) – York Durham Sewage System Modifications
– The West Vaughan Sewage System Project – York Region

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Current Tunnel Projects
Eglinton Crosstown LRT
Eglinton Crosstown LRT – Tunnel Work

West Tunnels

- TBM 1 & TBM 2 - Keele Park to Yonge
- 3x8 hours shifts/ 5 days/week with option 7 days
- Completed tunnelling on April 2016
- Both TBMs are left in ground at Yonge Street to be extracted at a later date

Contractor: Crosstown Transit Constructors (Obayashi/ Kenaidan/ Kenny/Technicore)

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Eglinton Crosstown LRT – Tunnel Work

East Tunnels

- TBM 3 and TBM 4 – Leslie to Yonge
- 2x12 hours shifts/ 5 days/week with option 7 days
- TBM 3 completed tunnelling in August 2016
- TBM 4 completed tunnelling in December 2016
- Both TBMs are being extracted at ES-3 in Feb-2017

**Contractor:** Aecon - Dragados JV
Eglinton Crosstown LRT – Stations Work

• **West Tunnels**
  – Number of stations: 9
  – Work started: 2016
  – Estimated completion time: 2021

• **East Tunnels**
  – Number of stations: 4
  – Work started: 2016
  – Estimated completion time: 2021

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Eglinton Crosstown LRT – Mined Stations

Avenue Station Rendering

Source: thecrosstown.ca
Mid-Halton Zone 1 Watermain – from Burloak WPP to Kitchen Reservoir

**Owner:** Halton Region  
**Location:** City of Burlington, Town of Oakville  
**Engineer:** R.V. Anderson Associates  
**Contractor:** C&M McNally Tunnel Constructors  

**Project Status:**
- All 6318m of tunnelling has been completed  
- The tunnel north was constructed from one heading (4232m long)  
- TBM utilized was a LOVAT RM99GS Shielded Gripper  
- 2100m of pipe has been installed and grouted in place  
- Pipe on the 4232m north run is currently being installed and should be grouted by May/June  
- Full pipeline commissioning and surface work expected to be complete by Feb 2018
Mid-Halton Zone 1 Watermain – from Burloak WPP to Kitchen Reservoir
Mid-Halton Zone 1 Watermain – from Burloak WPP to Kitchen Reservoir
West Trunk Sanitary Sewer

**Owner:** Region of Peel  
**Location:** City of Mississauga  
**Engineer:** WSP  
**Contractor:** McNally Construction  
**Project Status:**
- Tunnel length: 9780m  
- Total distance mined to date 5161m  
- 2.4m finished internal diameter (CIP)  
- 3.03m diameter Robbins Main Beam TBM being utilized  
- Geology was expected to be shale; however, TBM encountered a 125m long valley of soft ground unexpectedly, which stopped the advance of the main beam TBM; so a 129” Lovat EPB TBM was deployed to complete the remainder of that tunnel drive (350m)  
- The tunnelling is 53% completed  
- Recovery shaft complete  
- Concrete lining underway  
- 400mm WM constructed under 401 by Jack & Bore (Earth Boring); complete  
- Settlement monitoring program for crossing 401, 403 and CNR tracks
Hanlan Feedermain

**Owner:** Region of Peel  
**Location:** City of Mississauga  
**Engineer:** CH2M  
**Contractor:** McNally Construction  
**Project Status:**
- Tunnel length: 5725m  
- 2.4m finished internal diameter (CPP pipe with cellular grout backfill)  
- 12ft Robbins Main Beam TBM installing Rib & lagging  
- Geology is shale  
- The tunnelling is 100% completed  
- All pipe installation has been completed  
- 688m of 3.124m steel casing under rail lines and QEW  
- Settlement monitoring program for crossing QEW and Rail tracks  
- Construction of permanent structures ongoing  
- CPP pipe was supplied by Forterra (formerly Hanson)  
- Largest watermain ever undertaken by Region of Peel
Twinning of West Trunk – Contract 2

Owner: Region of Peel
Location: City of Mississauga
Engineer: WSP
Contractor: Technicore Underground Inc.

Project Status:
• Tunnel length: 3800m
• 3m internal diameter precast concrete segments produced by Ewing
• Geology is 80% shale, 20% soft ground, 2 bar max pressure
• Two EPB TBMs being utilized (modified by Technicore)
• The tunnelling is 45% completed

Highlights:
• Herrenknecht combi-segments being utilized with 5mm HDPE Liner
• Compressible grout being used for annular void grouting
Twinning of West Trunk – Contract 2
Twinning of West Trunk – Contract 2
Hwy # 50 Sanitary Sewer Project

Owner: Region of Peel  
Location: Bolton, Ontario  
Engineer: Hatch  
Contractor: Technicore Underground Inc.

Project Status:
- Tunnel length: 1500m
- 1500mm internal diameter precast concrete microtunnel pipe
- Three tunnel drives; one drive contained a curve of 500m radius
- Geology is sand, silt, clay, till with high boulder content
- EPB TBM being utilized (modified by Technicore)
- The tunnelling is 100% completed
- Ongoing works include connections in manholes

Highlights:
- Utilized laser guidance system designed for this project
- No settlement issues, no need to utilized IJS system
Hwy # 50 Sanitary Sewer Project
Trafalgar Derry Rd Project

Owner: Halton Region
Location: Milton
Engineer: Associated Engineering
Contractor: Dibco Underground (Kenaiden is GC)

Project Status:

- Total Tunnel length: 4048m (multiple runs, various diameters)
- 22 Shafts (Secant pile, pile and lag, rib & lagging); 8m to 16m deep
- 615m of 48” cement mortar lining northwest pipe watermain
- 5923m of 36” cement mortar lining northwest pipe watermain
- Various TBMs: 80” & 136” Lovat EPB, 66”, 88”, 96” Open face TBM
- Mixed geology from shale to till to soft soils
- The tunnelling is ongoing
Trafalgar Derry Rd Project

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West Whitby Trunk

Owner: Durham Region
Location: Whitby
Engineer: WSP
Contractor: Dibco Underground (Kenaiden is GC)
Project Status:
- Total Tunnel length: 2400m
- 84” Rock TBM being utilized and installing rock bolts and mesh
- 4 Shafts (Secant pile, pile and lag, rib & lagging); 18m to 22m deep
- 435m of 48” CPP and backfill grouting
- 1965m of 36” CPP and backfill grouting
- Geology is shale
- Construction of shafts is well underway
- Tunnelling is yet to commence
West Whitby Trunk
Ottawa CSST

**Owner:** City of Ottawa  
**Location:** Downtown Ottawa  
**Engineer:** Stantec / CH2M Hill  
**Contractor:** Dragados / Tomlinson JV

**Project Status:**
- Total Tunnel length: 4088m + 2199m  
- Herrenknecht Double Shield Rock TBM installing 3m ID segments  
- Geology is shale  
- Tunnel Construction is yet to commence
Other ongoing projects

-Hwy # 20 – Centennial Rd, Hamilton – McNally Construction

-Mid Halton Wastewater Treatment Plant Phase IV/V Expansion Effluent Outfall, Halton Region – Strabag

-Washburn Feedermain, Halton Region – C&M McNally Tunnel Constructors

Various Microtunnel and Trenchless projects also ongoing; mostly being performed by:

• Ward & Burke Microtunnelling
• CRS Tunnelling Inc.
• Michels Canada
• Earth Boring
Future Tunnel Projects

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Future Tunnel Projects

• Ashbridges Bay Treatment Plant Outfall
• Hwy 401 Rail Tunnel
• Burnhamthorpe Watermain project
• Don River and Central Waterfront Project - Coxwell Bypass Tunnel, City of Toronto
• Upper York Sewage Servicing (UYSS) – York Durham Sewage System Modifications
• The West Vaughan Sewage System Project – York Region
Ashbridges Bay Treatment Plant Outfall

**Ashbridges Bay Treatment Plant**
- Largest & oldest WWTP in Canada
- Current outfall is nearing the end of its service life

**Tunnel**
- 7 m ID PCTL, 3.5km long sub-aqueous tunnel in rock (Georgian Bay Shale)
- 14 m diameter shaft on land, ~80 m deep (19 m soil, 61 m rock)
- 1,000 m long diffuser with 50 risers (1m ID)
- 50 m deep risers (35 m overburden & 15 m rock), connections to be made from within tunnel

**Contract**
- Design-Bid-Build Project
- CCDC 2 (Stipulated Price Contract) with Stipulated Price and Unit Price Components
- Estimated value $350 million

**Schedule**
Currently at 30% Design
2018 – Project Tender & Award
2023 – Project Completion

Client: City of Toronto
Designer: Hatch with CH2M and Baird

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Ashbridges Bay Treatment Plant Outfall

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Highway 401 Rail Tunnel

RFP Issued by Metrolinx / Infrastructure Ontario (IO) to three shortlisted teams:

- Kiewit (lead by Peter Kiewit infrastructure)
- TK Link (lead by Aecon and Dragados)
- Toronto Tunnel Partners (Ellisdon and Strabag)

- The work is required to accommodate GO Transit expansion along the Kitchener Corridor under Metrolinx's Regional Express Rail (RER) program.

- Scope Includes:
  - Construction of a second tunnel under the GTA's Highway 401/409
  - Replacing footings of retaining walls that support the ramp from eastbound Hwy#409 to eastbound Hwy#401

The existing rail tunnel beneath Hwy # 401 in the Toronto area (Source Infrastructure Ontario)

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(Source Infrastructure Ontario & RT&S)
Burnhamthorpe Watermain, Mississauga

- Region of Peel Project
- RFQ scheduled for March 2017
- 4km of 1500mm (Tunnel)
- 4km of 1200mm (Microtunnel)
- Estimated Value ($60 million)
- Majority of Geology is Shale
- Tender target is before end of 2017

(Source Region of Peel, Hatch)
Don River and Central Waterfront Project - Coxwell Bypass Tunnel, City of Toronto

- RTP (Request to Prequalify) issued by City of Toronto
- Mandatory Site Meeting on March 13th, 2017 at 10am
- RTP Due March 24, 2017
- Tender to Prequalified Contractors in Fall of 2017

- Construction of 10.6 km of 6.3 m diameter tunnel, entirely in bedrock of the Georgian Bay Formation, One Tunnel Drive utilizing shielded TBM and PCTL; adjacent to the East Inner Harbour of Lake Ontario Shoreline and Don River; 50m deep
- 5 No. Shafts, 20m+ in diameter, sized for hydraulic performance of the WWF Tunnel
- 13 Tunnel Connections (Drop shaft and Adit tunnels)
  - Drop shafts range from 1.4 to 3.2m;
  - Adit tunnels range from 1.2m to 4.3m in diameter.
Don River and Central Waterfront Project - Coxwell Bypass Tunnel, City of Toronto

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<th>#</th>
<th>SHAFT I.D.</th>
<th>DIA. (m)</th>
<th>DEPTH (M)</th>
<th>DEPTH IN SOIL (m)</th>
<th>DEPTH IN ROCK (m)</th>
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(Source Daniel Cressman, Black & Veatch Canada)
Don River and Central Waterfront Project - Coxwell Bypass Tunnel, City of Toronto

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Don River and Central Waterfront Project - Coxwell Bypass Tunnel, City of Toronto

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(Source Daniel Cressman, Black & Veatch Canada)
Upper York Sewage Servicing (UYSS) –
York Durham Sewage System (Newmarket) Modifications

- York Region Project
- Consultant: GHD

- 9 Drives ranging from 60m to 815m in length
- Total trenchless installation is approx. 5km
- Primary liner range 1.8 – 2.6m
- 9 Watertight shafts

- Three day workshop was held with prospect contractors and suppliers in Oct 2016

- Currently in Design; with possible RFQ before end of 2017

(Source York Region, GHD)
The West Vaughan Sewage System Project – York Region

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<td>2022 to 2025</td>
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<tr>
<td>Tunnel Phase 1 package</td>
<td>2024 to 2028</td>
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<tr>
<td>Tunnel Phase 2 package</td>
<td>beyond 2034</td>
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WVSS Project compared CDR and PDR alignments and compounds

The internal diameter will be 3m finished and the total length of tunnelling will be approximately 14km long.

Source GeoData Engineering for YR
Thank you!

Questions?