Fairbank Silverthorn Basement Flooding Protection Project

Storm Trunk Tunnel and Local Sewers Projects

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City of Toronto, Engineering & Construction Services, Major Infrastructure, Major Tunnels

Presentation Outline

Fairbank Silverthorn BFPP

1. Project Background
2. Design Approach & Solution
   - Storm Trunk Tunnel
   - Local Sewers
   - Inlet Control Devices
3. Delivery of the Projects / Construction Sequencing
4. Current Construction Progress
   - Tunnel Contract
   - Local Sewer Contracts
5. Future of the Project

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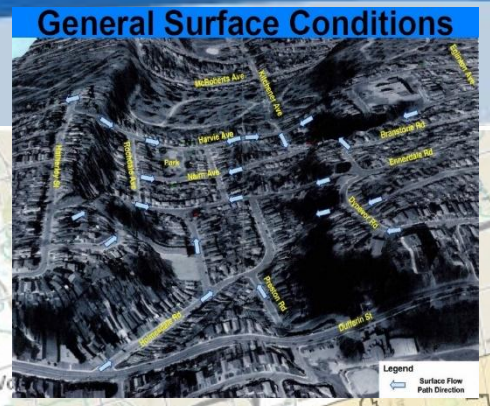
Project Background – BFPP Area 3



- BFPP study Area 3 has a long history of severe and chronic flooding
- Serviced by mainly Combined Sewers built in 1950's
- Insufficient investment on sewer infrastructure
- Topography – "Soup Bowl"

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Design - Timeline

- Project has been in the works for many years
- 3 major storms experienced in 2000, 2005 and 2008 resulted in a study of Area 3
- Class EA was completed in 2011 by CH2M Hill
- Conceptual design in 2012 by CH2M Hill
- Preliminary design completed by Hatch Mott Macdonald in 2015
- Design was refined by Jacobs in 2019 and proceeded to detailed design
- Construction started in July 2021

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Project Background – Objectives

- HGL in sanitary sewers
- HGL in combined & storm sewers
- Depth of water on road
- Reduce Combined Sewer Overflows
- Completion of new infrastructure by the end of 2027
- Plan and stage construction, and bundling with other SOGR projects to minimize disruption to affected neighbourhoods
- Upgrading substandard water services
- Parks to be enhanced after post construction restoration

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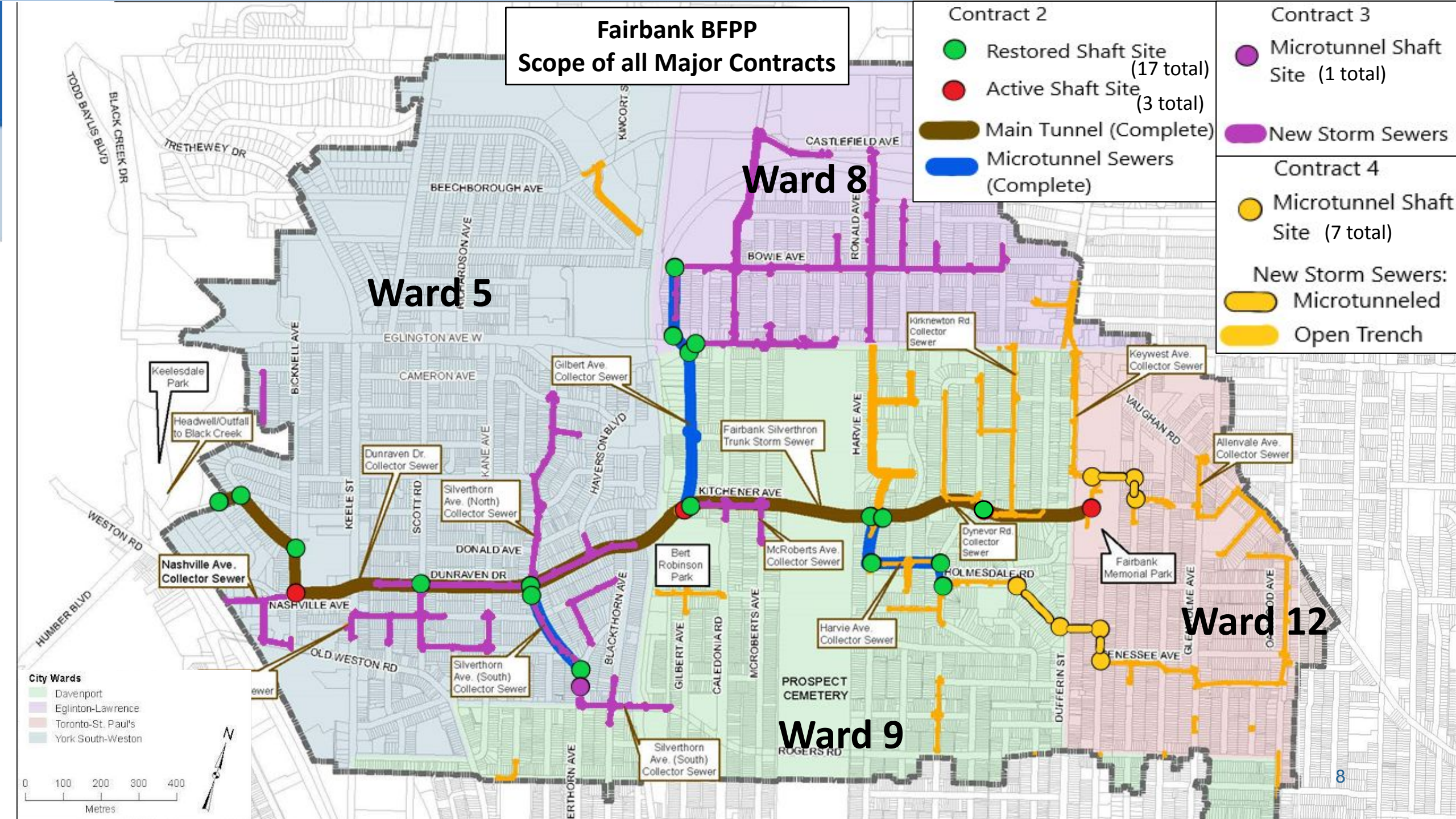
Design – Project Evolution

Design Iteration	Design Phase	Tunnel Length & Diameter	New Local Storm Sewers Length	ICD Quantity (Design ICD Capture Rate)		
1	EA Solution (2011, CH2M Hill Ltd.)	3.0 km & 3.0 m	10.0 km	~500 (10L/s capture rate)		
2	Pre-Design (2015, Hatch Mott Macdonald)	2.2 km & 4.0 m & 0.8 km & 1.8 m outfall section	11.0 km	~500 (10L/s capture rate)	Cause	Effect
3	Detailed Design (2020, Jacobs [CH2M Hill Ltd.])	2.4 km & 4.5 m & 0.5 km & 1.8 m outfall section	16.1 km	326 (16L/s capture rate)	Increased capture rate into existing combined sewers	More sewer separation required to meet BFPP criteria
					More Local storm sewers required	More flow to the tunnel
					More flow to tunnel without increasing discharge rate	Increasing tunnel storage (increased diameter)


Fairbank BFPP
Scope of all Major Contracts
Contract 2
Restored Shaft Site (17 total)
Active Shaft Site (3 total)
Main Tunnel (Complete)
Microtunnel Sewers (Complete)
Contract 3
Microtunnel Shaft Site (1 total)
New Storm Sewers
Contract 4
Microtunnel Shaft Site (7 total)
New Storm Sewers:
Microtunneled
Open Trench
Ward 8
Ward 5
Ward 9
Ward 12
TODD BAYLIS BLVD
BLACK CREEK DR
TRETHEWEY DR
BEECHBOROUGH AVE
RICHARDSON AVE
KINCORT S
CASTLEFIELD AVE
BOWIE AVE
RONALD AVE
EGLINGTON AVE W
CAMERON AVE
BICKNELL AVE
Keelesdale Park
Headwell/Outfall to Black Creek
Gilbert Ave. Collector Sewer
Kirknewton Rd Collector Sewer
Keywest Ave. Collector Sewer
Dunraven Dr. Collector Sewer
KANE AVE
HAVERSON BLVD
Fairbank Silverthorn Trunk Storm Sewer
HARVIE AVE
VAUGHAN RD
Allenvale Ave. Collector Sewer
KEELE ST
SCOTT RD
Silverthorn Ave. (North) Collector Sewer
KITCHENER AVE
WESTON RD
DONALD AVE
Nashville Ave. Collector Sewer
DUNRAVEN DR
Bert Robinson Park
McRoberts Ave. Collector Sewer
Dynevor Rd Collector Sewer
HOLMESDALE RD
Fairbank Memorial Park
HUMBER BLVD
NASHVILLE AVE
BLACKTHORN AVE
GILBERT AVE
CALEDONIA RD
MCROBERTS AVE
Harvie Ave. Collector Sewer
OLD WESTON RD
Silverthorn Ave. (South) Collector Sewer
PROSPECT CEMETERY
DUFFERIN ST
ENESSEE AVE
ROGERS RD
Silverthorn Ave. (South) Collector Sewer
City Wards
Davenport
Eglinton-Lawrence
Toronto-St. Paul's
York South-Weston
N
0 100 200 300 400
Metres

Construction – Planning & Sequencing

- Construction work being delivered through multiple contracts due to size, different construction techniques (tunneling, open-cut)

	Timeline	Description	Contractor	Contract Price
Contract 1	Completed 2022	Installation of inlet control devices on 67 catchbasins as a pilot	Aquatech Solutions	$0.4M
Contract 2	2021-2025 (Brown Lines on Map)	3 km long, 4.5 m diameter new storm trunk sewer (STS) by tunneling from Fairbank Memorial Park and 1.4 km of collector sewers by micro tunneling	EBC-Bessac JV	$202.0M
Contract 3	2024-2027 (Purple Lines)	Approx. 8 km of new storm sewers and other improvements and SOGR improvements	Drainstar Contracting	$67.0M
Contract 4	2024-2027 (Gold Lines)	Approx. 8 km of new storm sewers and other improvements and SOGR improvements	GIP Paving	$90.6M

Total Price: $360M

Construction – Project Costs

- Tunnel Contract is in construction and the Contract was awarded for $205.8M
- Local Sewer Contracts awarded for $157.6M combined
- Project is partially funded by the Government of Canada's Disaster Mitigation and Adaptation Fund (DMAF). Government of Canada is sponsoring $73.2M towards the total of $360M.

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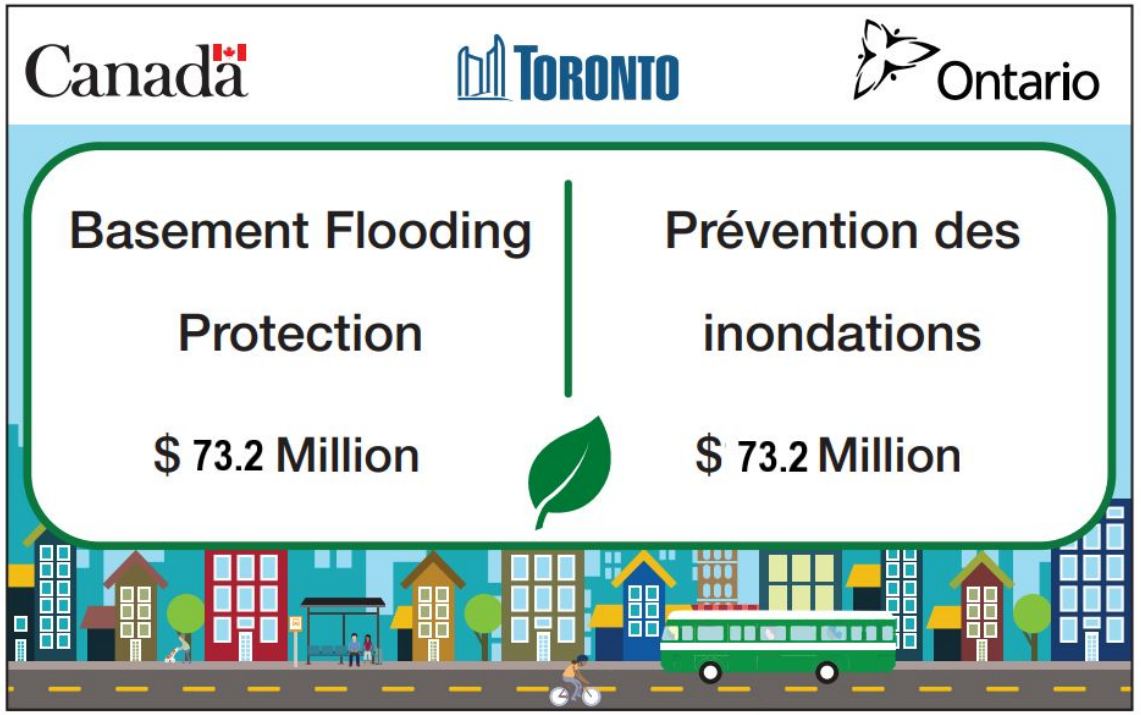

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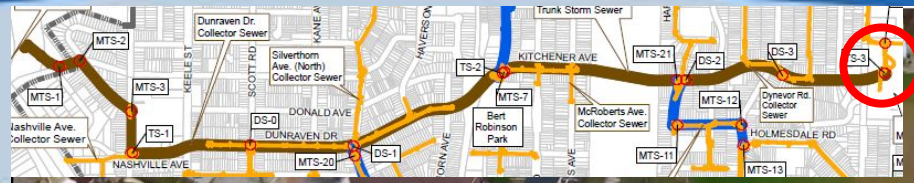
Construction – Launch Shaft



Baseball diamond and Park partially open

Launch Shaft TS-3

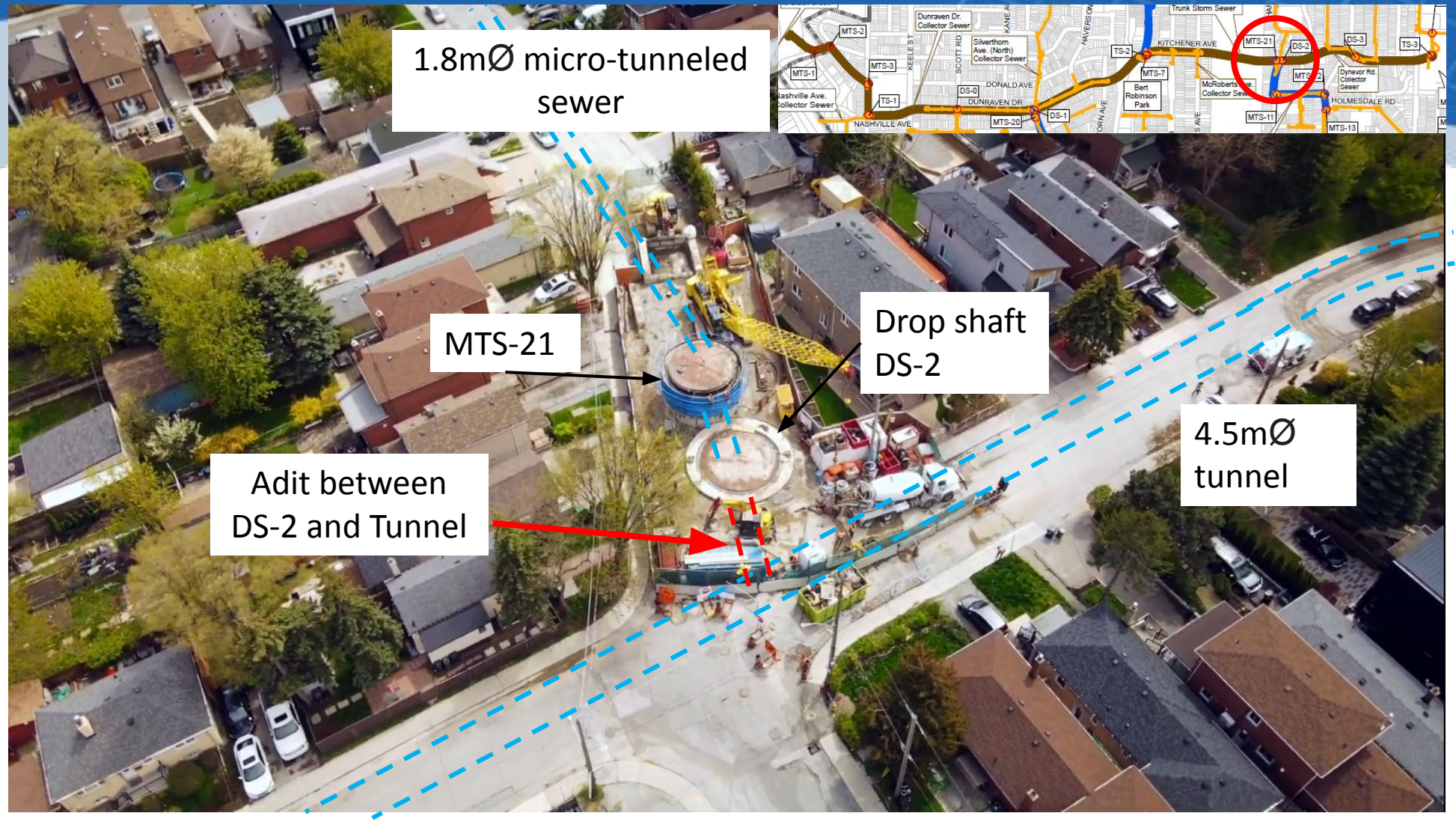
Fairbank Community Centre

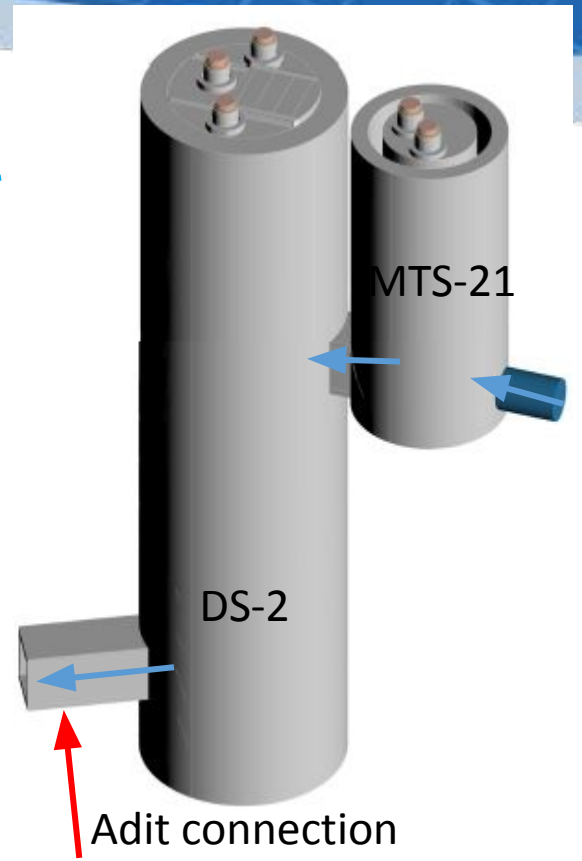
4.5mØ tunnel

Grout Plant

TS-3 Maintenance Hole

Construction – Drop Shafts





Kitchener & Harvie – DS-2/MTS-21 Harvie Collector
MTS-21 (6.0m ID, 16.9m deep), DS-2 (7.0m ID, 34.4m deep)

Construction – Extraction Shaft

Bicknell Ave. & Nashville Ave. - TS-1 TBM Extraction Shaft (9.2m ID, 17.0m deep)

Construction – Keelesdale Park Outfall

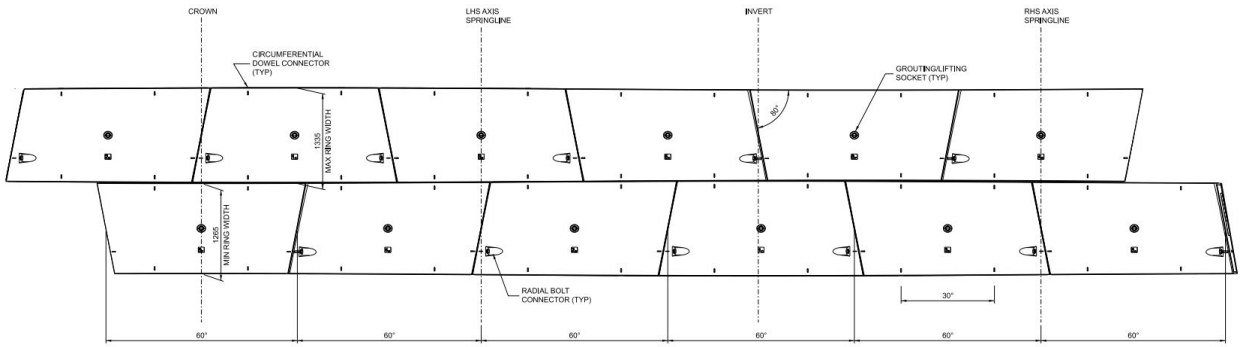
Construction – Shaft in Challenging Areas

Silverthorn & Kenora - MTS-6 Silverthorn South Collector
(8.0m ID, 12.4m deep)

Construction – May 2023 TBM Launch

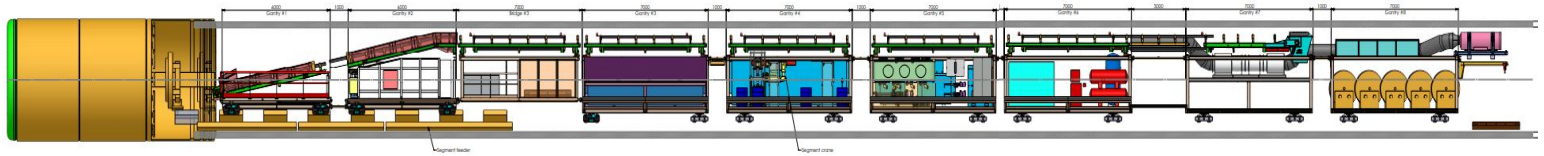
Construction – Tunnel

- Precast Tunnel Liner (PCTL) segments are used to build the ring of the tunnel. Six segments per ring. Each ring is 1.3m long. The full tunnel will have 1850 rings.
- PCTLs were manufactured at a faster rate than installation. Surplus PCTLs were stored at Decast Factory in Stouffville due to lack of storage on site.

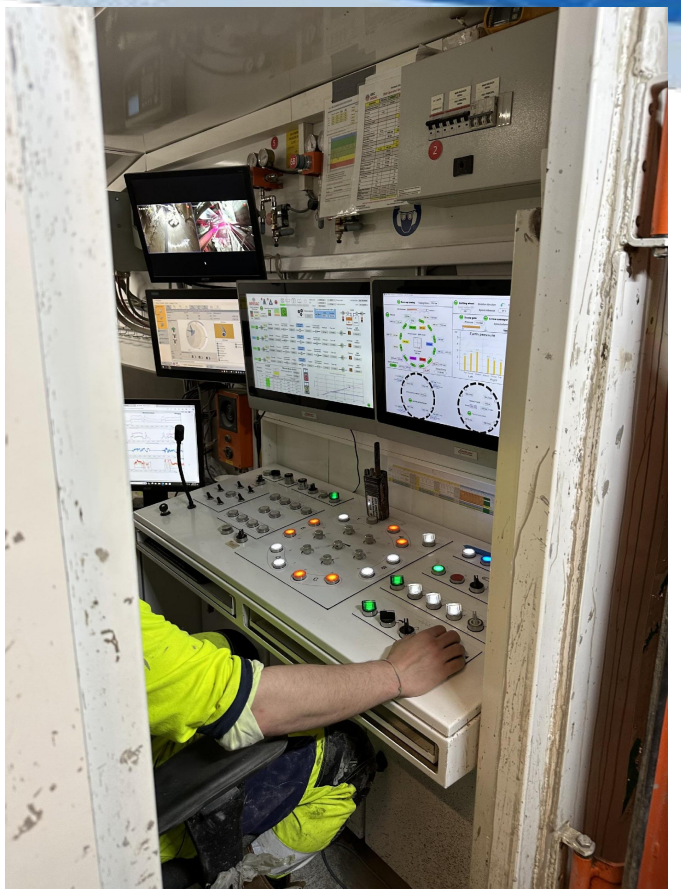


Construction – Tunnel

- 2410m of 2410m completed (100%)
- Rate of avg. 10.5 rings per day (ring = 1.3m length) about 13.6m a day
- Contractors worked 24 hours Monday-Friday, 5 days a week with two 12-hour shifts.



- TBM is about 80m long when fully assembled. TBM “Head”, 8 gantries and a bridge piece.
- Earth Pressure Balance Machine (EPBM) used to tunnel in soft ground



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Construction – October 2024 Tunnel Breakthrough

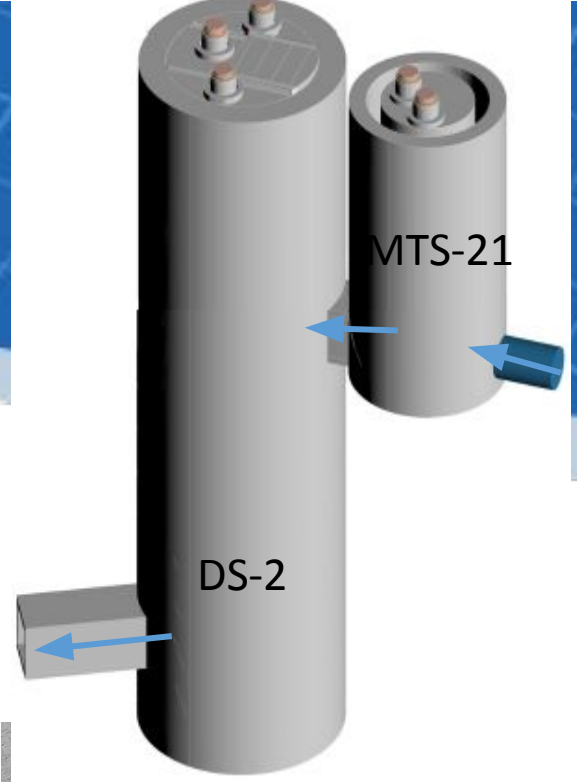
- TBM completed its 2.41 km journey and broke through at the extraction shaft on October 2, 2024
- TBM extraction by the Contractor took over two weeks.

Construction – Challenges – Adit Sequencing

Ground Consolidation
(From Drop Shaft)

November 2023:
Drop Shaft DS-2 - Adit to Tunnel

Hand Mining
(Pipe jacking from Drop shaft to few metres away from proposed tunnel alignment)



Adit completed
(From Drop Shaft)

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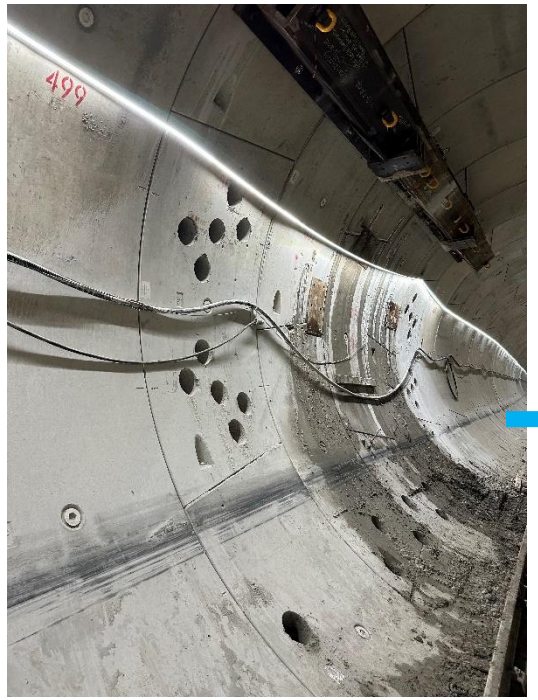
Construction – Adits Continued

Jan 2025 to Date:
Adit Construction from inside Tunnel

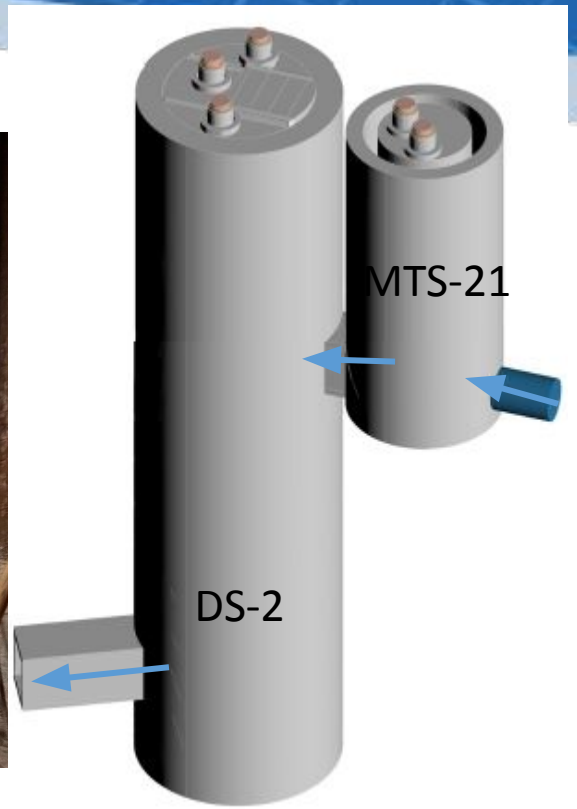


Ground Consolidation w/ Grout Injection

Support Frame Installation

"Connection Zone"

Removal of PCTL & Locating Previously Installed Adit



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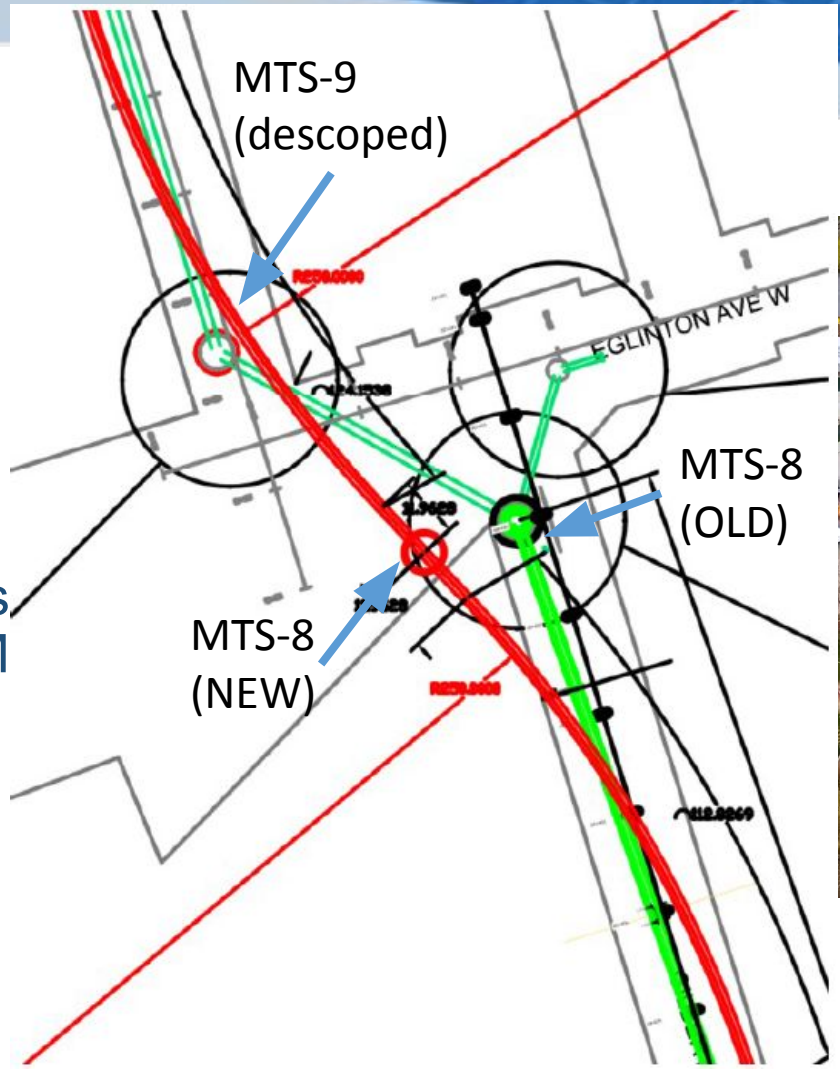
Construction Challenges – MTBM & Tie-backs

- New alignment was proposed and issued as a Change Order to the Contract
- Credit for one less shaft (MTS-9 was de-scoped)
- Additional cost for curved tunnel, and restoration of the park
- Better option than to risk delay claims from the Contractor and costly MTBM recovery



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Construction – Local Sewers Contract

January 2025 to July 2027 construction duration (2.5 years)

- Sewer Separation (Storm Tunnel Tie-in)
- Inlet Control Device Installation
- Watermain related works
- Substandard Water Services Upgrades:

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Future of Project

- Tunnel contract completed
- Local sewers construction commenced, coordinating works in large area, and managing the tie-in process
- Be proactive and avoid repeating same issues at the remobilized construction sites
- Now that the work areas are expanded, optimize work to minimize traffic impacts
- Continue to coordinate with other City Contracts to avoid conflicts
- Communication, communication, communication
- Finish the work!

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Thank you