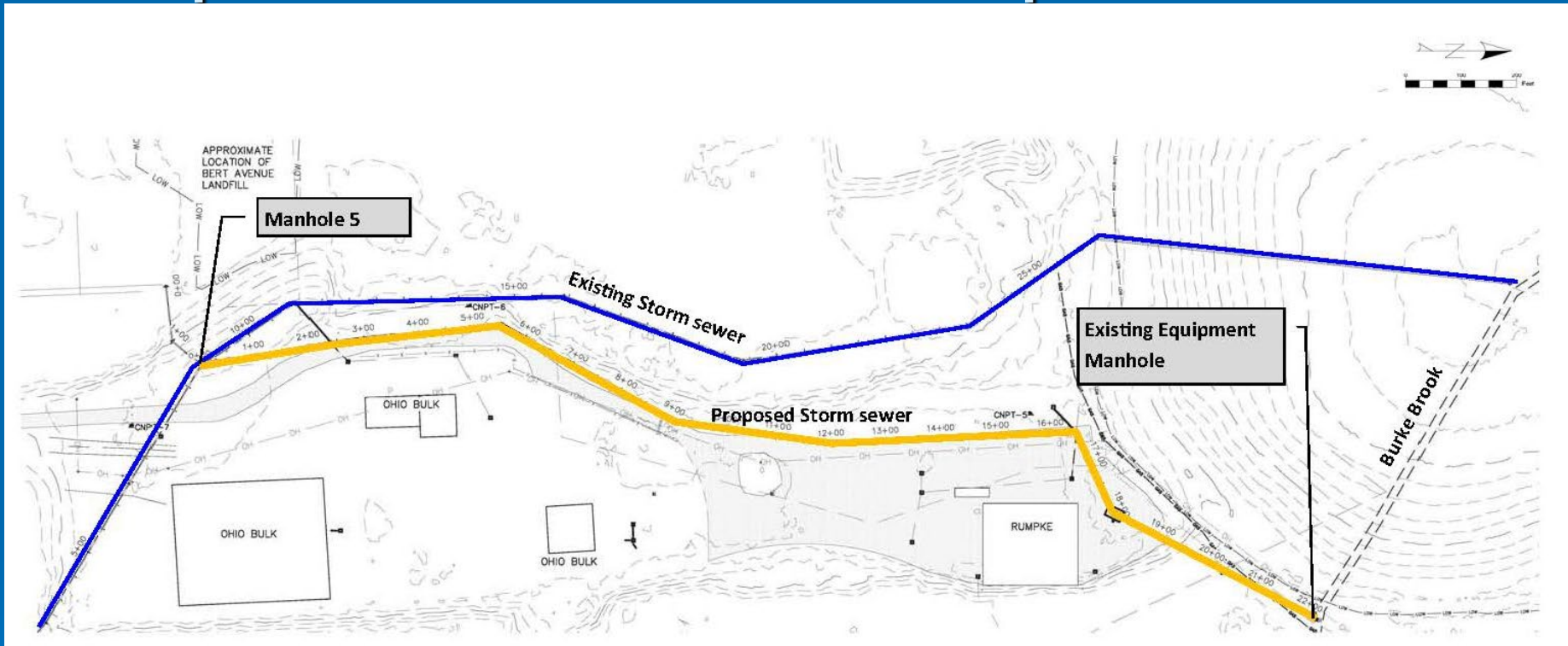


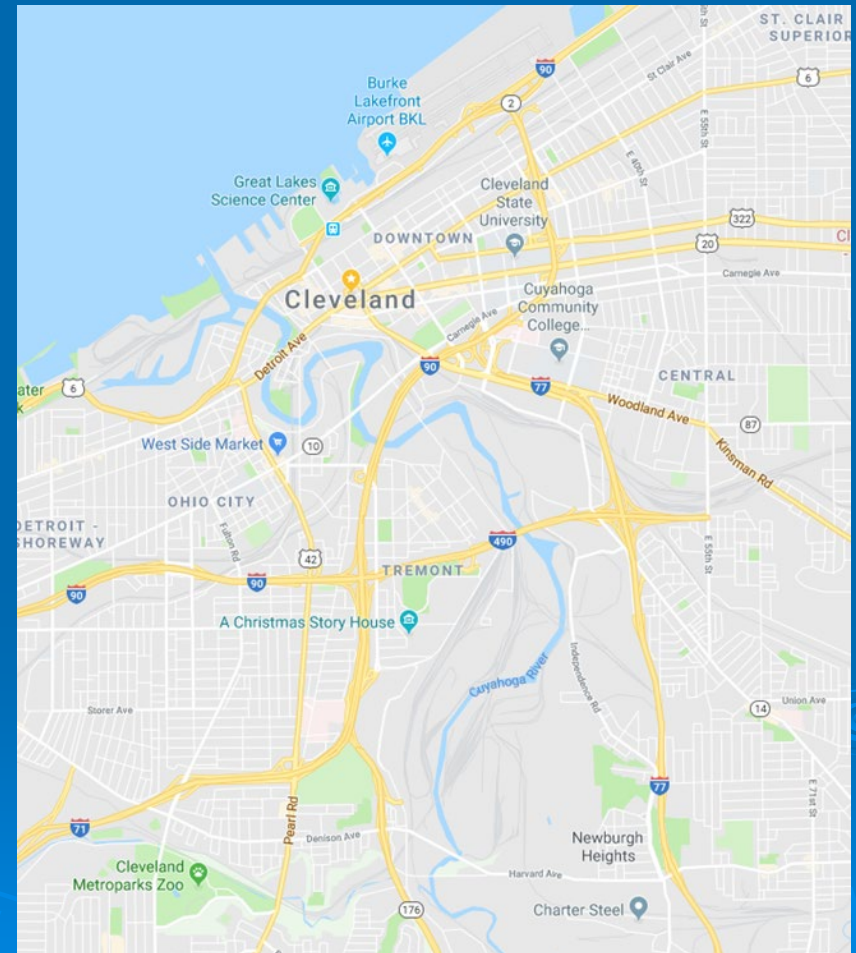
# A Public-Private Collaboration for Replacement of a Collapsed Sewer



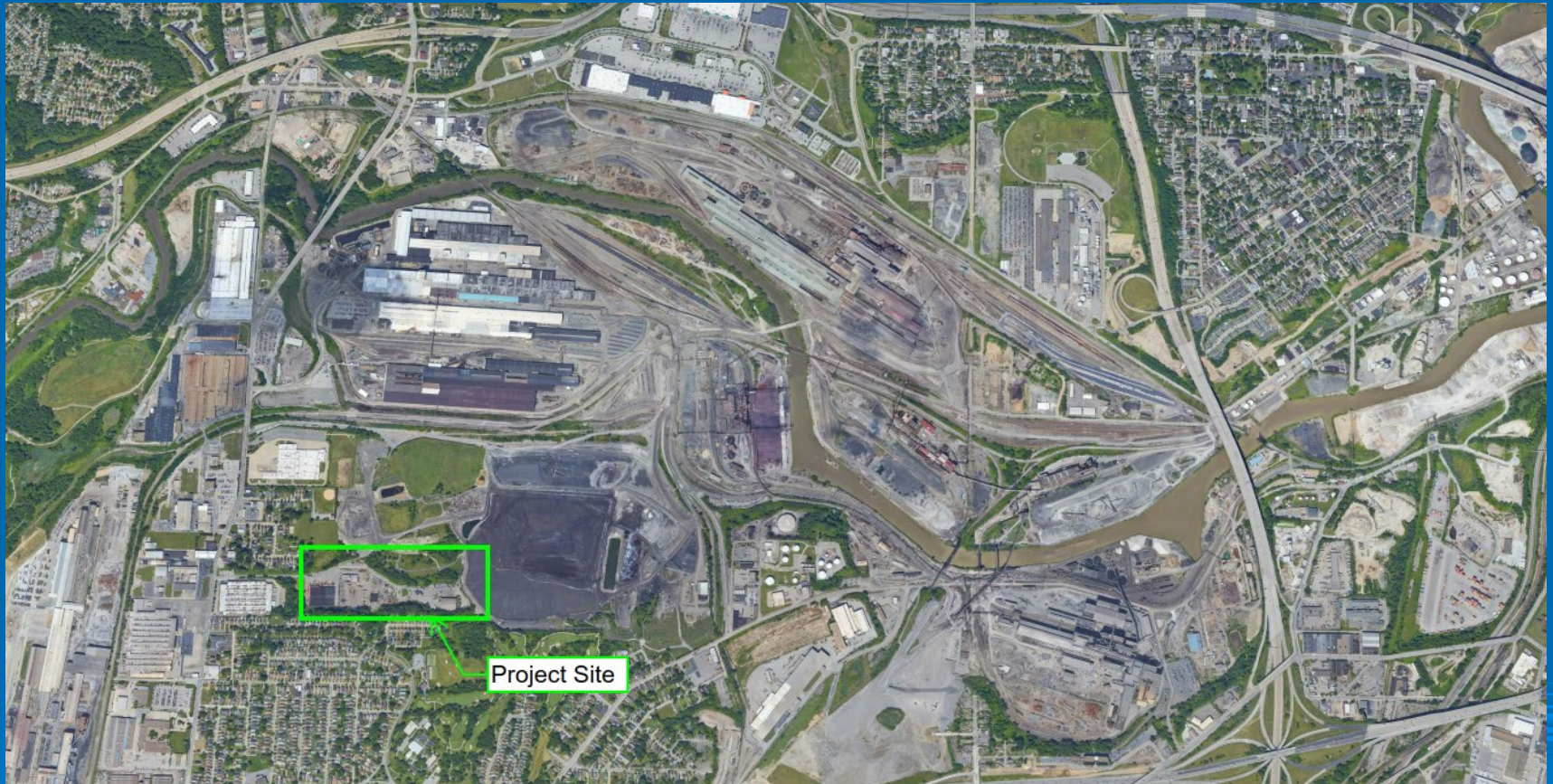
Presenters: Doug Lopata, NEORSD  
Brian Egan, AECOM  
Louis Burnoski, AECOM

# Introduction

- ArcelorMittal
  - International steel producing company
  - Cleveland, Ohio
  - Produce hot-rolled, cold-rolled and hot dipped galvanized sheet and semi-finished slabs of steel



# Project Location



- Within Cuyahoga River Valley with between 50 to 130 feet of fill

# Localized Flooding



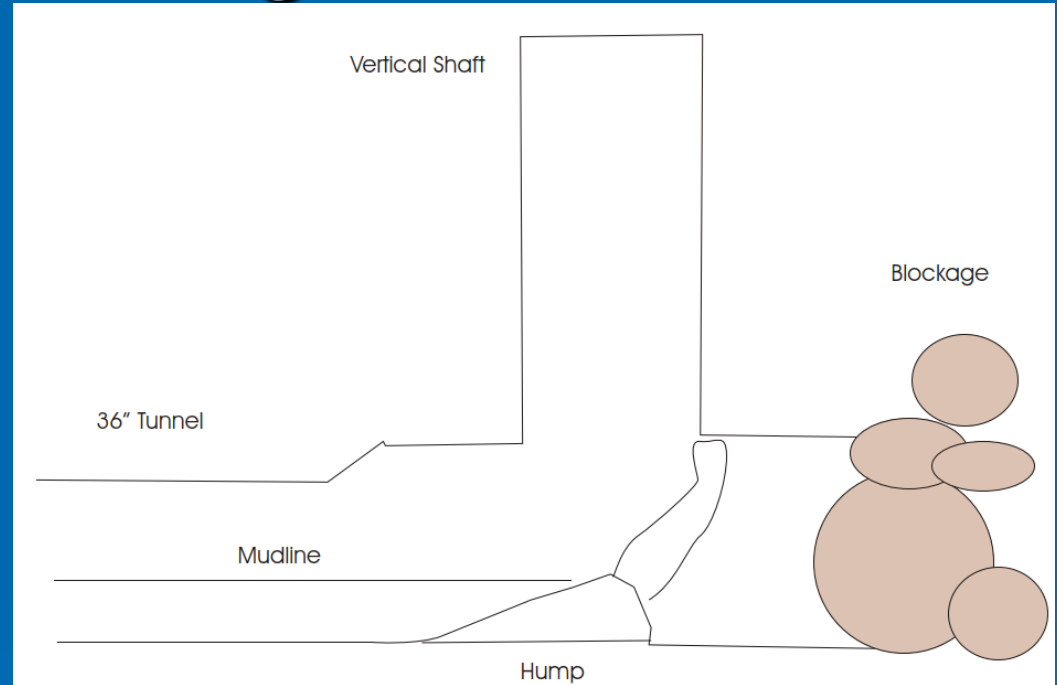
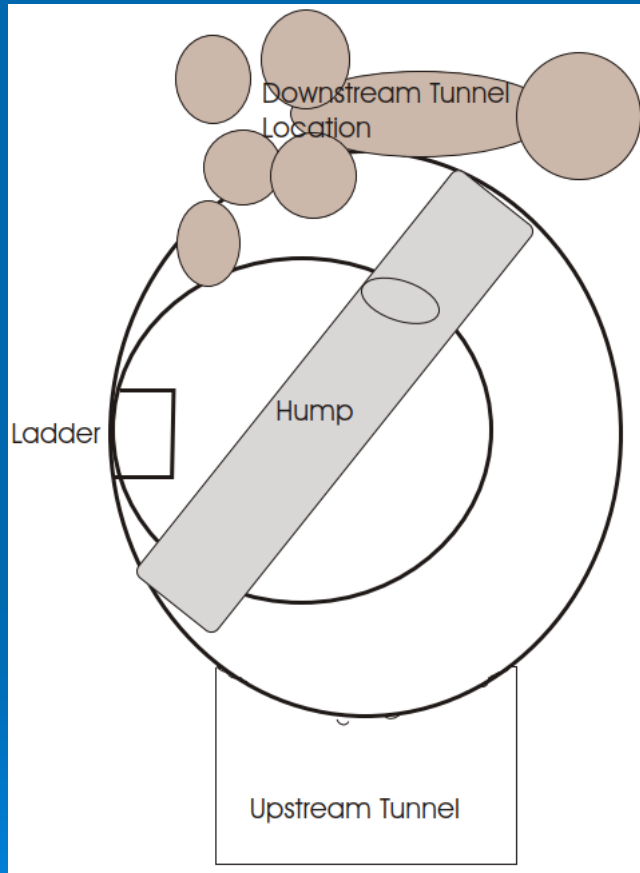
- The Existing sewer was located in the buried valley.
- Flooding discovered at the Rumpke Transfer Station
- Bypass pumping installed

# Blockage Discovered



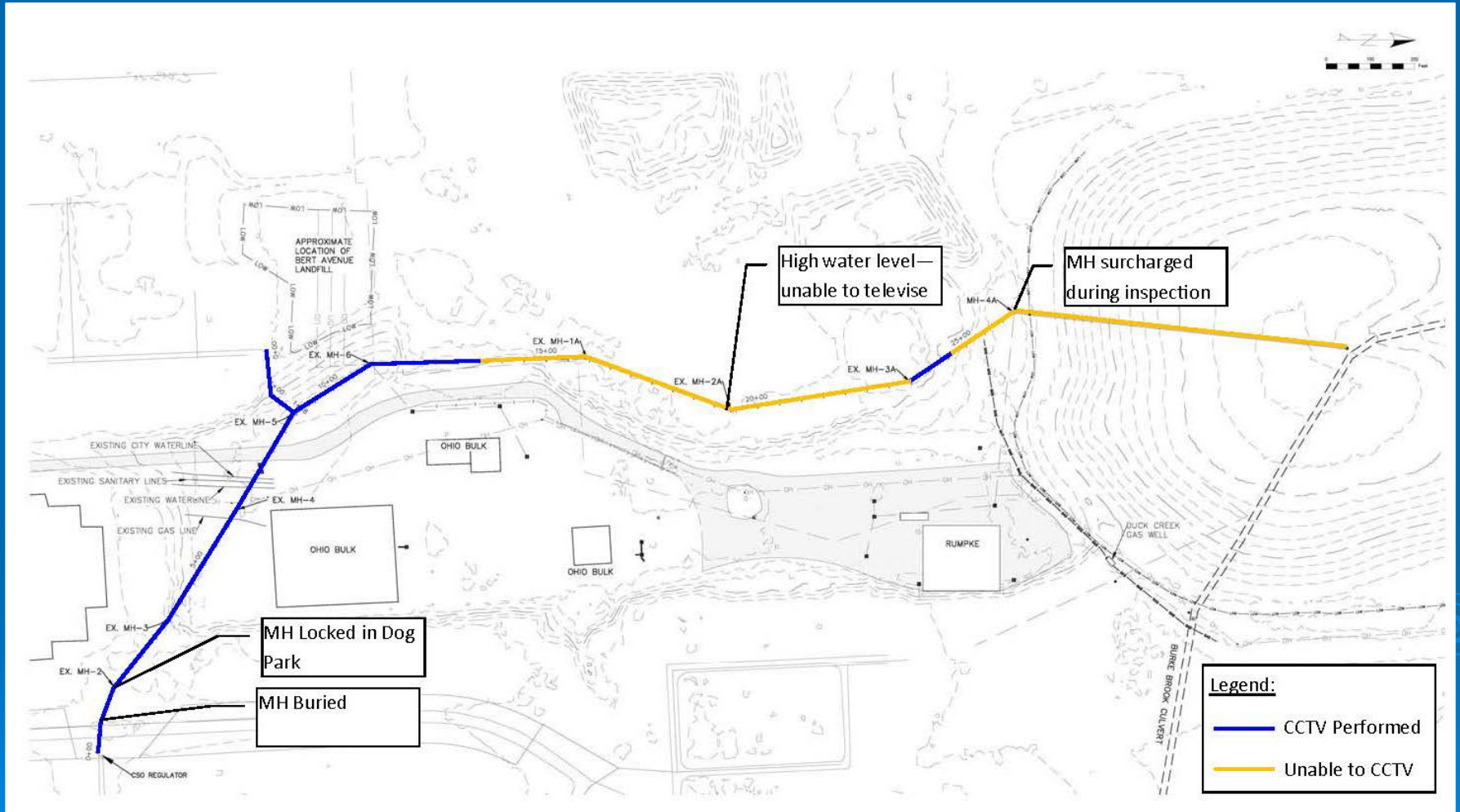
- 36-inch corrugated metal pipe
- MH 4A -Flooded 50-foot deep manhole

# Investigation – Diver & Hydro-Jetting



- Underwater Marine Contractors

# Investigation - CCTV



# Investigation – Burke Brooke Inspection



- Unsuccessful due to excessive deteriorated pipe conditions



# MH-4A Pump Down



- ArcelorMittal conducted a pump down of the flooded manhole

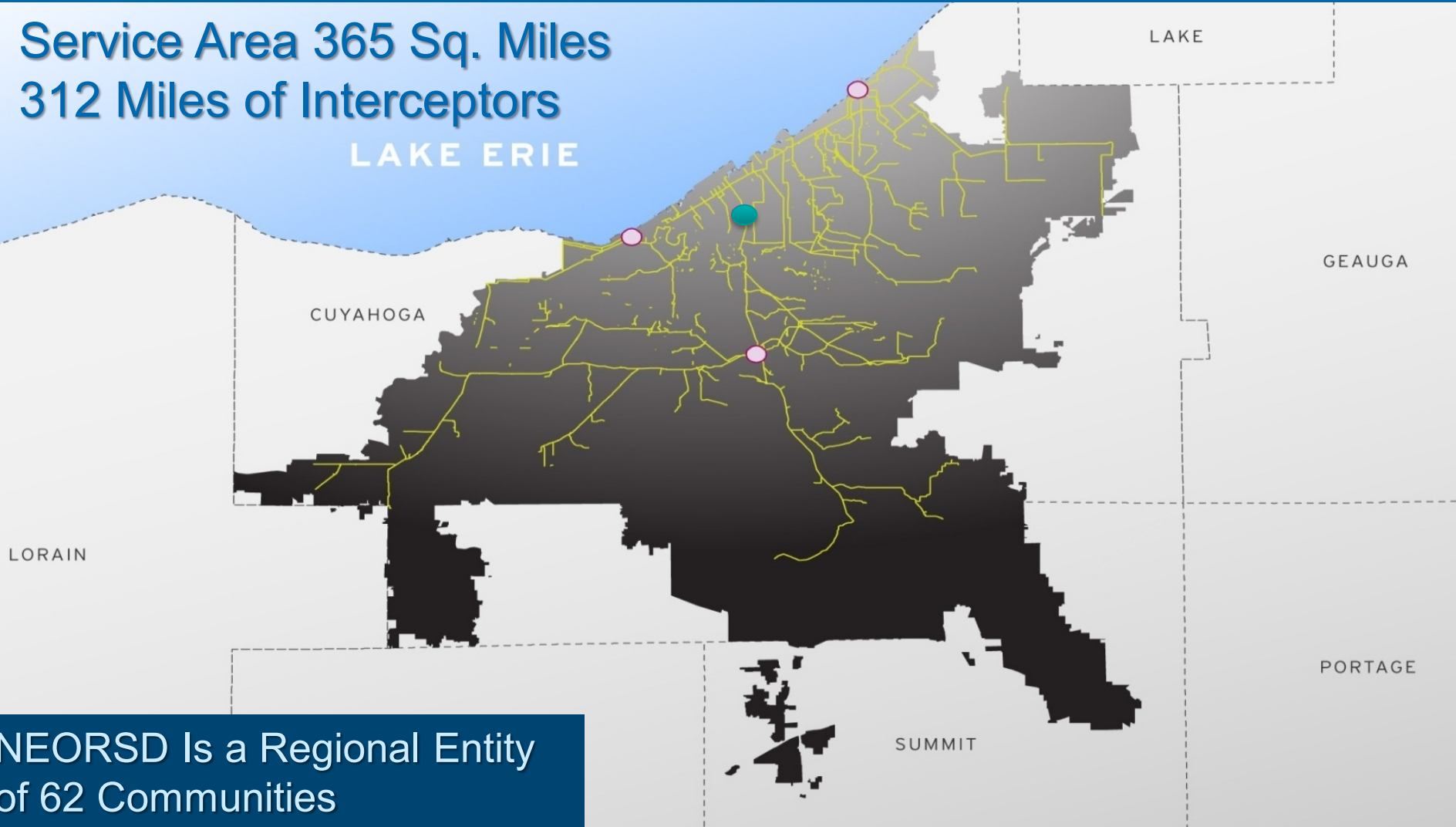
# NEORSD Long-Term Control Plan

- NEORSD planned modifications to the failing storm sewer on ArcelorMittal's property.



# NEORSD Interceptors and Treatment Facilities

Service Area 365 Sq. Miles  
312 Miles of Interceptors



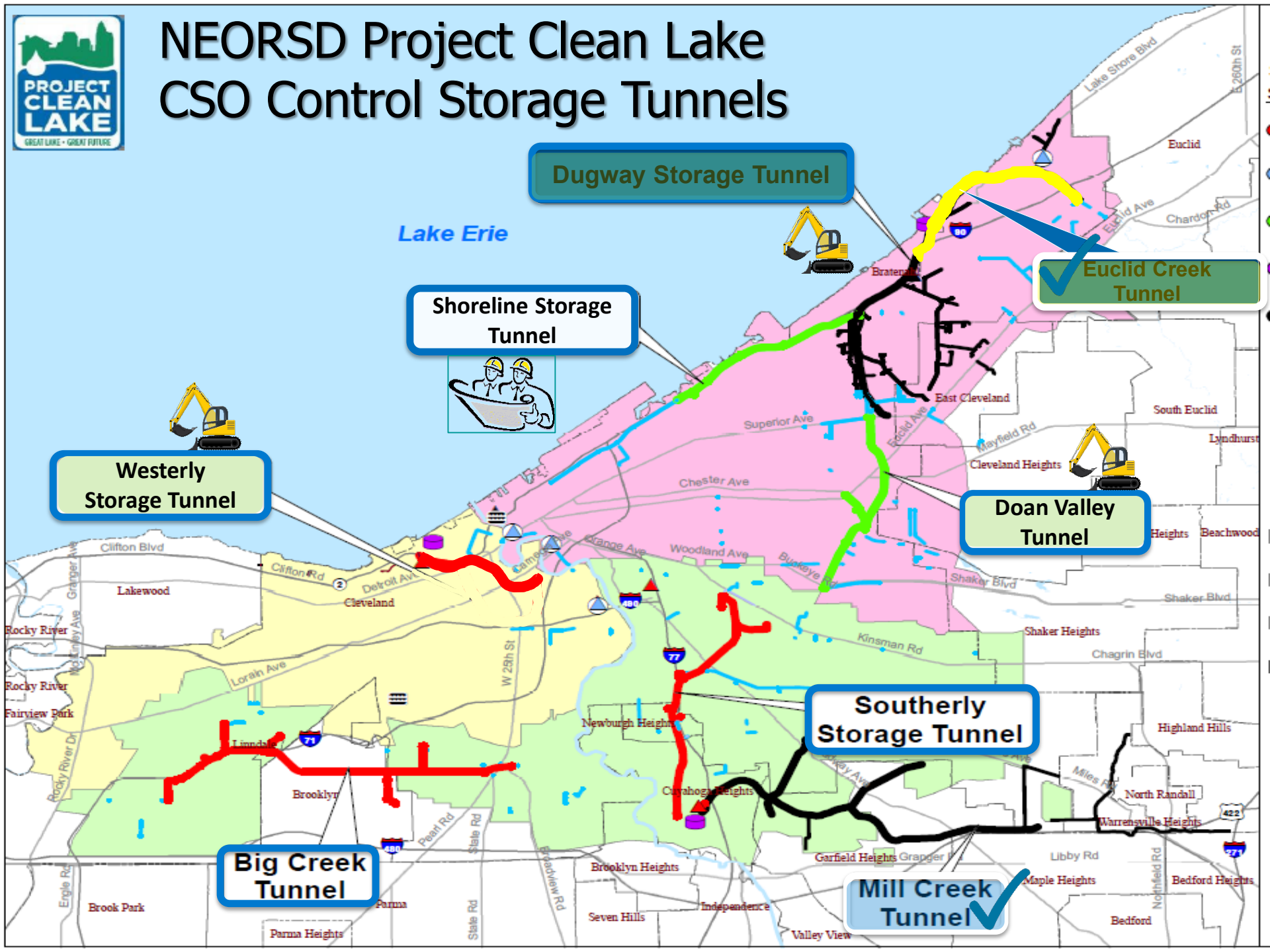
NEORSD Is a Regional Entity  
of 62 Communities



- District Service Area
- Treatment Plant
- ⋯ County Boundary
- District Sewer



# NEORSD Project Clean Lake CSO Control Storage Tunnels



**Dugway Storage Tunnel**

**Euclid Creek Tunnel** ✓

**Shoreline Storage Tunnel**



**Doan Valley Tunnel**

**Westerly Storage Tunnel**

**Southerly Storage Tunnel**

**Big Creek Tunnel**

**Mill Creek Tunnel** ✓

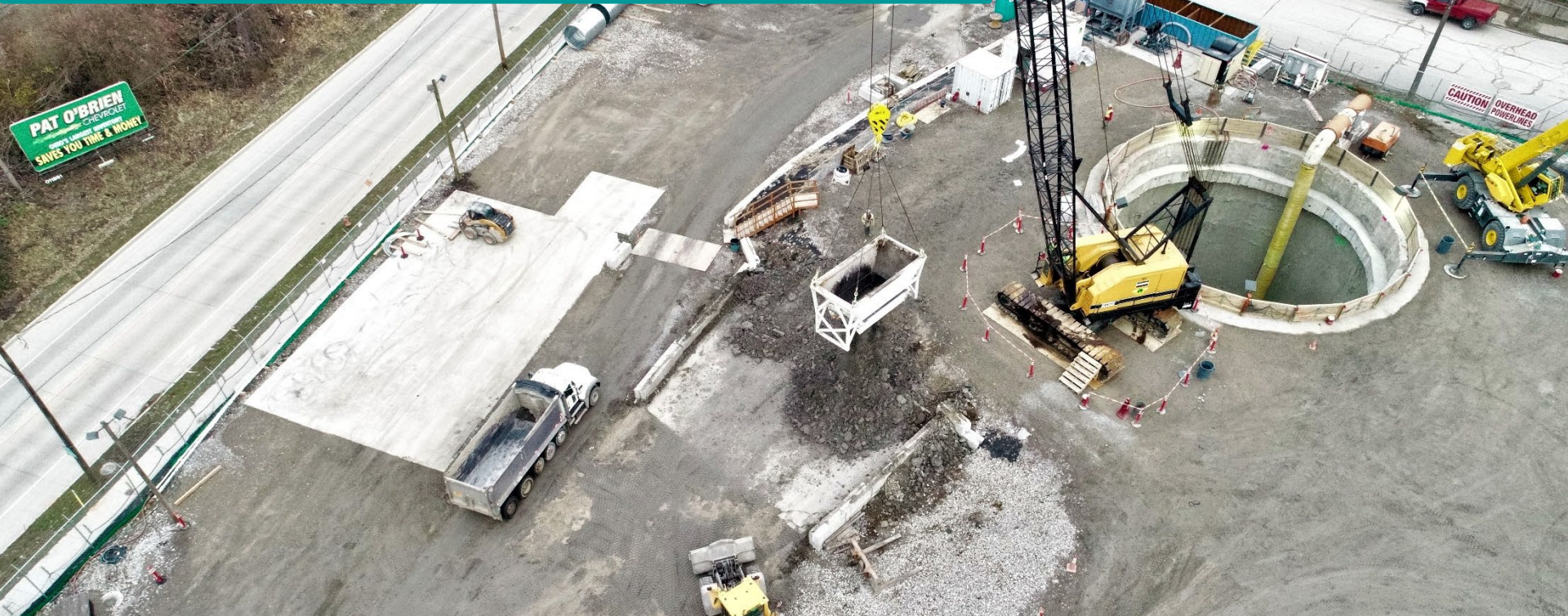


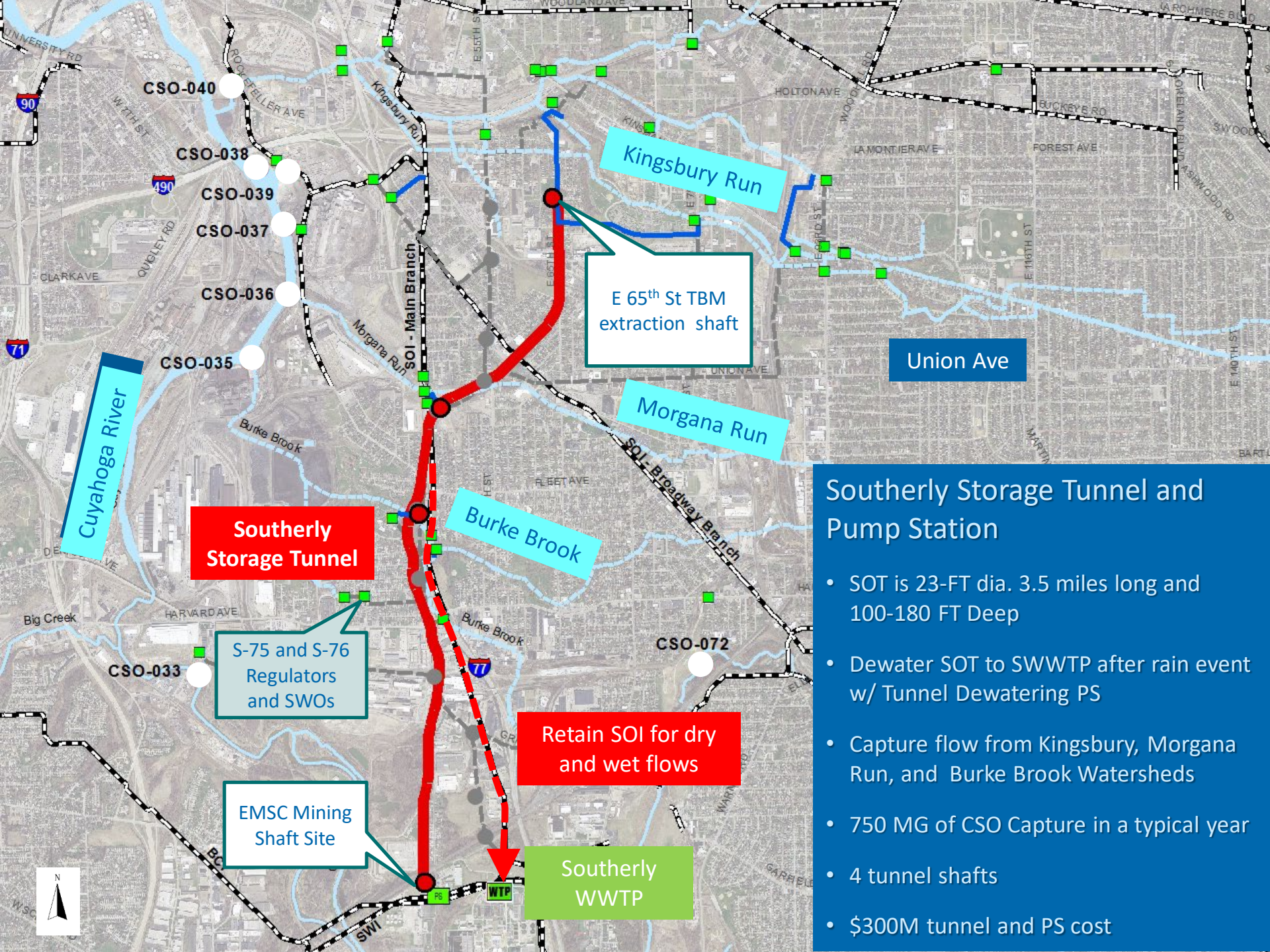
March 12, 2018



Dugway Storage Tunnel – Recently Completed

# Westerly Storage Tunnel Under Construction Slurry/Diaphragm wall Shaft





Kingsbury Run

E 65th St TBM extraction shaft

Union Ave

Morgana Run

Southerly Storage Tunnel

Burke Brook

S-75 and S-76 Regulators and SWOs

Retain SOI for dry and wet flows

EMSC Mining Shaft Site

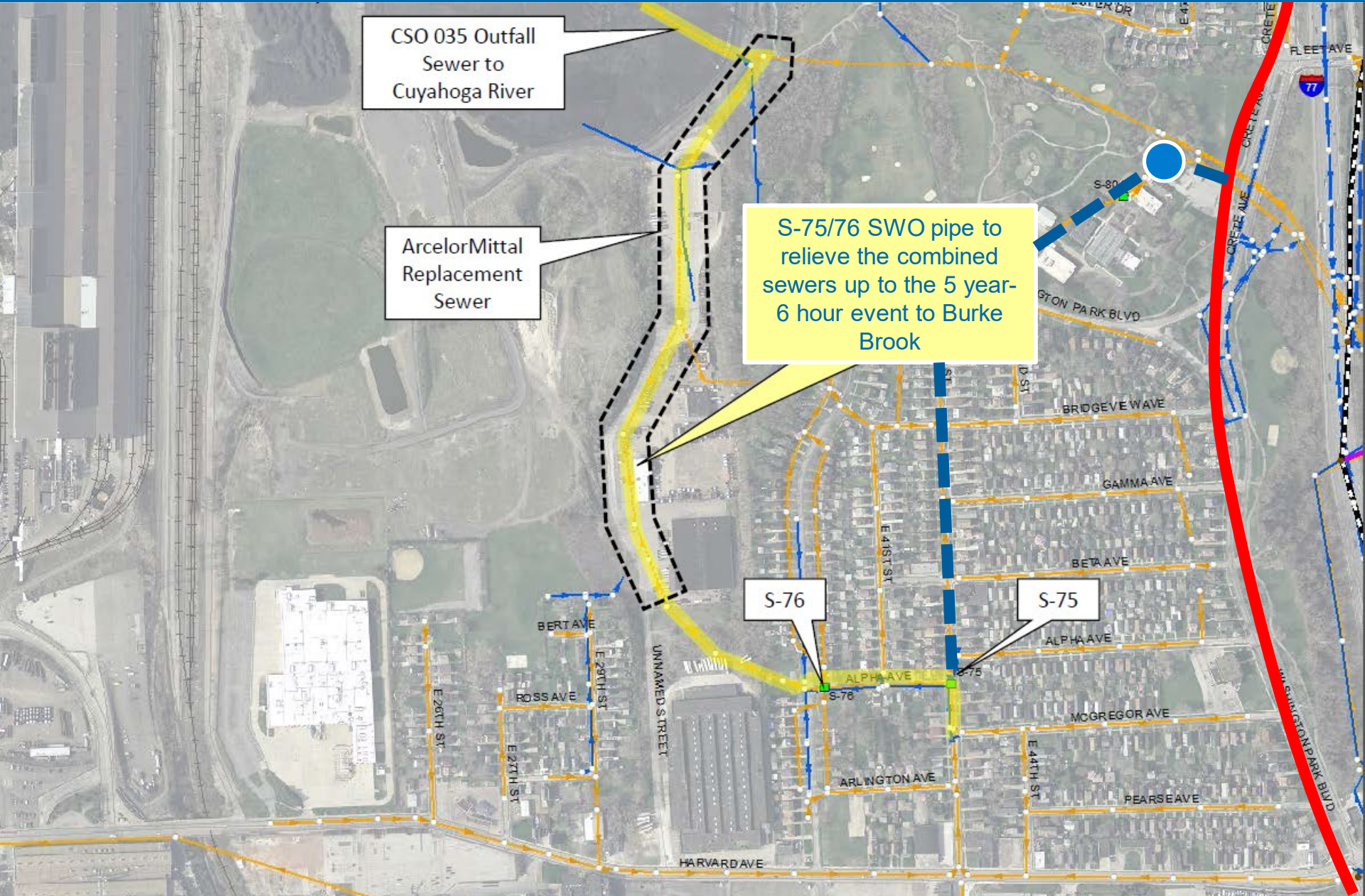
Southerly WWTW

## Southerly Storage Tunnel and Pump Station

- SOT is 23-FT dia. 3.5 miles long and 100-180 FT Deep
- Dewater SOT to SWWTP after rain event w/ Tunnel Dewatering PS
- Capture flow from Kingsbury, Morgana Run, and Burke Brook Watersheds
- 750 MG of CSO Capture in a typical year
- 4 tunnel shafts
- \$300M tunnel and PS cost



# Southerly Storage Tunnel and Pump Station Shaft 2 Flow Connection for Burke Brook



CSO 035 Outfall Sewer to Cuyahoga River

ArcelorMittal Replacement Sewer

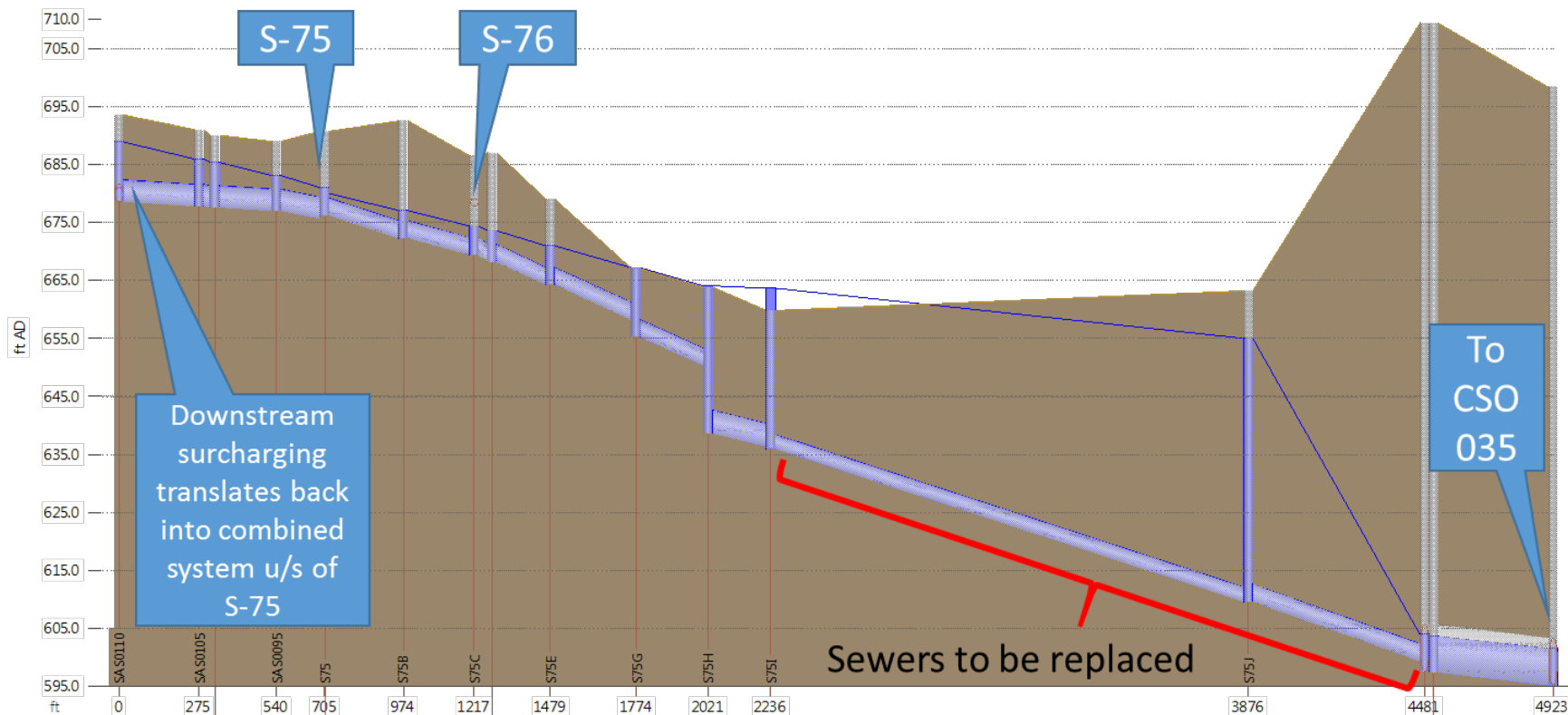
S-75/S-76 SWO pipe to relieve the combined sewers up to the 5 year-6 hour event to Burke Brook

S-76

S-75

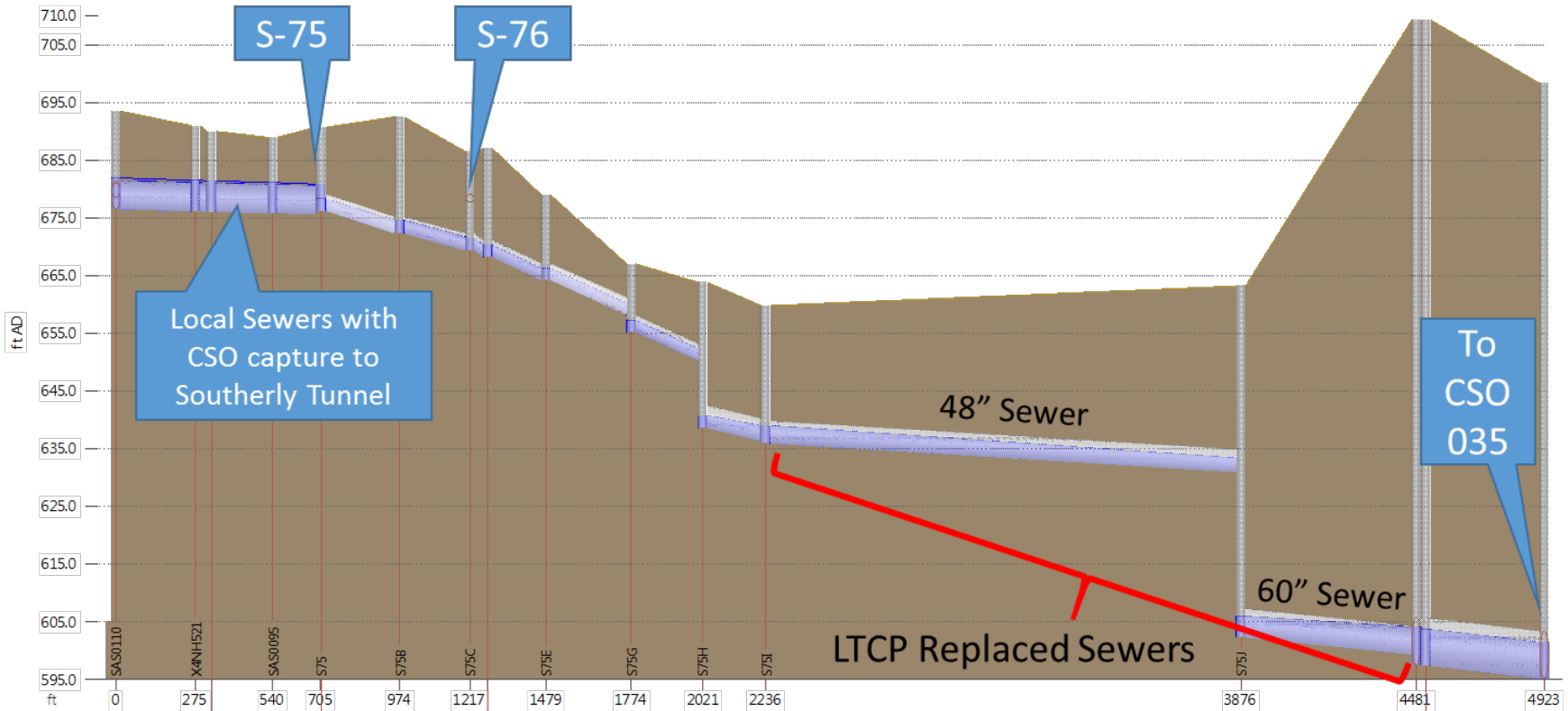


# Previous Conditions – 5-yr, 6-hr S-75 SWO Profile



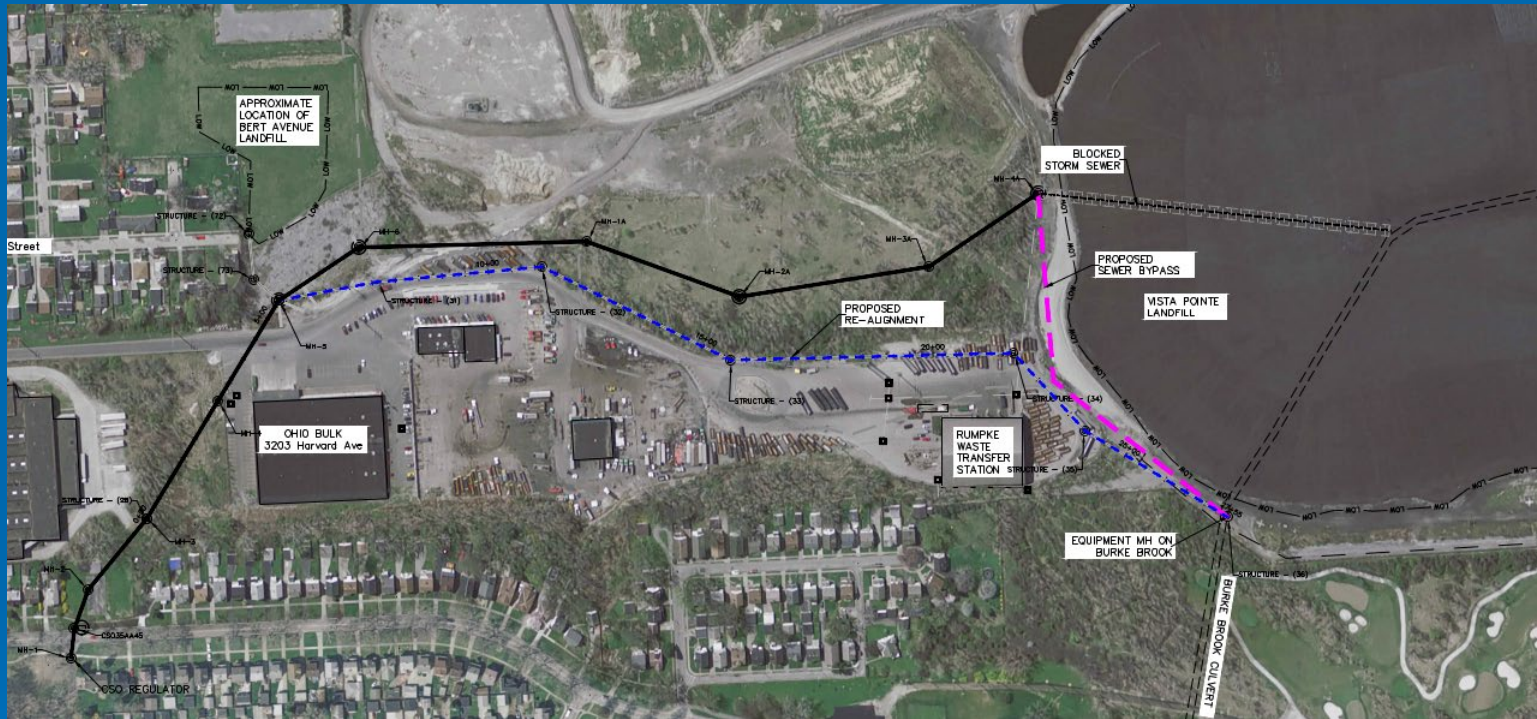
Link	SAS0110.1	-	-	S75WF.1	S75B.1	-	S75D.1	S75E.1	S75G.1	S75H.1	S75I.1	S75J.1	UA00030.1
length (ft)	275.1	210.0	165.0	268.9	243.2	200.0	295.0	247.0	215.4	1640.0	604.8	409.3	
height (in)	44.9	44.9	44.9	36.0	36.0	36.0	36.0	36.0	48.0	30.0	36.0	100.0	
us inv (ft AD)	678.600	677.600	676.150	672.288	668.200	664.200	655.200	638.630	635.900	609.600	609.600	597.370	
ds inv (ft AD)	677.800	677.000	672.288	669.370	664.200	658.200	650.260	636.300	609.600	599.330	595.110	595.110	
surc	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	0.77	
r.pfc (MGD)	22.135	21.939	44.778	40.928	52.841	53.287	52.841	83.691	29.099	30.430	763.240	626.04987	
DS flow (MGD)	42.32057	38.70428	39.20917	10.052	12.277	42.26803	11.786	9.065	36.21144	67.73199	14.230	14.369	
DS velocity (ft/s)	7.344	7.402	8.079	10.185	12.277	19.510	11.786	9.065	10.561	14.230	14.369	14.369	
Node				S75B		S75E	S75G	S75H	S75I		S75J	UA00032	
flood dep (ft)				-15.429		-8.024	0.167	0.276	3.864		-8.175	-105.347	

# Proposed Conditions – 5-yr, 6-hr S-75 SWO Profile



Link	SAS0110.1	-	-	S75WF.1	S75B.1	-	S75D.1	S75E.1	S75G.1	S75H.1		S75I.1		S75J.1	UA00030.1
length (ft)	275.1	-	210.0	165.0	268.9	243.2	200.0	295.0	247.0	215.4		1640.0		604.8	409.3
height (in)	60.0	-	60.0	60.0	36.0	36.0	36.0	36.0	36.0	48.0		48.0		60.0	100.0
us inv (ft AD)	676.480	-	676.070	-	676.150	672.288	668.200	664.200	655.200	638.630		635.900		602.354	597.370
ds inv (ft AD)	676.140	-	675.810	-	672.288	669.370	664.200	658.200	650.260	636.300		630.980		599.330	595.110
surc	2.00	-	2.00	2.00	0.79	0.79	0.69	0.68	0.69	0.68		0.78		0.96	0.77
r.pfc (MGD)	51.291	-	51.337	-	44.778	40.928	52.841	53.287	52.841	83.691		44.074		103.166	763.209
DS flow (MGD)	55.58543	-	-	-	38.60441	39.06742	-	42.50169	42.43675	-		41.37867		91.31767	648.20166
DS velocity (ft/s)	4.246	-	4.272	4.562	10.060	10.184	12.838	12.945	12.838	7.515		8.052		9.891	14.921
Node	-	-	-	-	S75B	-	S75E	S75G	S75H	S75I		S75J		UA00032	-
flood dep (ft)	-	-	-	-	-17.854	-	-12.756	-9.739	-23.081	-20.765		-57.207		-105.186	-

# ArcelorMittal and NEORSD Private Partnership

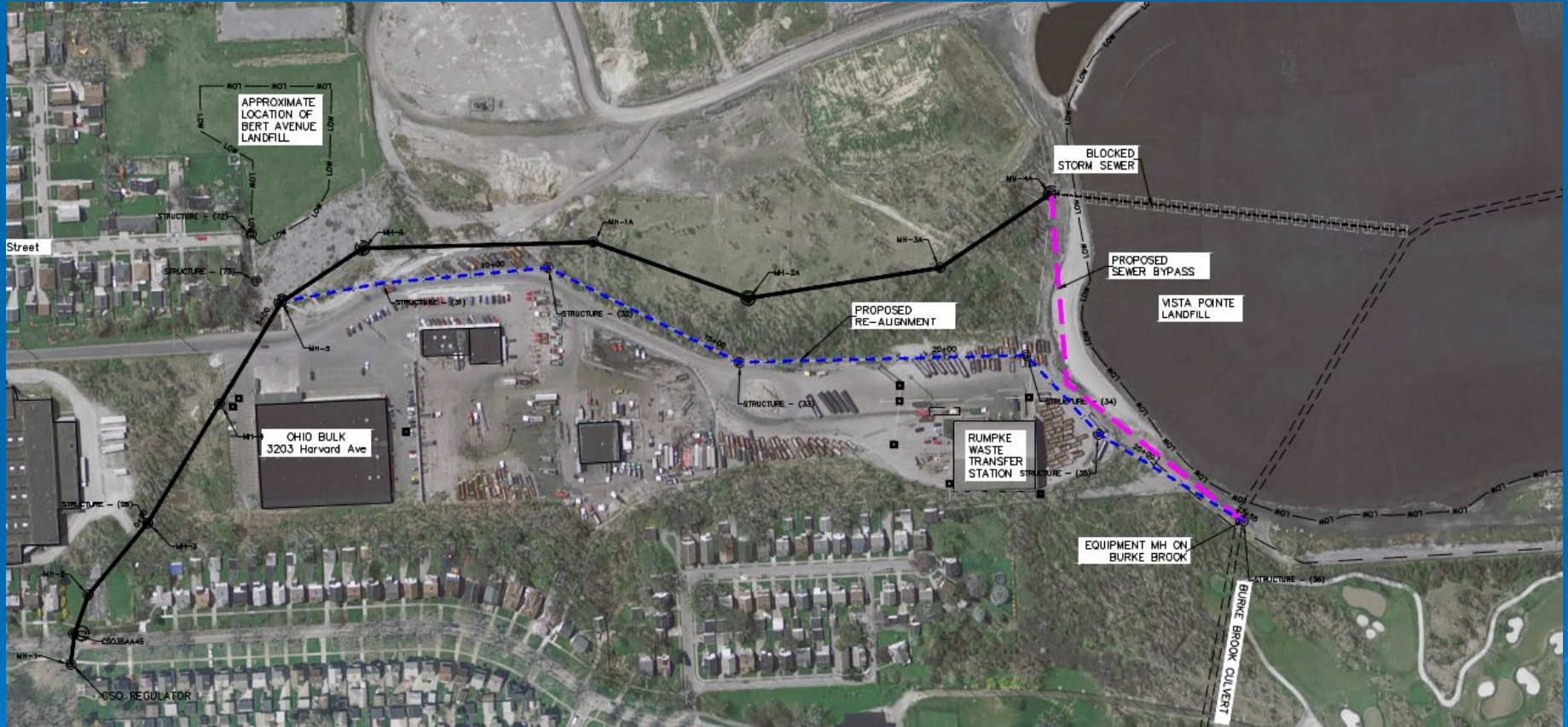


- ArcelorMittal approached NEORSD with Stormwater Outlet issues and potential shared project approach
- Sewer repair options were presented to NEORSD

# NEORSD/Private Partnership

- NEORSD's LTCP included an increased sewer system in this location by 2030 with funds reserved.
- ArcelorMittal provided a sewer repair option which included a 2,000LF sewer installation with a possibility of a pipe upsized if NEORSD would enter into a partnership
- Following the initial investigation, NEORSD gained board approval to enter into agreement with ArcelorMittal with AECOM providing the design services

# Public Private Partnership Benefits



# Public Private Partnership Benefits

## ArcelorMittal

- Reduced Cost
- NEORSD input during design
- Complete sewer replacement
- Transfer ownership to NEORSD

## NEORSD

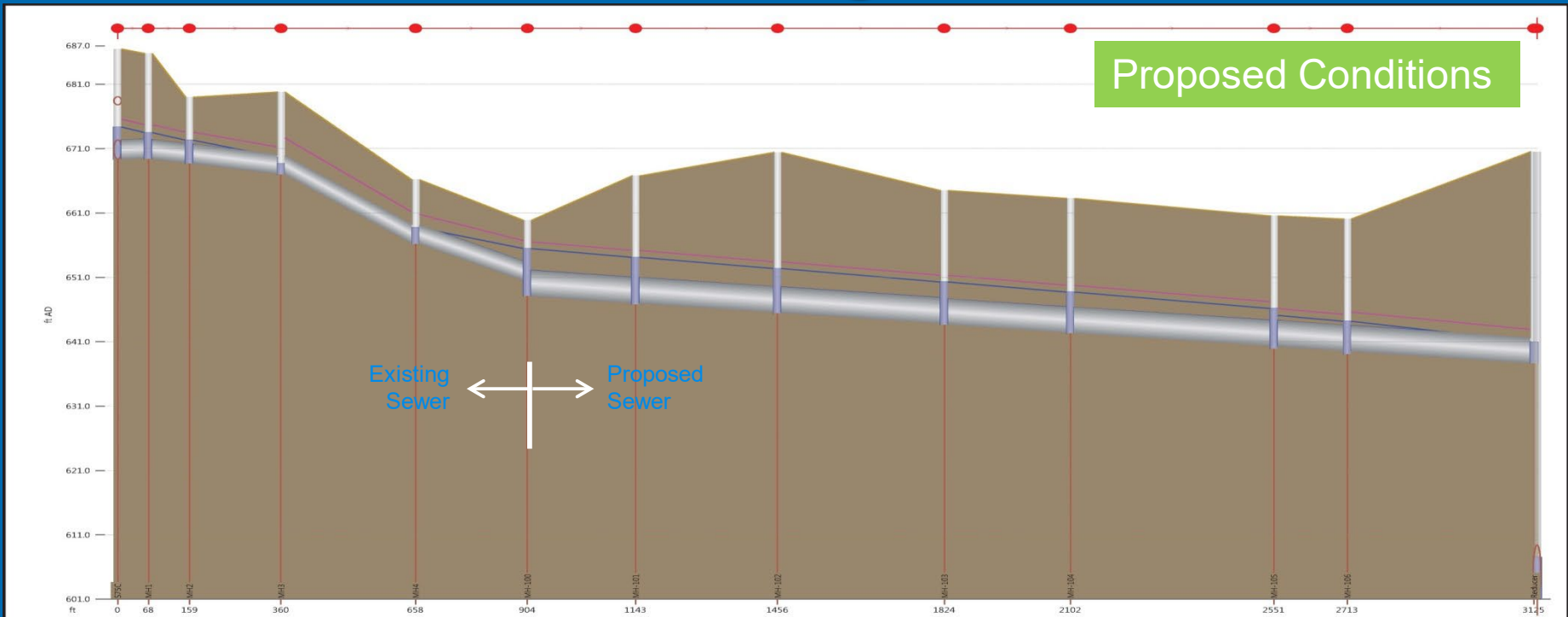
- Reduced Cost (cost sharing & reduced inflation)
- Managed by ArcelorMittal
- Preliminary work performed prior to cooperation agreement
- Project completed ahead of schedule
- Value Engineering

# Design



- Numerous iterations balancing pipe size, slope, and material to minimize flooding.

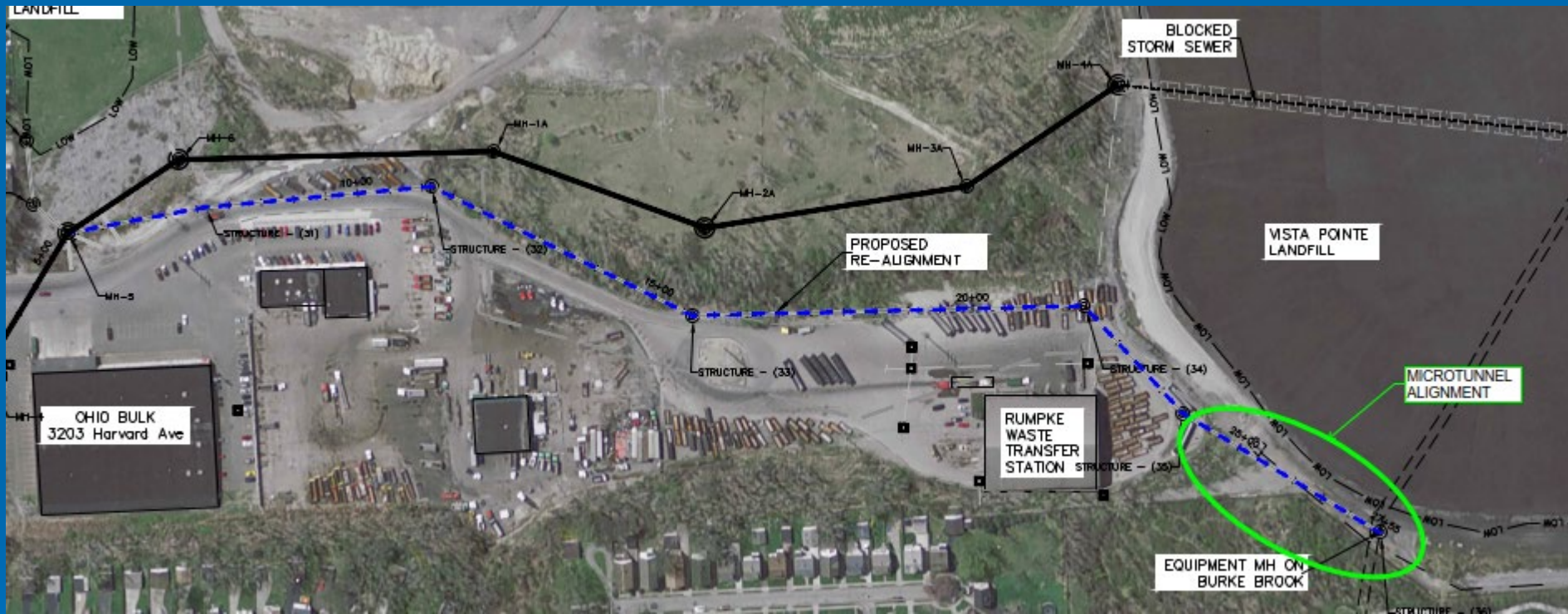
# Design



- Numerous iterations balancing pipe size, slope, and material to minimize flooding.



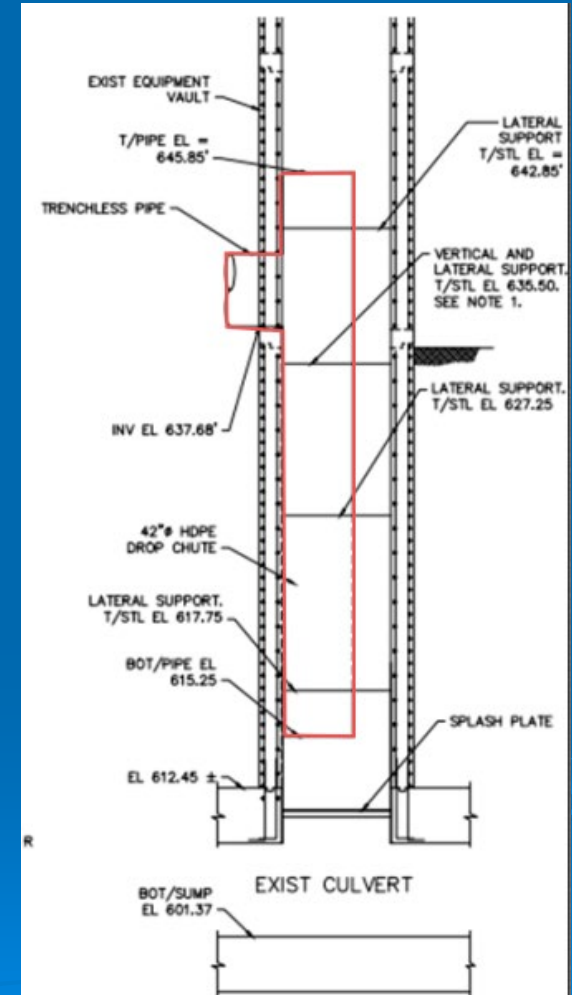
# Design



- Final alignment was 48-inch reinforced concrete pipe (Tunnel) and 48-inch polypropylene pipe (open cut) for a total alignment over 2,000 feet in length
- Open-cut and trenchless construction

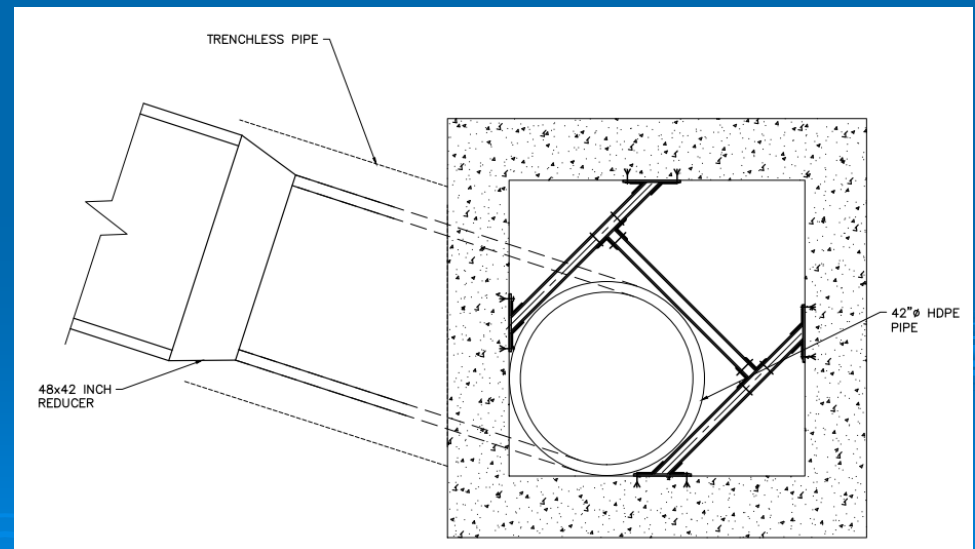
# Existing Equipment Vault

- Moved Burke Brook tie-in point
- Connecting to existing equipment vault
- Flow drop approximately 40 feet



# Existing Equipment Vault

- Flow Drop was a 42-inch HPDE pipe and was installed vertically into the Equipment Vault.
- Design included stainless steel supports to hang the HDPE pipe and handle the hydraulic forces associated with expected flows during rain events



# Bidding

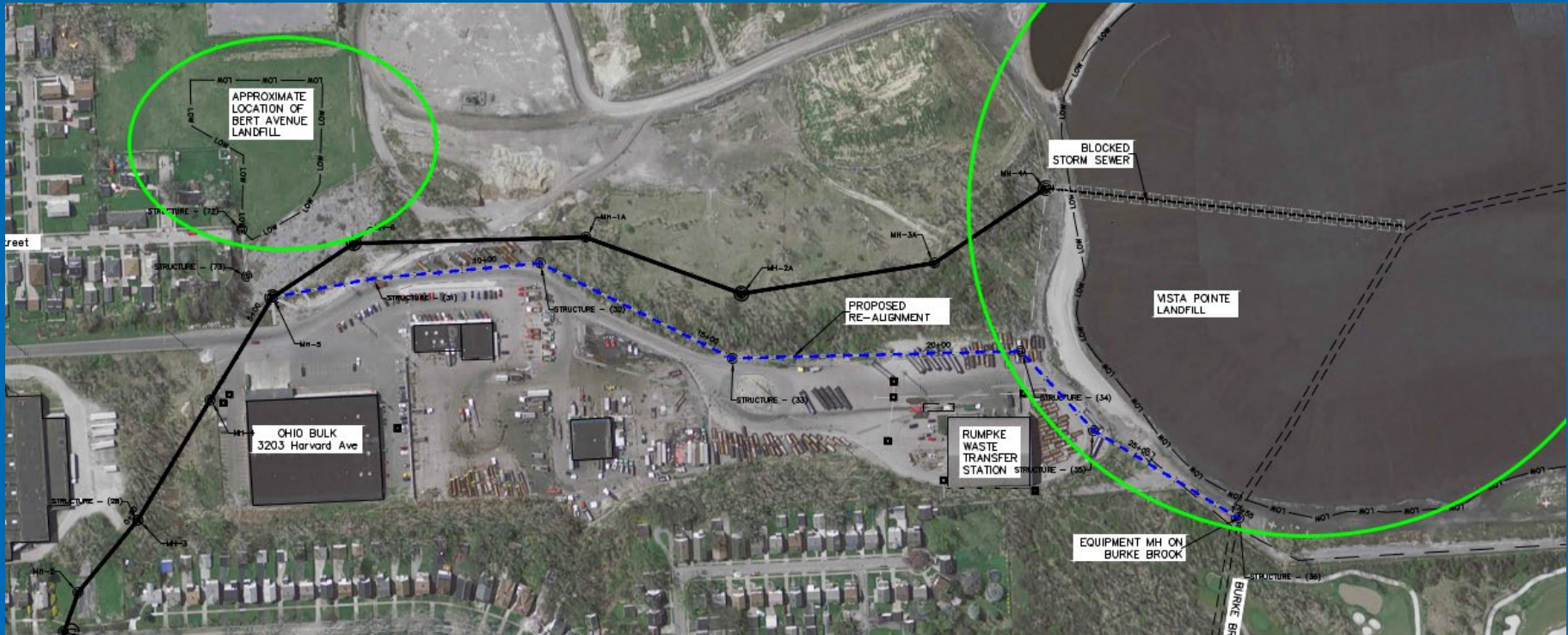
Tunneling Bid Costs	Hand Mine Bids (\$)	Microtunnel Bids (\$)
<b>EOPCC</b>	1,237,391	1,418,666
<b>Contractor #1</b>	1,750,000	
<b>Contractor #2</b>	1,775,152	
<b>Contractor #3</b>		875,825
<b>Contractor #4</b>		2,349,708

- **Contractor #3 selected**
  - Independence Excavating with Ward & Burke Tunneling performing the trenchless install.

# Sunken Caisson Method of Shaft Construction



# Environmental

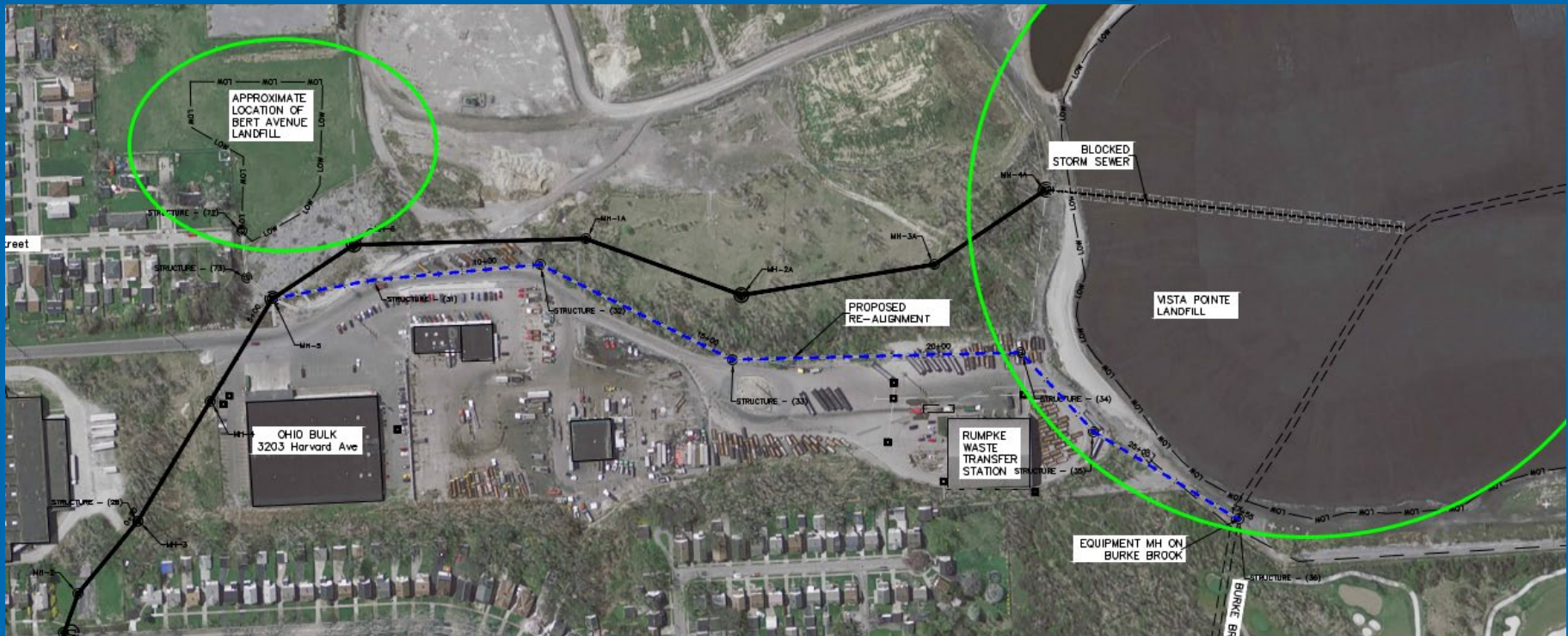


- Alignment adjacent to 2 landfills
- Potential groundwater contamination along alignment

# Environmental – Groundwater Treatment



# Geotechnical Investigation



- AECOM completed the geotechnical investigation for the open cut and the tunnel installation
- The investigation included 16 Borings and 3 Monitoring Wells



# Construction Photos



# Construction Photos



# Construction Photos



# Construction Photos



## AVN 1200 TBM Installation

# Construction Photos



# Construction Photos



# Construction Photos



# Construction Photos





# Construction Photos



# Construction Photos



# Construction Photos



# Construction Photos



# Construction Photos



# Conclusion

- The total project costs were approximately \$3.5M. This represented an approximate savings of \$3.7M projected in the NEORSD Long Term Control Plan.
- Overall great partnership to save rate payers funds and achieved the level of service required by the Long Term Control Plan 10 years earlier than planned.
- ArcelorMittal and NEORSD accomplished the following goals with their partnership:
  - Reduced costs
  - Greater efficiency
  - An upsized sewer installation
  - Ownership transferred to NEORSD for future maintenance responsibilities

Thank you

Questions?