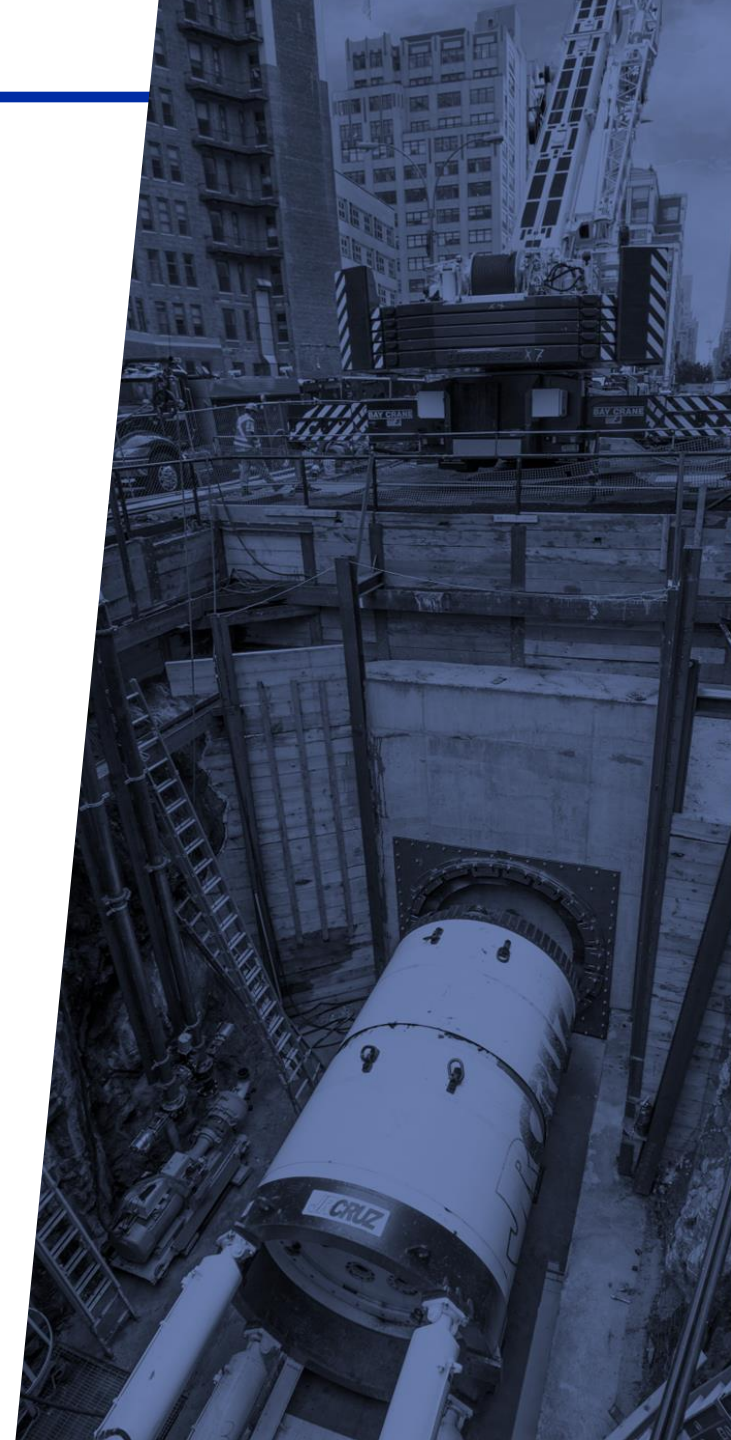

Tunneling: Reducing Community Impact

Joseph Lione, P.E.

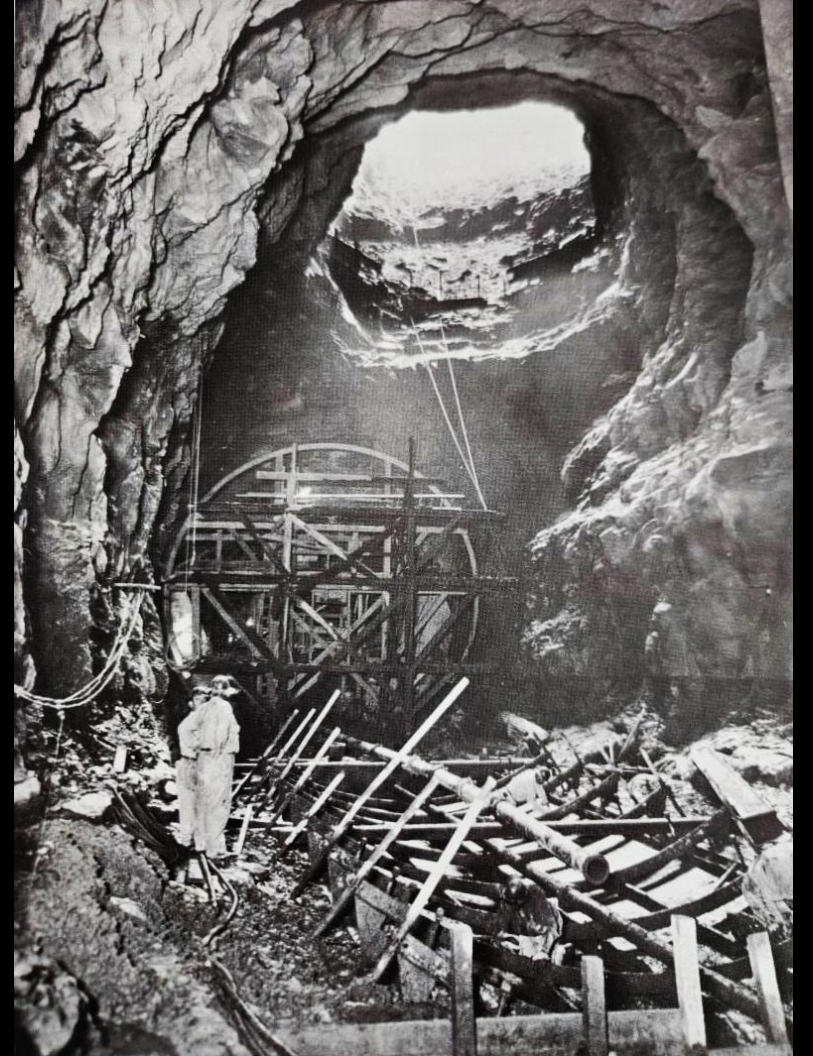
Associate Commissioner, Coastal Resiliency – Construction

-
- **History of Tunneling in NYC**
 - **Intro to Pipe Jacking**
 - **Intro to Wet Caisson Method**
 - **Intro to Microtunnel Boring Method**
 - **Reduction to Community Impacts**



City Tunnel #2 Construction,
just South of Hillview Reservoir
(May 24th, 1932)







Sand Hogs Removing Liner Plates

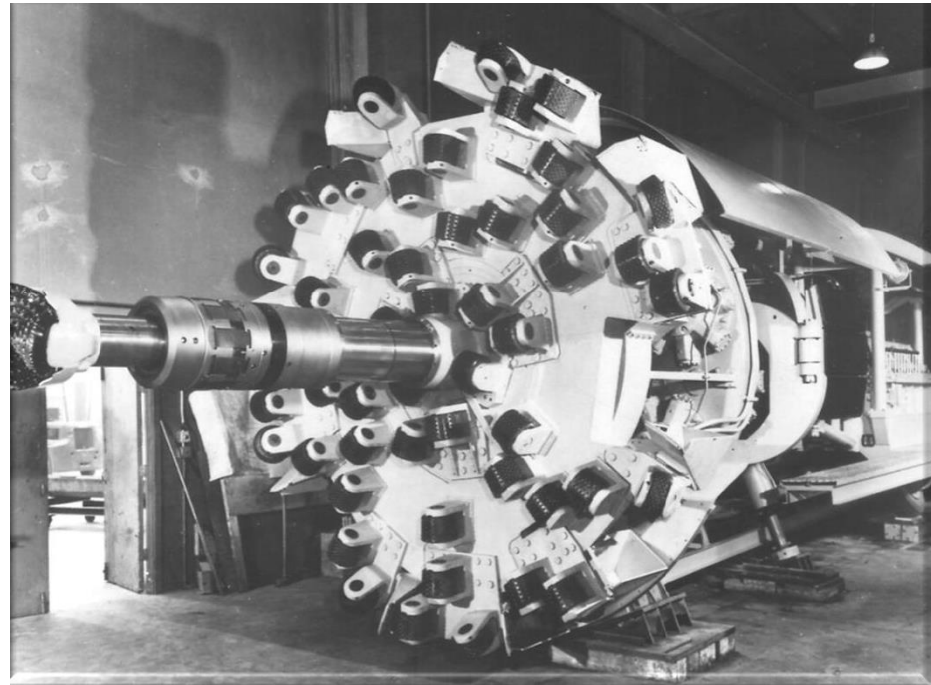


Liner Plates Removed

Richmond Tunnel

Richmond Tunnel is a 5-mile long tunnel across upper New York Bay, serving as Staten Island's primary source of water.

- Modern Tunnel Boring Machines (TBMs) were still a new technology in the 1960s
- Used for a portion of the Richmond Tunnel but machine needed more development before it would be an efficient method of tunneling
- Approach was abandoned in favor of the drill and blast method
- Project completed in 1970
- Machines were used again starting in the 1990s, primarily on construction of City Water Tunnel No. 3



TBM, ~1965



Jacking Pit Layout

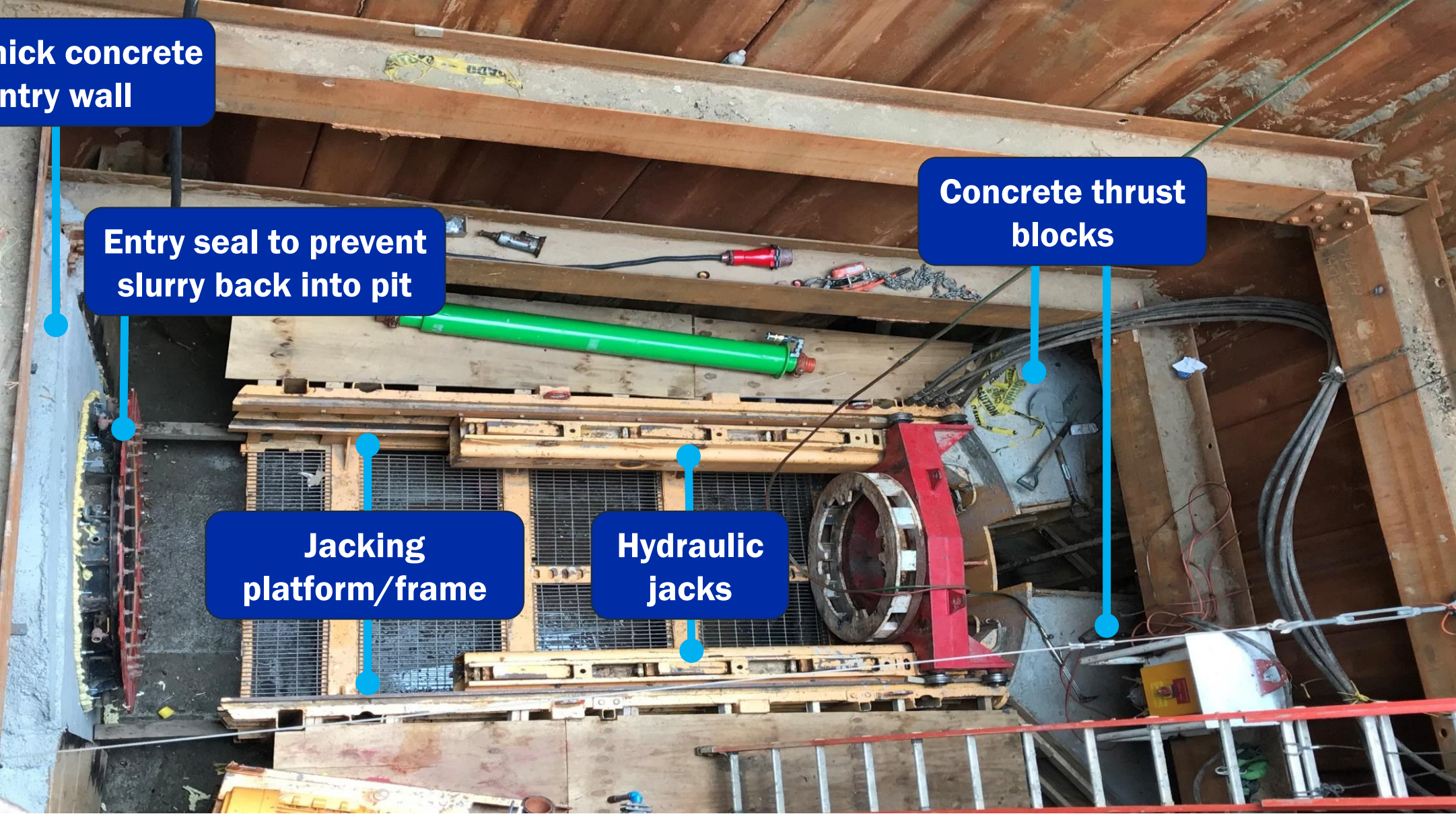
12" thick concrete entry wall

Entry seal to prevent slurry back into pit

Concrete thrust blocks

Jacking platform/frame

Hydraulic jacks

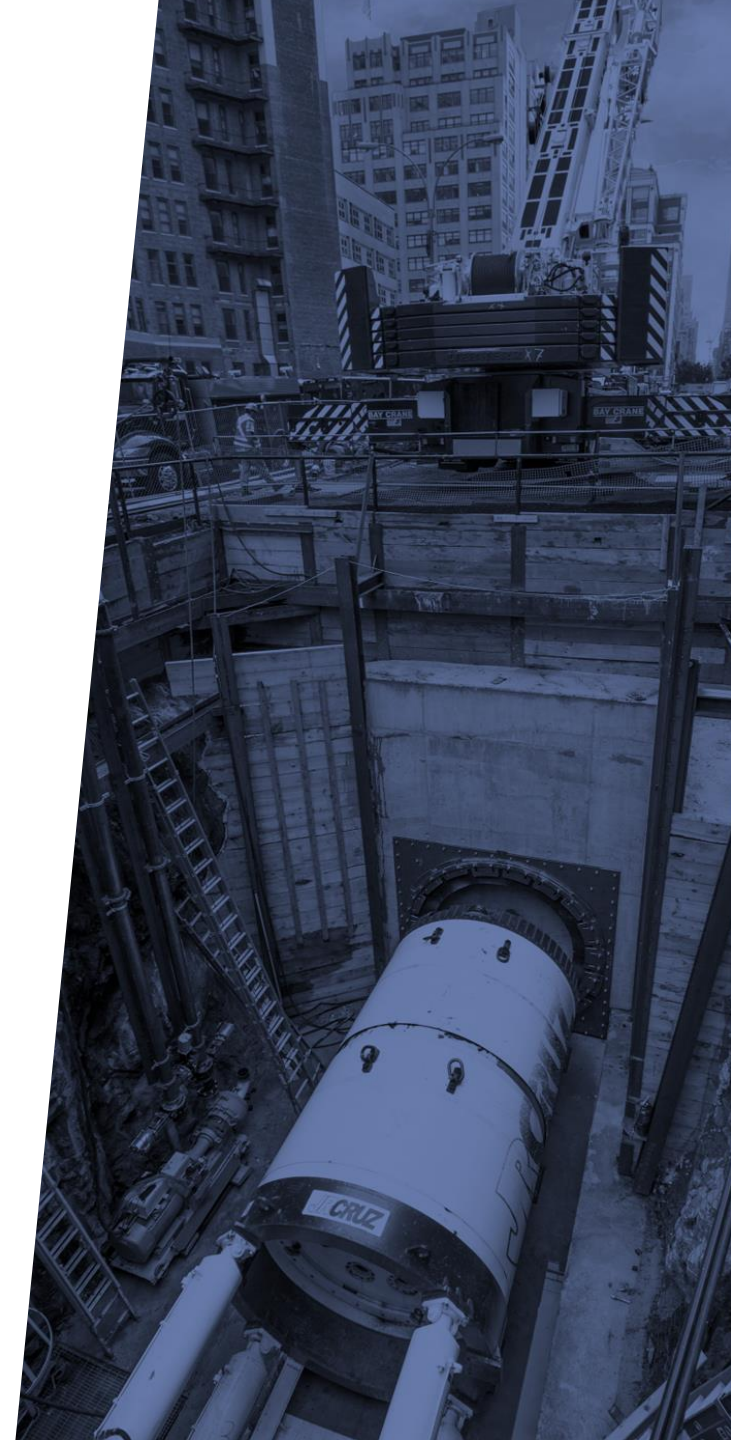


Conventional Excavation for Jacking & Receiving Pits



Issues to Overcome

- Dewatering – permits, deep wells, pumps, header pipe, and treatment facility
- Significant SOE (sheeting/shoring)
- Difficulties extracting excavated material



Civil Engineering/December 1992

MANHOLES AND MICROTUNNELING

EVARETT CRUZ JR.



952 Holmdel Road, Holmdel, New Jersey 07733
• Telephone: 908-946-8400 • FAX: 908-946-8956

— an equal opportunity employer —

Wet Caisson Method

CIVIL ENGINEERING/DECEMBER 1992



A STEEL CUTTING SHOE IS LOWERED INTO THE STARTING COLLAR OF A MANHOLE SHAFT IN STATEN ISLAND, N.Y. THE SHOE WILL HELP THE SHAFT SECTIONS SET ON TOP OF IT SETTLE INTO THE GROUND.



Constructing Caisson sections approximately 20' diameter and approximately 20' high

Wet Caisson Method



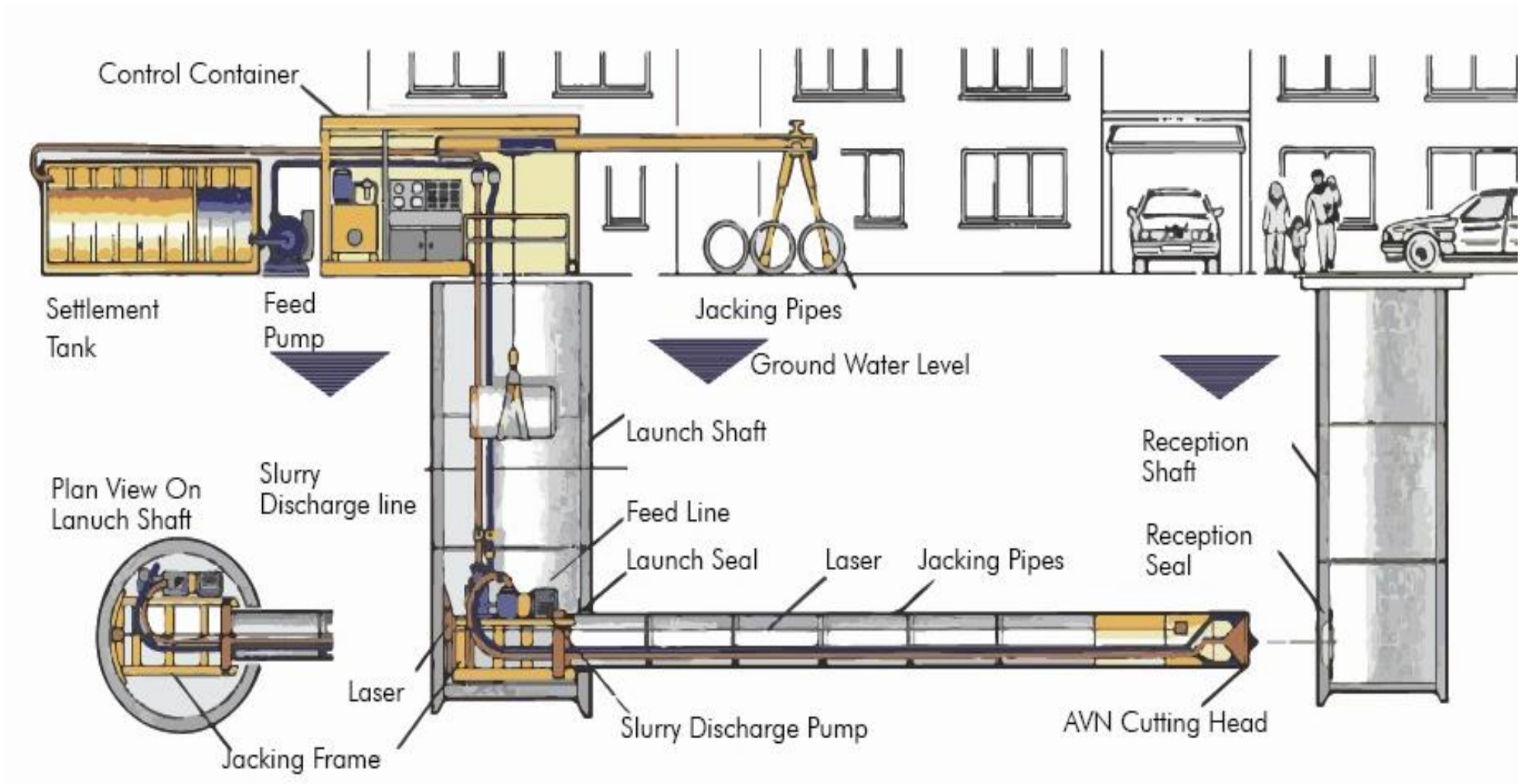
Excavation with clamshell bucket on an extendable teledipper arm.
Final section lowered.
Then, prepare keyway and *tremie pour* floor.

Wet Caisson Method – Completed Shaft

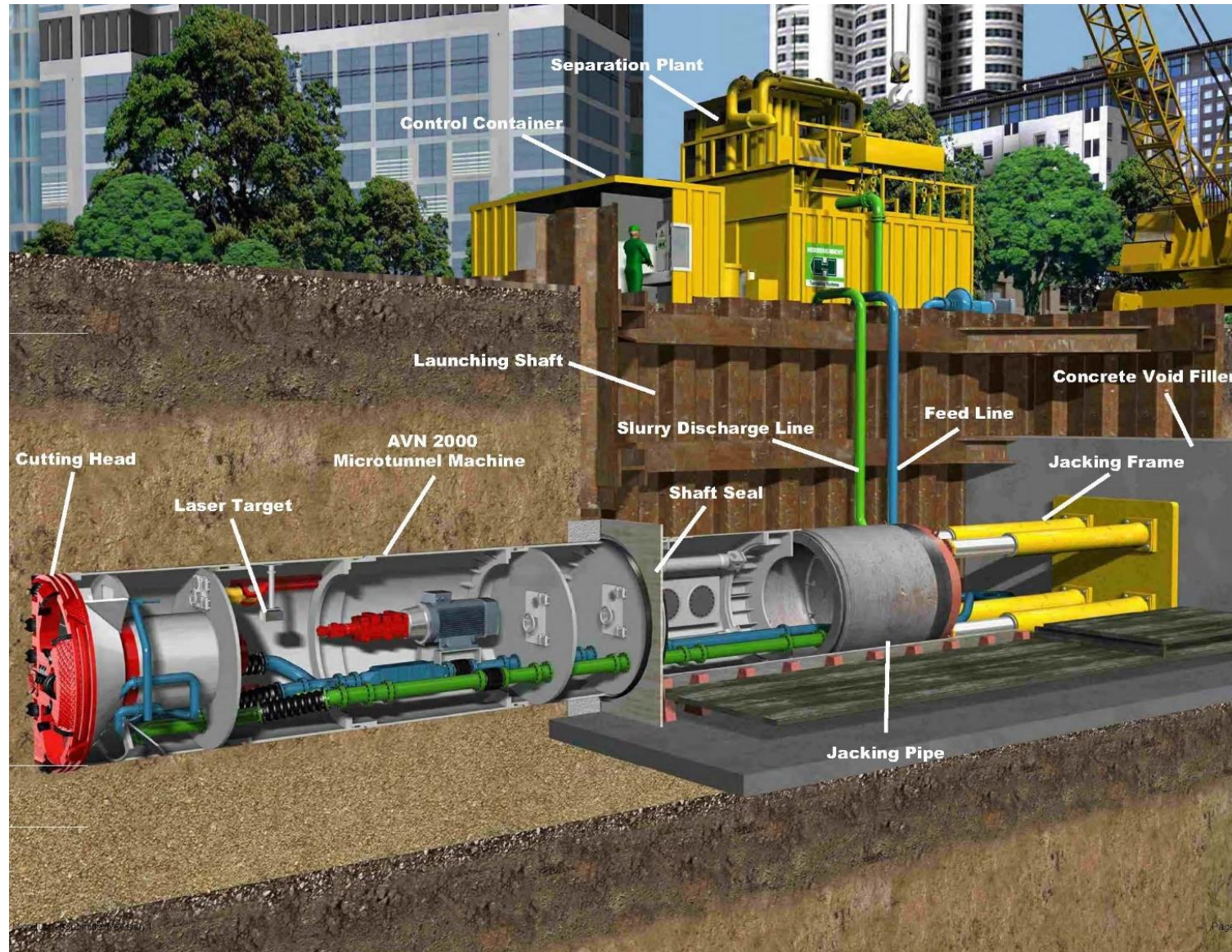


nest

Introduction to Microtunneling



Microtunneling Layout



Microtunneling Process

Control unit



Lowering MTBM cutter head using hydraulic crane



MTBM cutter head

Microtunneling Process

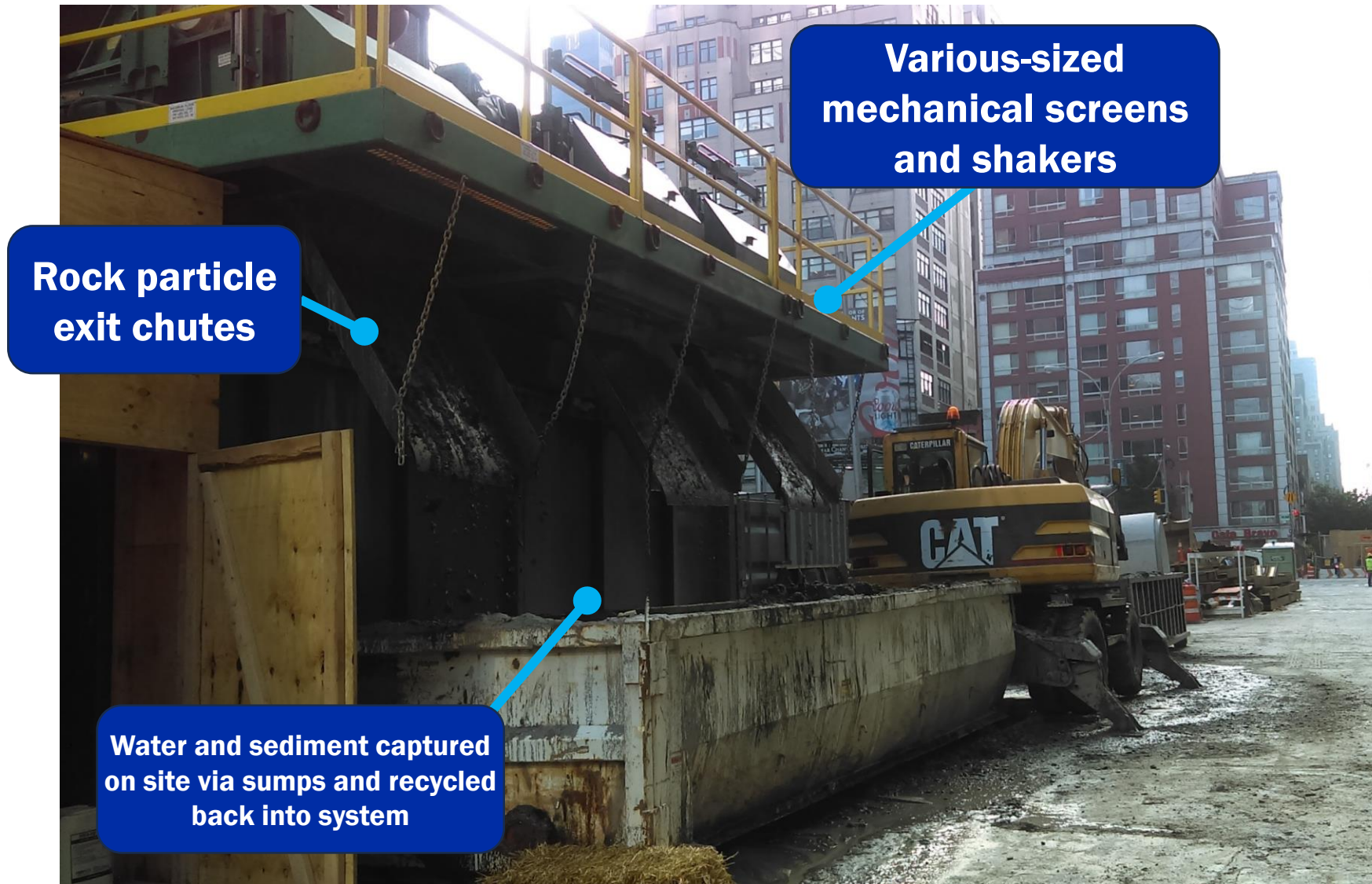


Jacking MBTM

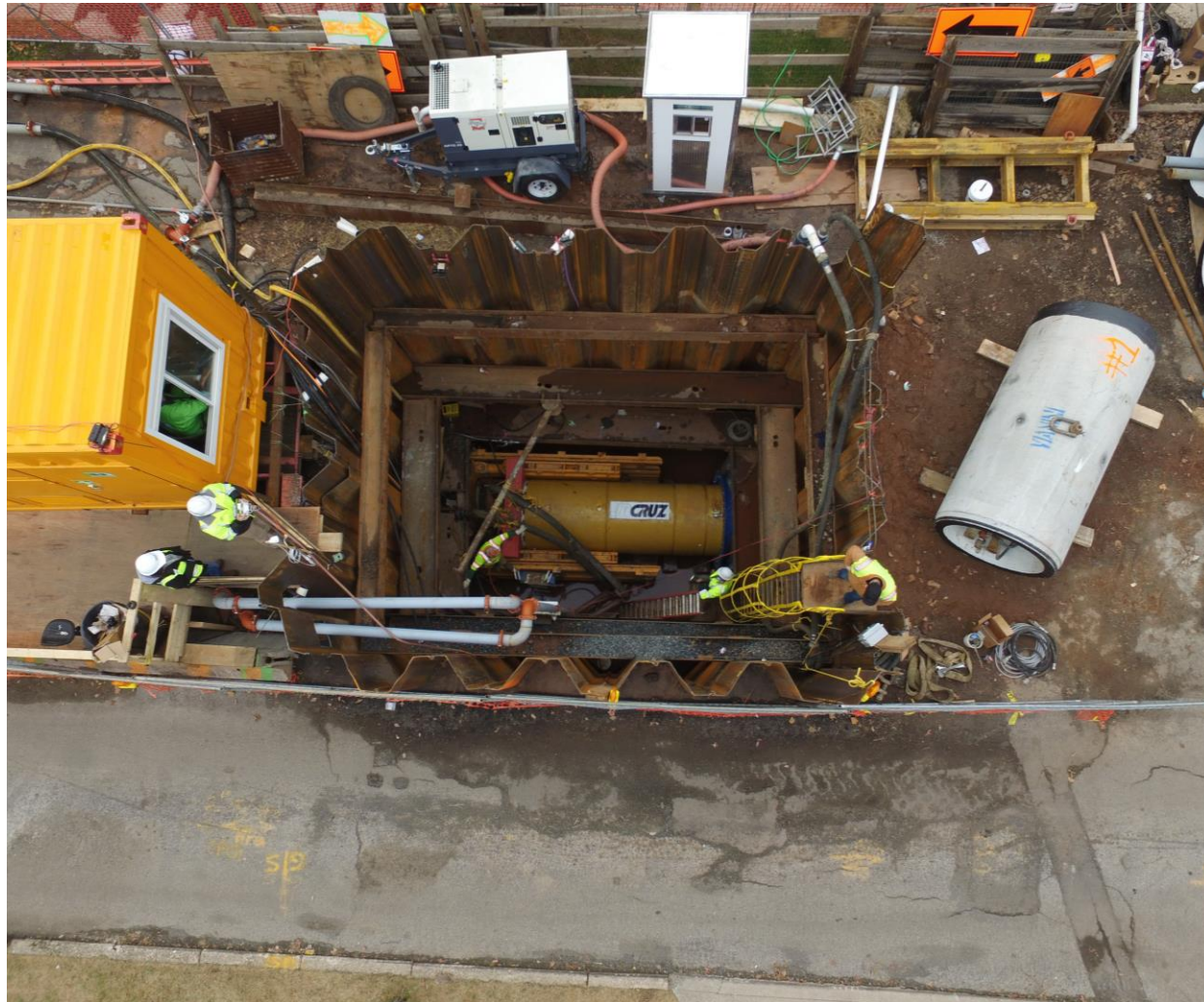


Jacking concrete pipe

Microtunneling Process

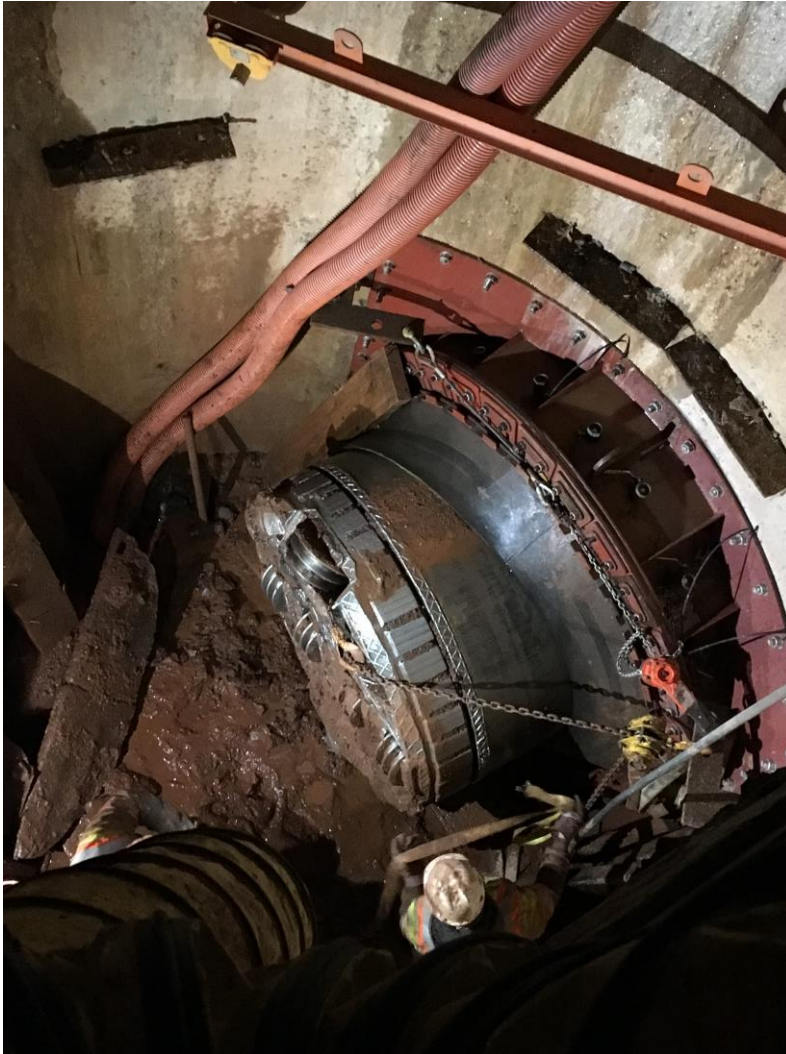


Microtunneling Process



Concrete jacking pipes prepared for installation

Microtunneling Process



Holing through

Utility Conflicts



Microtunneling Process

Benefits to the community /
Reducing impact:

- Less space
- Less traffic impact
- Less time
- Less noise
- Less cost

