

Ryan Hunt

City of Sarnia – Sewer Collection System Upgrades
Eliminating a Pumping Station and Hydraulic Bottleneck for
Systems Resiliency

Municipal Engineers Association Annual Conference

November 15, 2023

Introduction

- Presenter: Ryan Hunt, P. Eng
 - Structural Engineer
 - Project Manager
 - Infrastructure Projects (Bridges, Dams, Culverts, Marine Structures, Water/Waste Water Facilities)
- AECOM Canada Ltd.
 - Global Infrastructure Consulting Firm
 - Over 50,000 employees worldwide
 - Approx. 90 offices across Canada
- Retained by City of Sarnia to undertake an EA, Detailed Design and CA for the three phases of a Sewer Upgrade Project



City of Sarnia

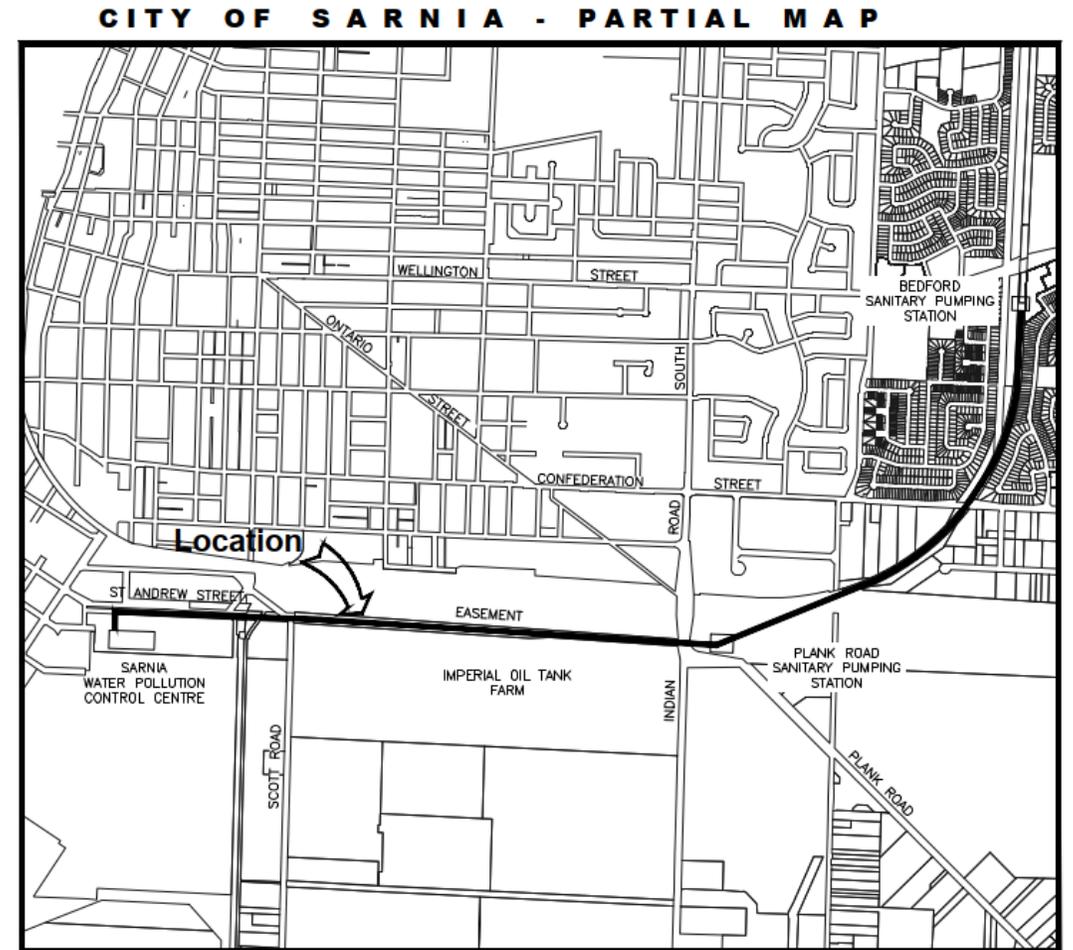
Contract No: 12-2019

SARNIA SEWER UPGRADE PROJECT

**Phase 3 - Trunk Sanitary
Sewer Microtunnelling**

Agenda

- Existing Infrastructure
- Project Background
- Project Overview
- Phase 1 - Forcemain Routing
- Phase 3 - Microtunnel
- Phase 2 - New Pump Station
- Construction Challenges
- Final Tie-in
- Question Period



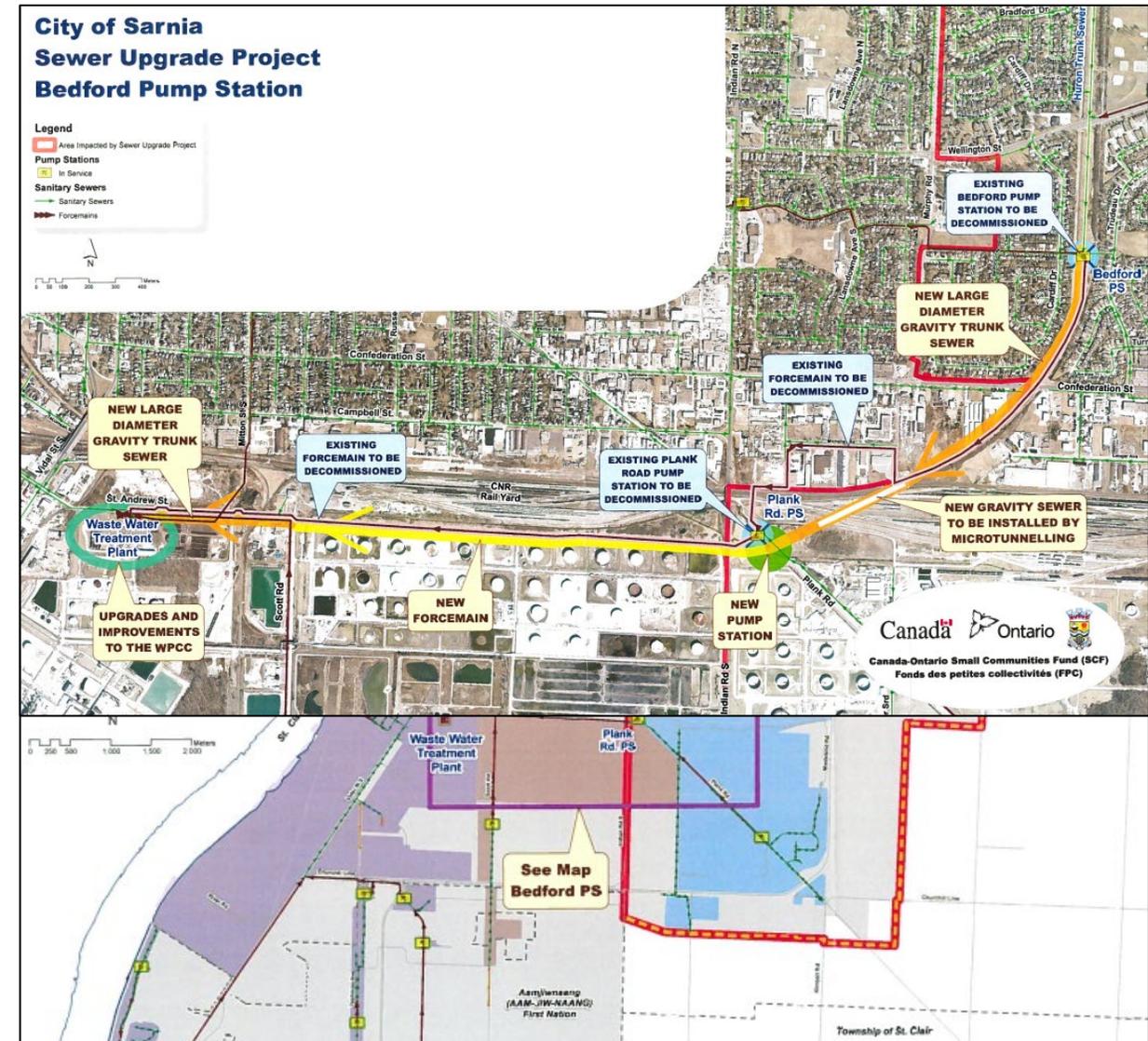
Existing Infrastructure

- Bedford and Plank Road Pumping Stations were both constructed in 1977
- Bedford and Plank Rd PS some of the largest in the City
- Bedford receives flow from 23 other PS and services 40% of the City
- Bedford PS feeds into Plank Rd PS by a 525mm FM
- Plank Rd PS feeds into the Sarnia Water Pollution Control Centre by a 600 FM

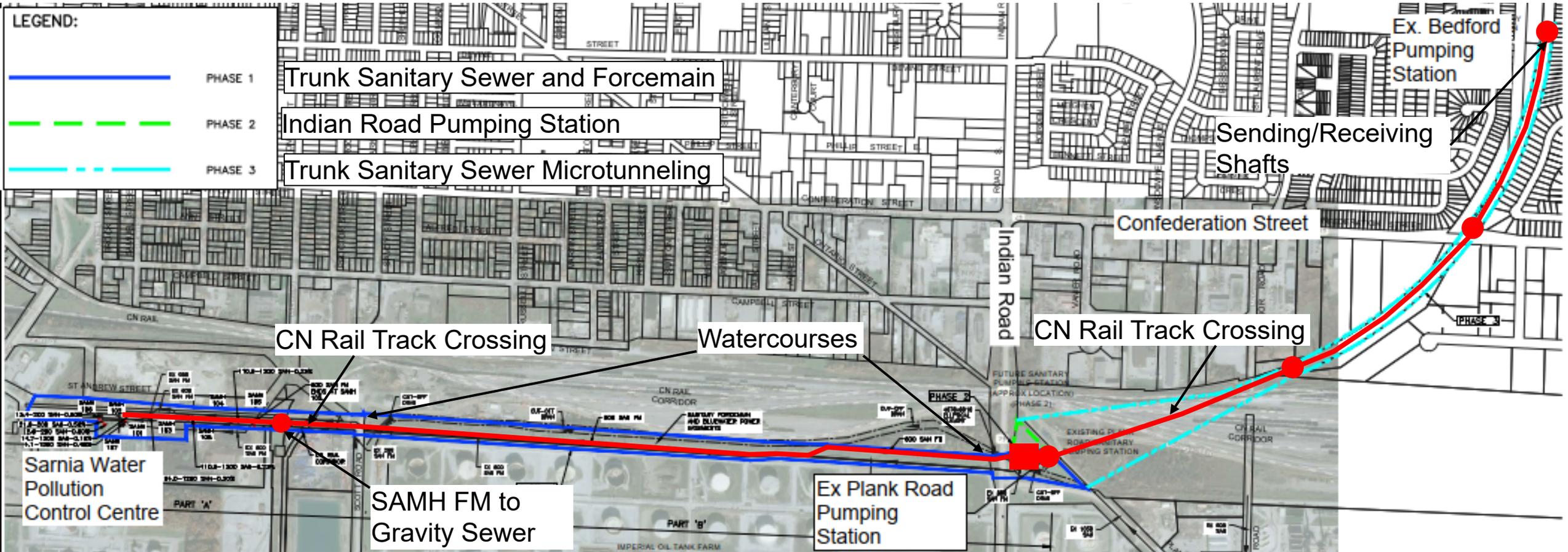


Project Background

- 2014 to 2017 for Environmental Assessment (Schedule B)
 - review replacement options for the existing Bedford and Plank Rd Pumping Stations
 - Upgrades to include for 20-year growth
- 2017 to 2019 for Detailed Design of the Sewer Upgrade Project
 - split into three contracts
- Phase 1 construction commenced in April 2019



Project Overview



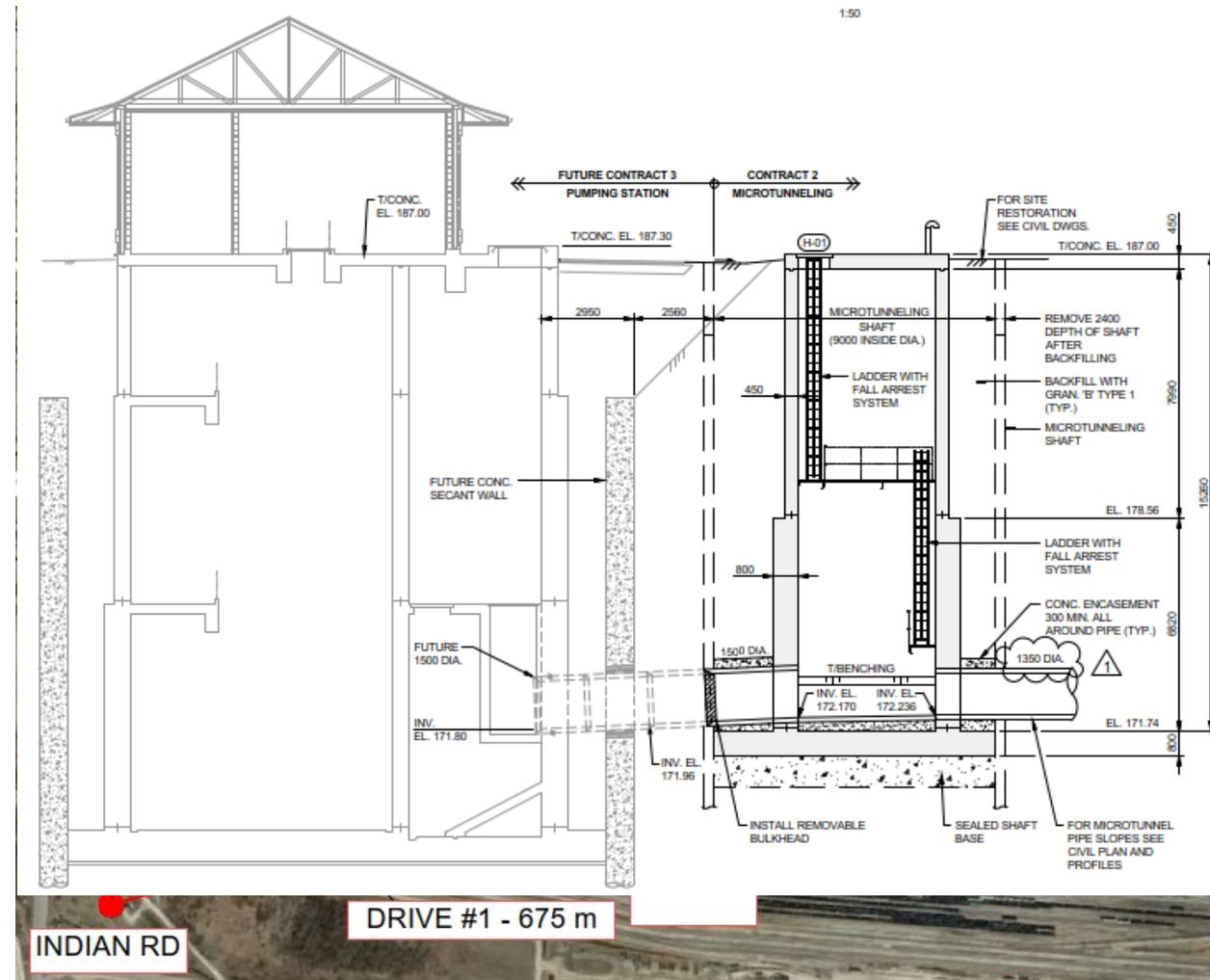
Phase 1 – Trunk Sanitary Sewer and Forcemain

- Trunk Sewer: 2200m of 600 FM and 360 m of 1200 gravity sewer
- Replacing aging infrastructure with previous points of failure
- Four trenchless crossings
- Combined flow from other major SPS
- Large portion of the FM on Hydro One property
- May 2019 to April 2020
- Construction Contract Value: \$7M



Phase 3 – Trunk Sanitary Sewer Microtunneling

- Approx. 1800 m of microtunneling
- 1350mm microtunnel approx. 14 m below grade
- Crossed CN rail yard with 13 tracks
- Four temporary driving/receiving shafts
- Four permanent SAMHs
- February 2020 to March 2022
- Construction Contract Value: \$19M



Phase 3 – Trunk Sanitary Sewer Microtunneling Cont'd

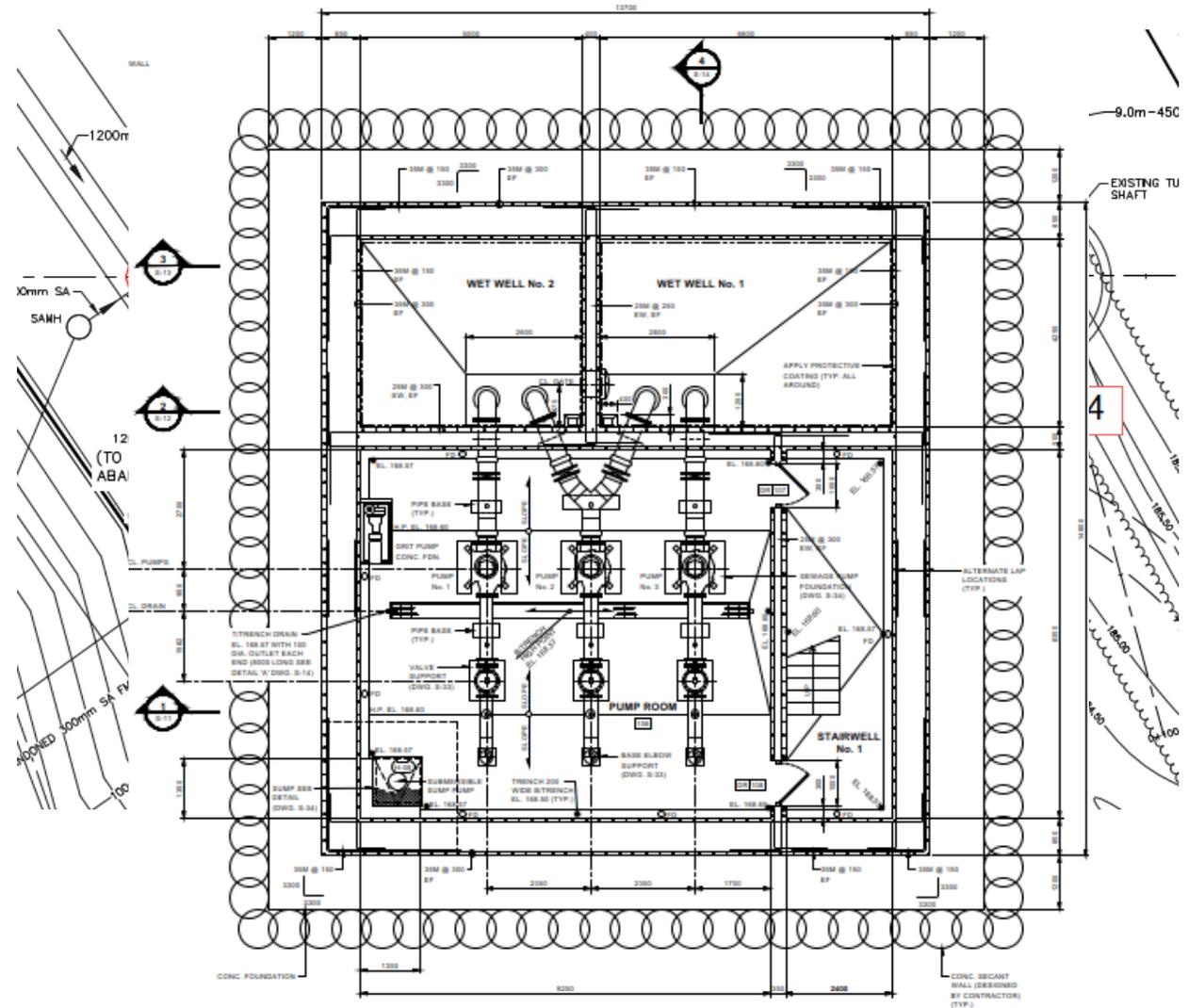
Microtunneling Process

- Prepare driving and receiving shafts
- Hydraulic jack system is installed
- Microtunnel machine pushed forward from jacking rig into ground
- Precast pipe placed on jacking rig pushes the boring machine forward
- Soil in front of boring machine is turned into a slurry
- Shaker plant filters soil slurry pumped from tunnel
- Grout pumped through ports on precast pipe to fill voids



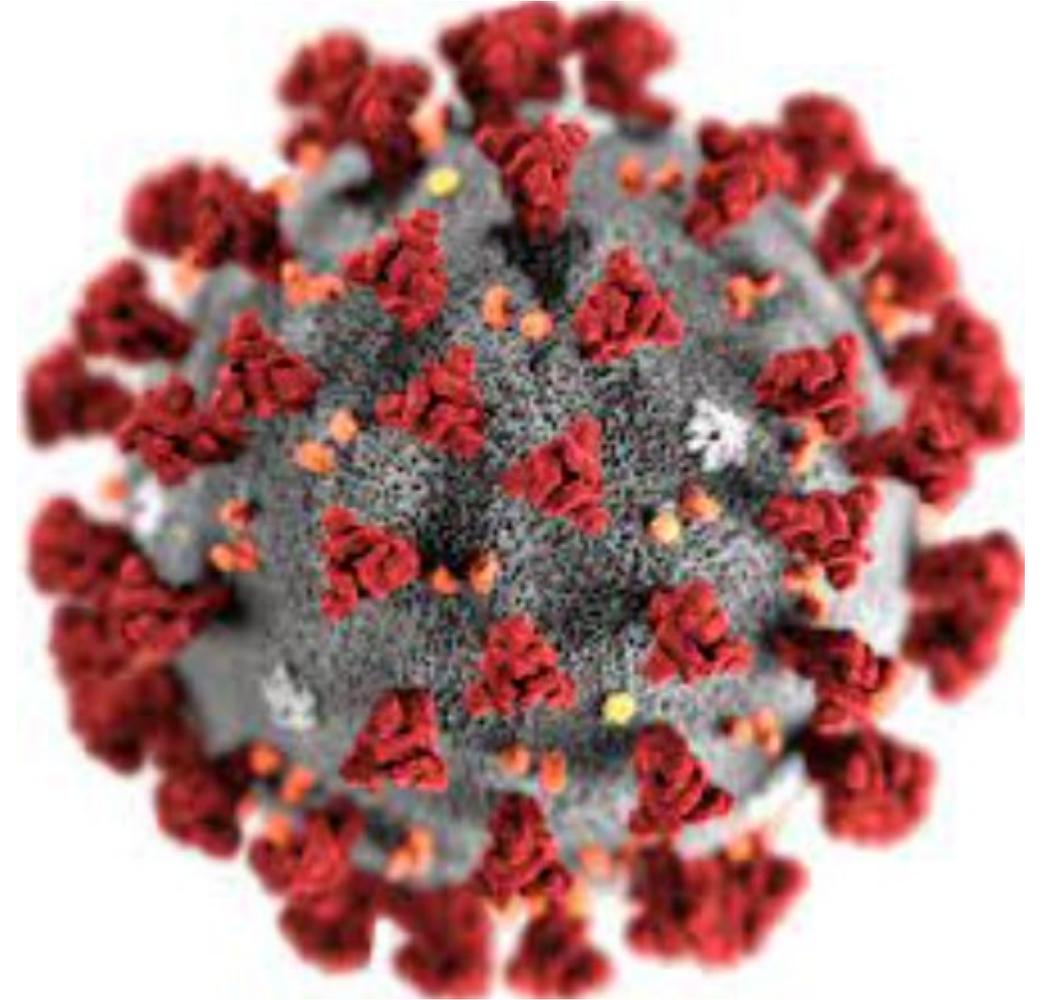
Phase 2 – Indian Road Pumping Station

- Temporary concrete secant shaft
- 18 m deep reinforced concrete PS
- Three raw sewage pumps (340L/s)
 - Single pump can meet daily flows
- Tie-in to microtunnel trunk sewer and 600 FM
- Decommission of Plank Rd PS
- May 2020 to September 2023
- Construction Contract Value: \$14M



Phase 1 and 3 Challenges

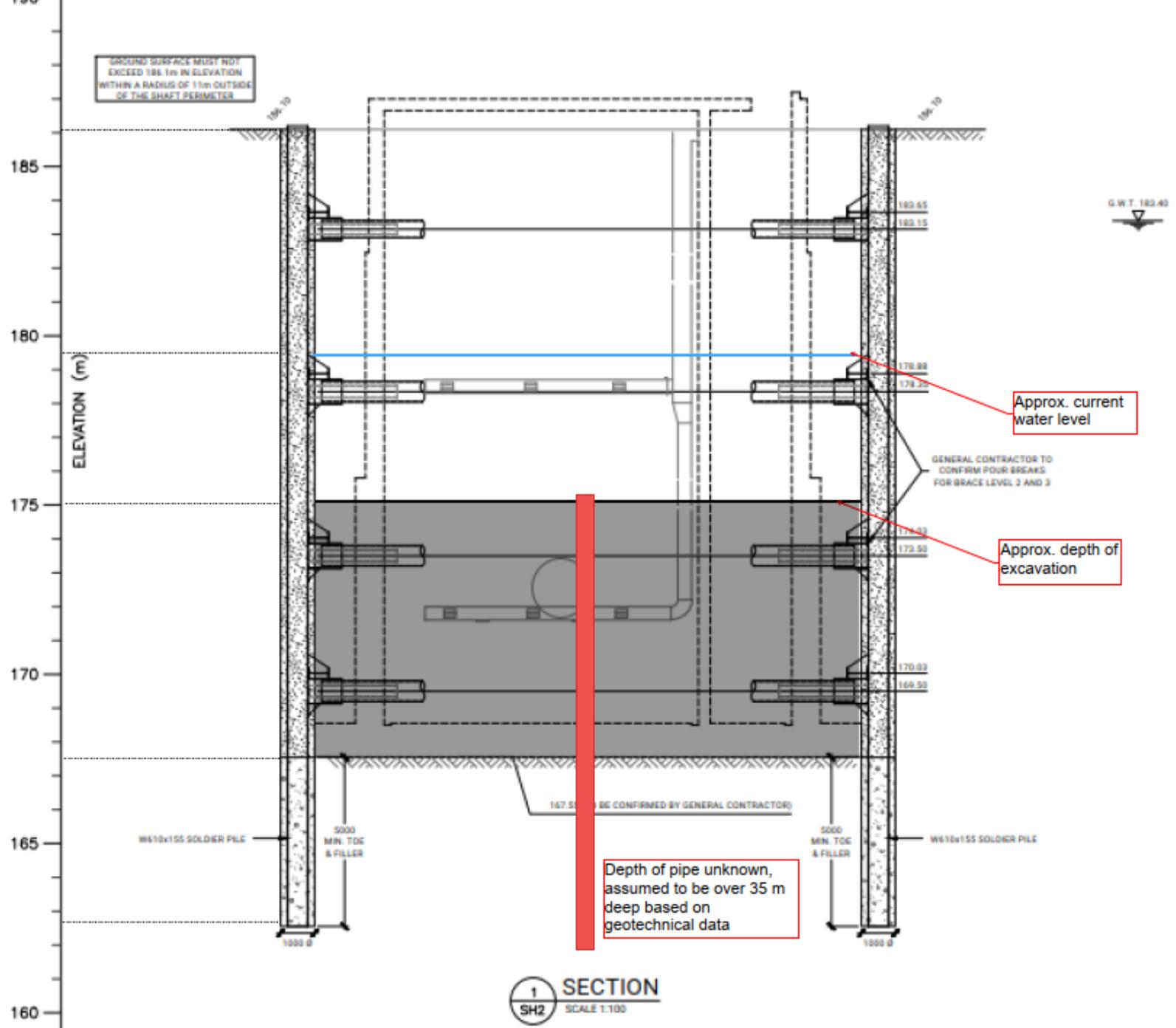
- Phase 1
 - CN Rail Permitting Delays
 - Shutdown constraint for tie-in
- Phase 3
 - Project commenced in 2020 however was immediately impacted by the 2019 Covid Pandemic.
 - Alternative suppliers for structural steel required for temporary shafts had to be sourced
 - Drilling specialists were American and how to follow quarantine protocols
 - Delayed the project over a year.



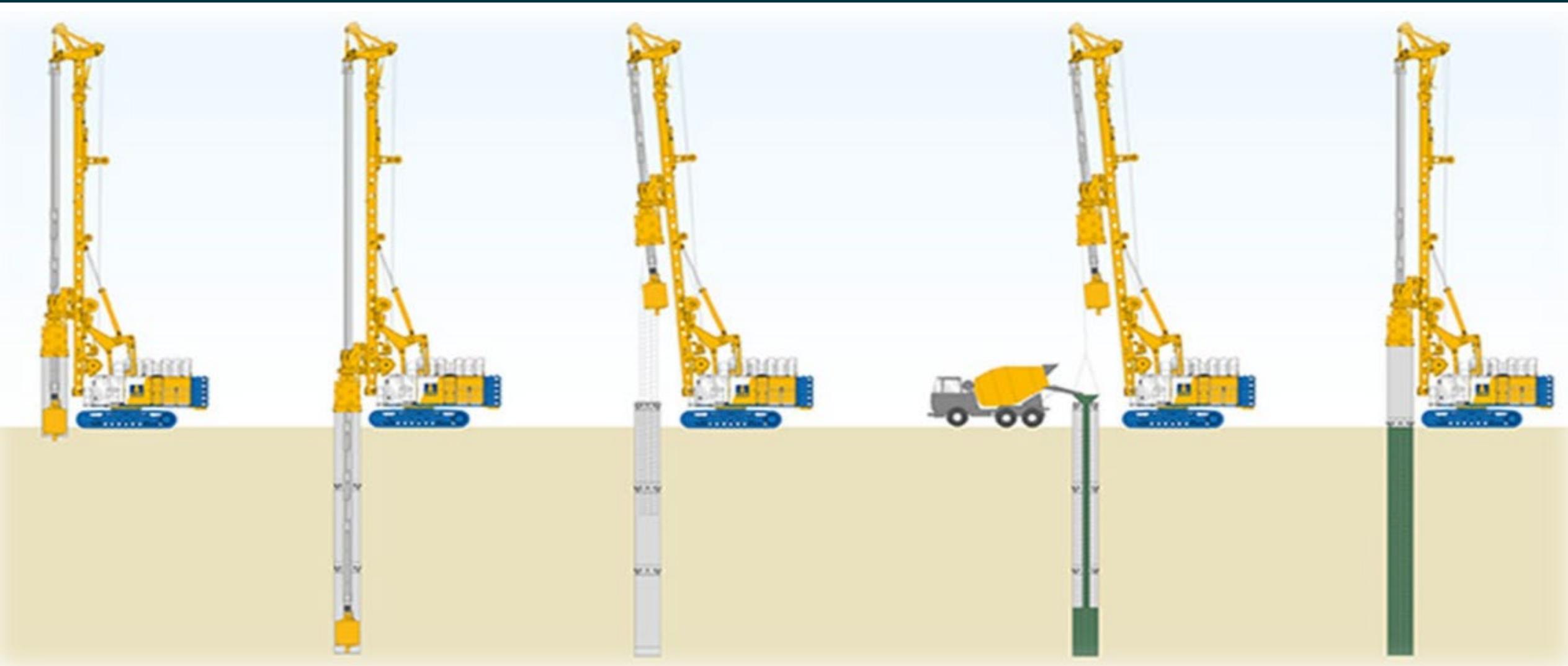
Phase 2 Indian Rd PS – Secant Shaft Excavation Challenge

- Concrete Caissons
- Four levels of corner bracing





Phase 2 Indian Rd PS – Secant Shaft Excavation Challenge



Final Tie-in

- The final tie-in to connect all three phase of construction
 - Downstream 600 FM was connected during a shutdown
 - Upstream flow into Plank Rd was bypass to Indian Rd pump station
 - Upstream sewers at Bedford and Plank were tied-in over a two-week period
- A 14-day performance run of the new Indian Rd Pumping Station was performed following tie-in
- The Phase 2 project was substantial performed on September 19, 2023



Questions?