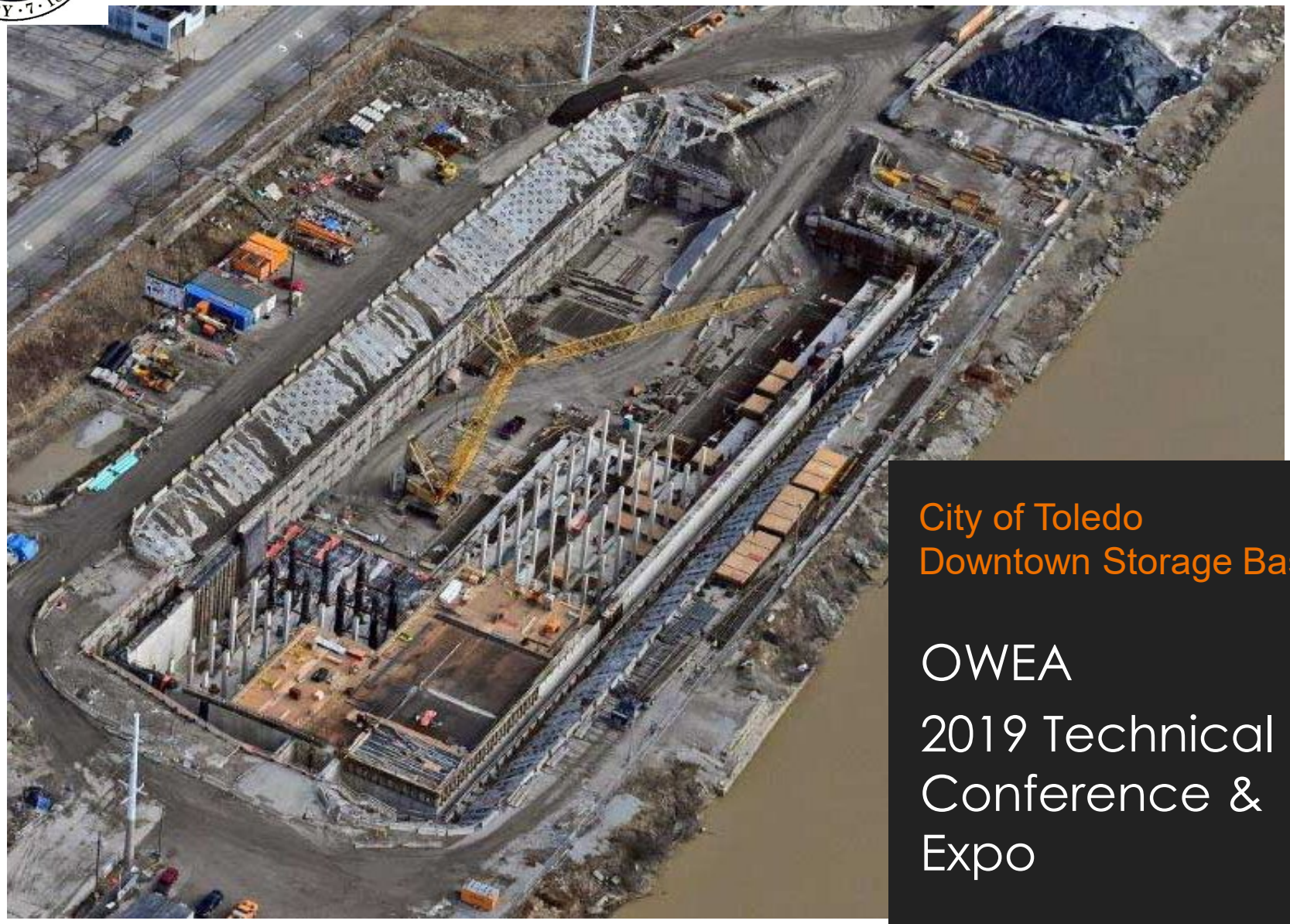
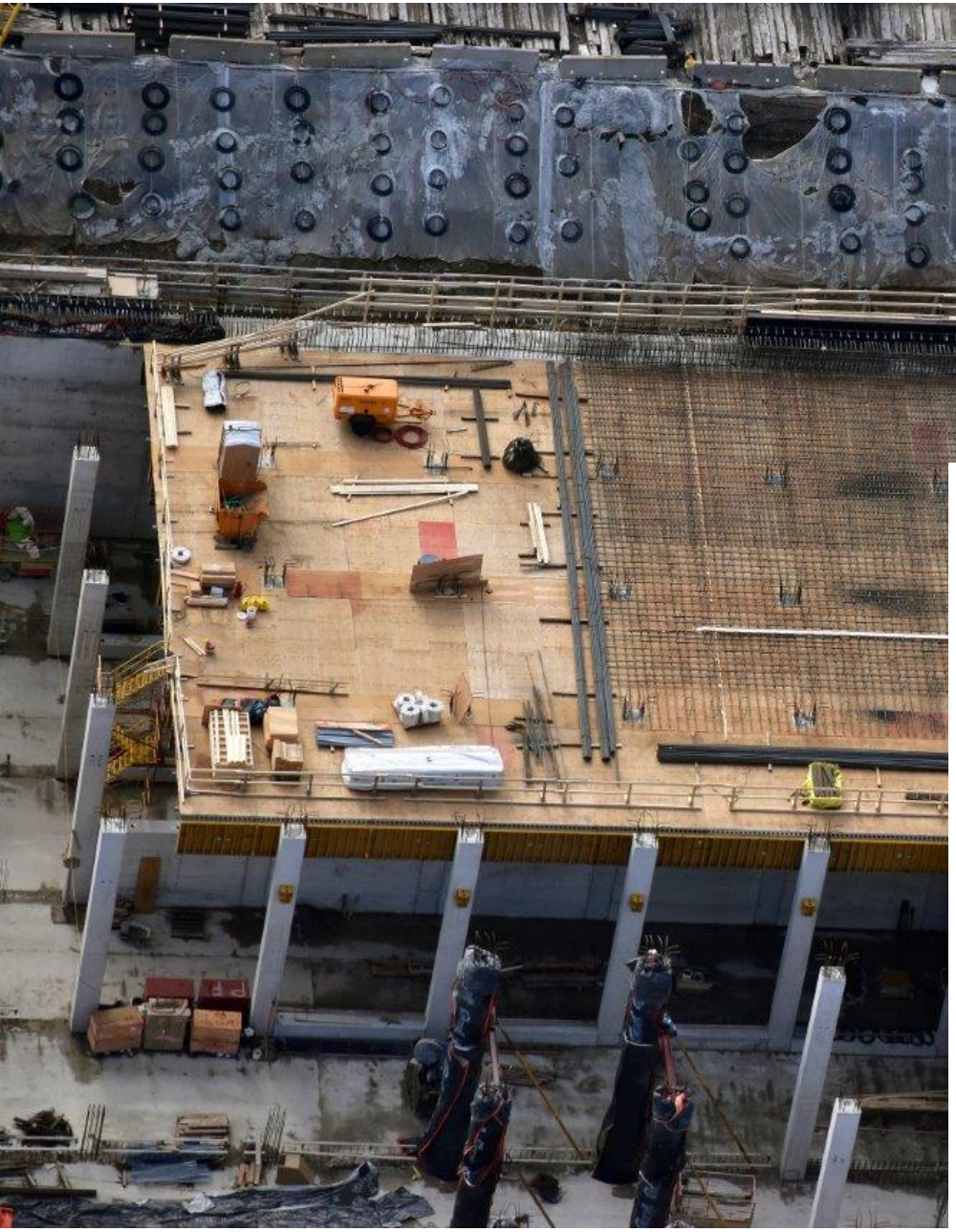


City of Toledo
Downtown Storage Basin

OWEA 2019 Technical Conference & Expo



Agenda

- Project Team
- TWI Background and Update
- Project Goals
- Preliminary Design
- Final Design
- Construction Progress
- Construction Challenges
- Conclusions

Project Team

- Owner – City of Toledo
- Program Manager – Black & Veatch
- Preliminary Design:
  - Prime Engineer/ SWMM Modeling – Tetra Tech
  - Geotechnical – TTL
  - Transient Modeling of Tunnel – Applied Science, Inc.
  - CFD Modeling – Black & Veatch
- Final Design:
  - Prime Engineer – Stantec
  - Electrical Engineer – DJE
  - Instrumentation & Control – SSOE
  - Survey – Garcia Surveyors & Northwest Consultants, Inc

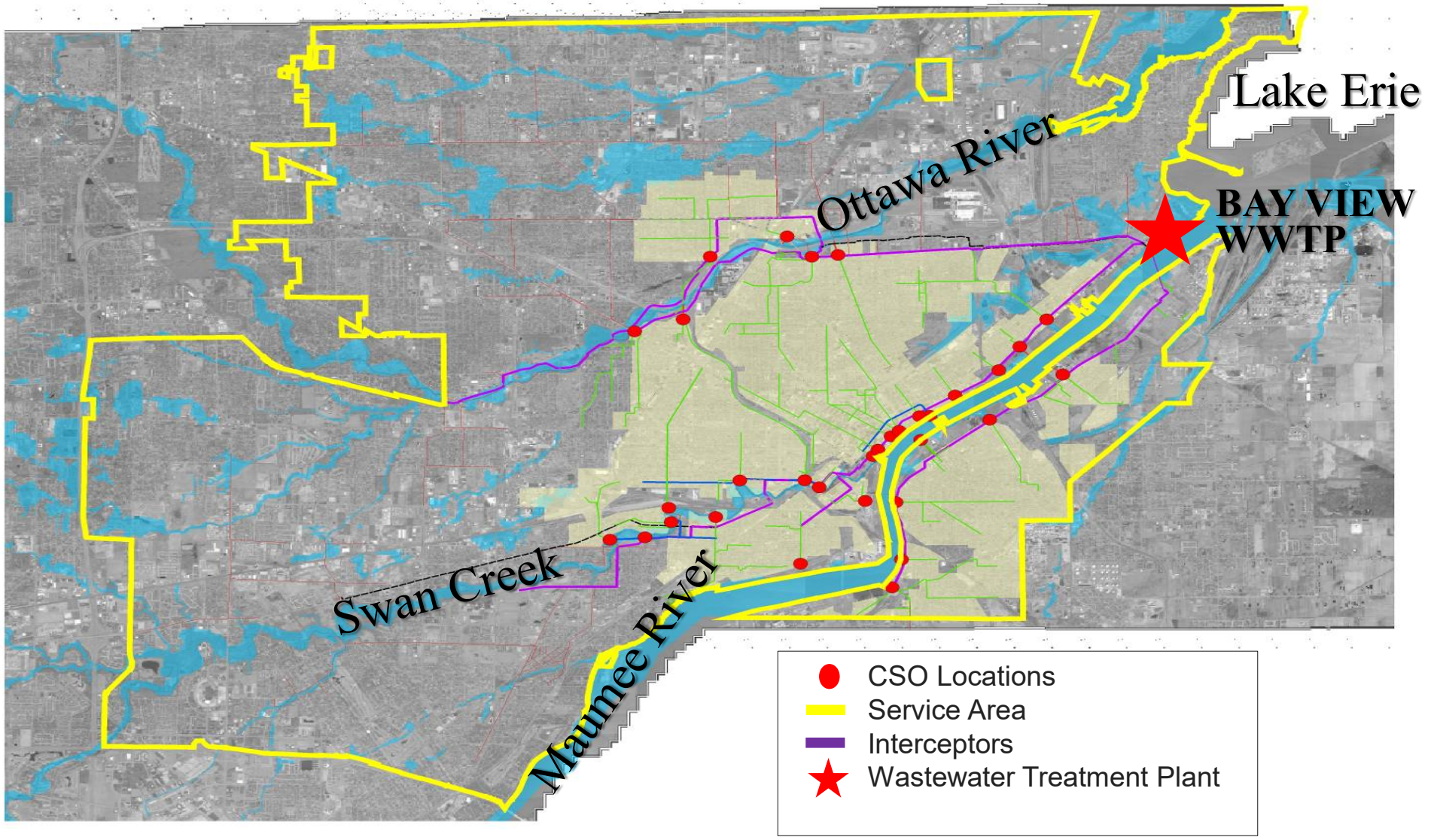
Project Team

- Construction:
  - Construction Manager – G. Stephens and Black & Veatch
  - Construction Engineering – Stantec
  - Prime Contractor – Kokosing Industrial
  - Electrical Contractor – Transtar Corporation
  - Tunneling Contractor – Turn Key Tunneling

TWI Background and Update – Program Background

- Toledo Waterways Initiative (TWI)
  - Federally mandated program to improve water quality
  - 18-year program at a total cost over $500 million
  - Three components in the program – Plant, SSDs, CSOs
- In 2002: 32 combined sewer overflow (CSO) locations discharging on average 624 MG per year
- In 2010: USEPA approved Toledo's plan to eliminate 8 CSO locations and significantly reduce CSO volumes
- Downtown Storage Basin (DSB) one of 25 CSO projects
  - Construction Contract = $44 million

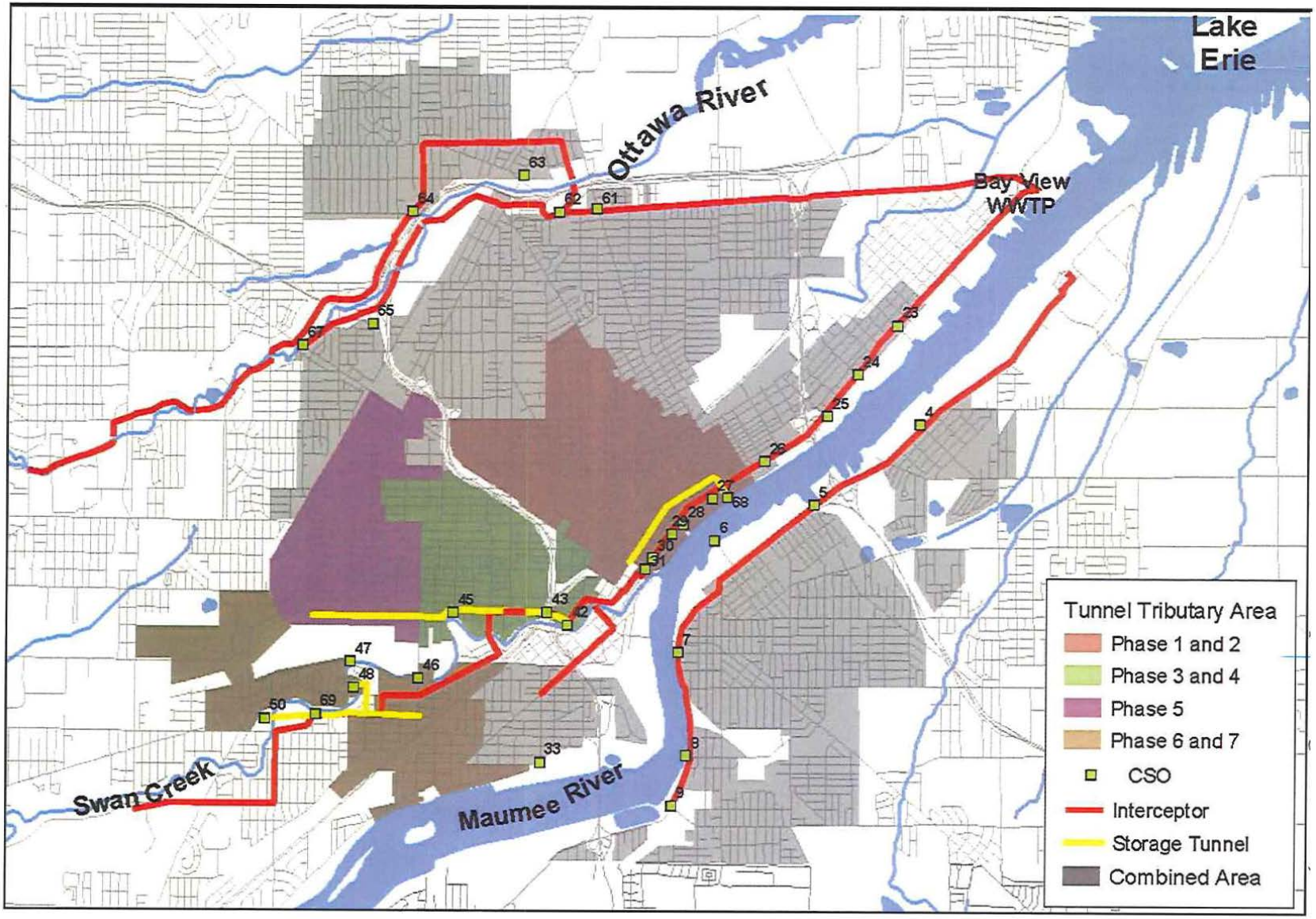
TWI Background and Update – Toledo Wastewater System



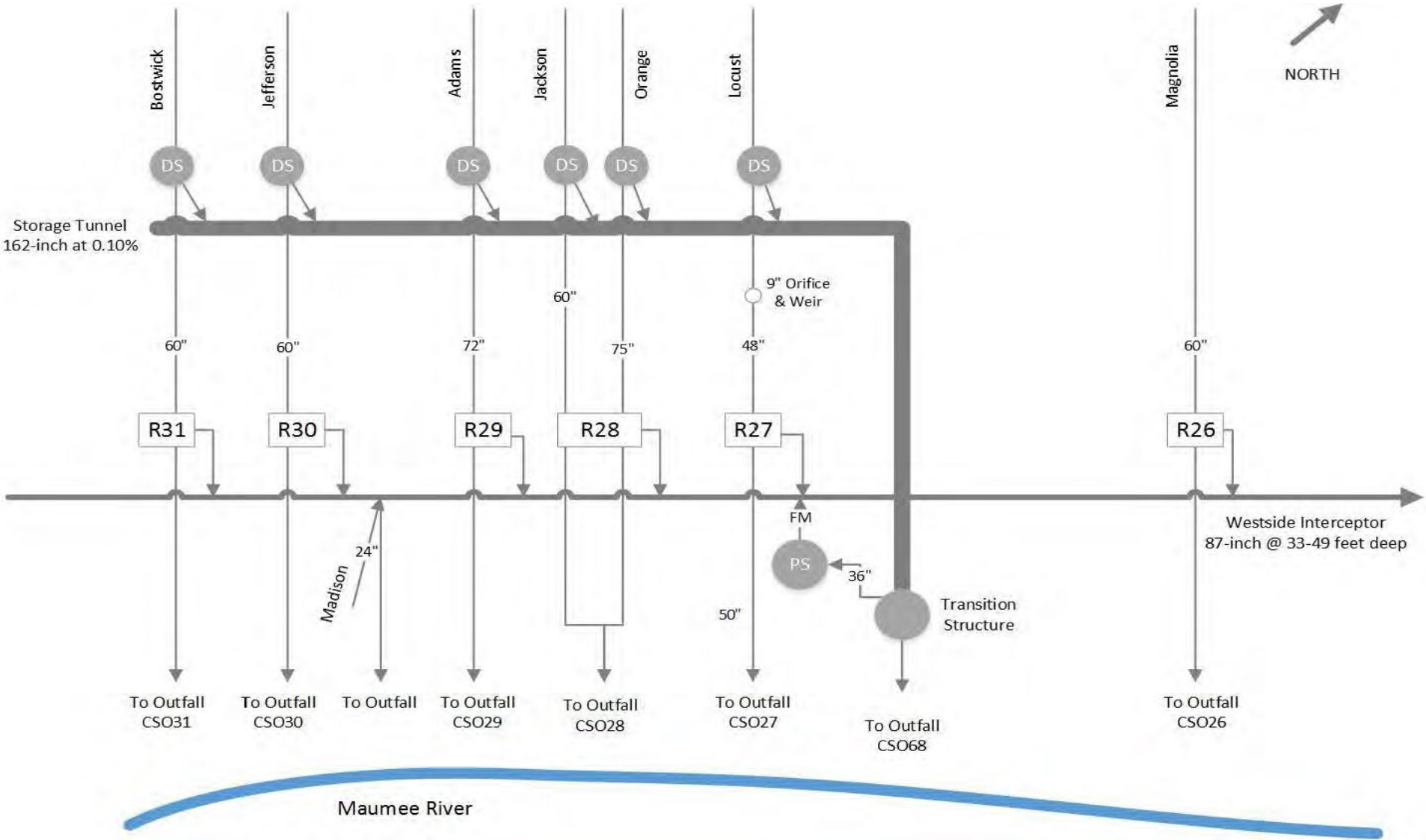
TWI Background and Update – Project History

- 1988-1993 – 3 CSO Storage Tunnels Constructed – Downtown Tunnel, Swan Creek North, Swan Creek South
- Downtown Tunnel (5.75 MG) installed as part of CSO Phases 1 & 2 to provide first flush flow storage for 6 combined sewer systems, dimensions 13.5' I.D., 5,374' L
- Long Term Control Plan (2009) – Improvements to Downtown Tunnel System
- Two Downtown Tunnel Projects – Tunnel Optimization, Downtown Storage Basin

TWI Background and Update – Tunnel Tributary Areas



TWI Background and Update – Tunnel Service Area & CSO Locations



Project Goals – CSO Reduction Goals (Overflow Statistics)

CSO Outfall	Pre-Construction Frequency, Overflows/Year	Volume, MG/Year	Peak Flow, CFS	Post-Construction Allowable Overflows/Year
26 – Magnolia	33.6	33.6	132	Eliminated
27 – Locust	29.6	26.2	130	3
28 – Orange/Locust	15.6	7.8	164	3
29 – Adams	14.2	7.7	121	3
30 – Jefferson	22	12.1	110	3
31 – Monroe	1.2	0.2	22	3
68 – Tunnel/ CSO1&2	16.8	144.7	529	3
Total	**34**	**232.3**	**1,210**	**3**

Preliminary Design – Recommendations

- 17 MG storage basin
- 108-inch connection from the Tunnel Transition Structure to the basin
- 72-inch connection from the Magnolia (CSO 26) outfall to the basin
- 48-inch connection from the Locust (CSO 27) outfall to the Tunnel Transition Structure
- Modifications to four existing tunnel drop shafts

Preliminary Design – CFD Modeling Recommendations

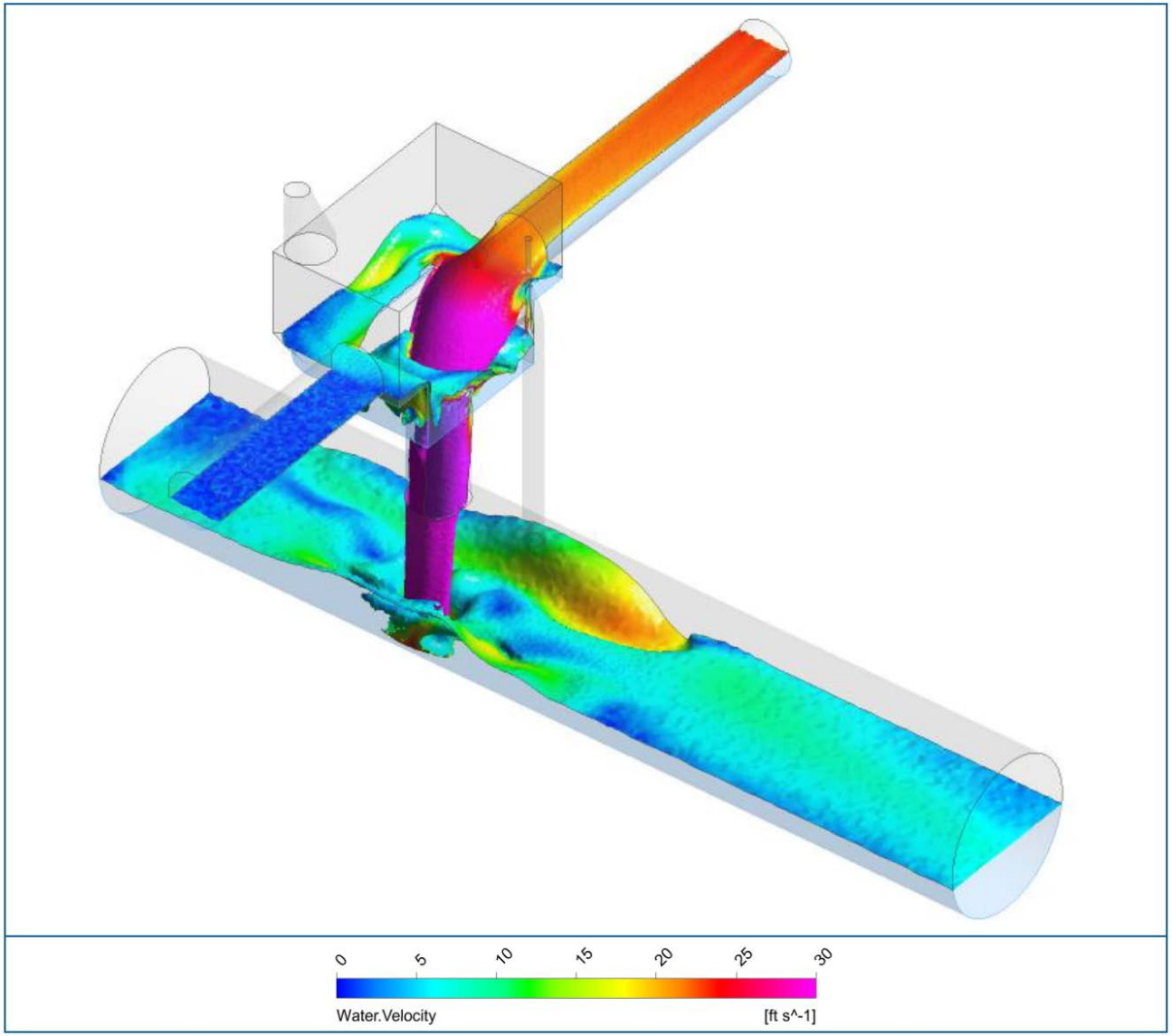
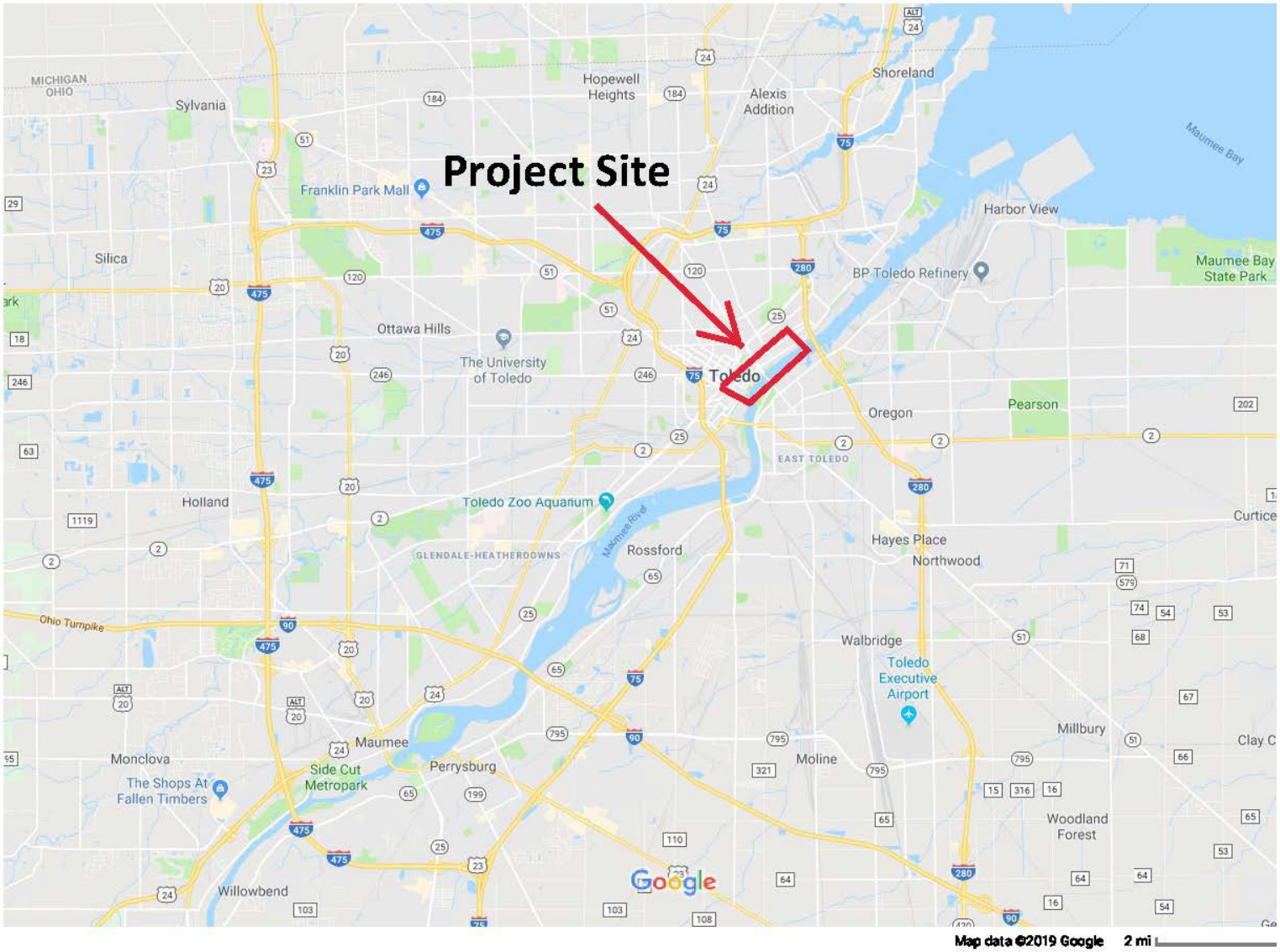
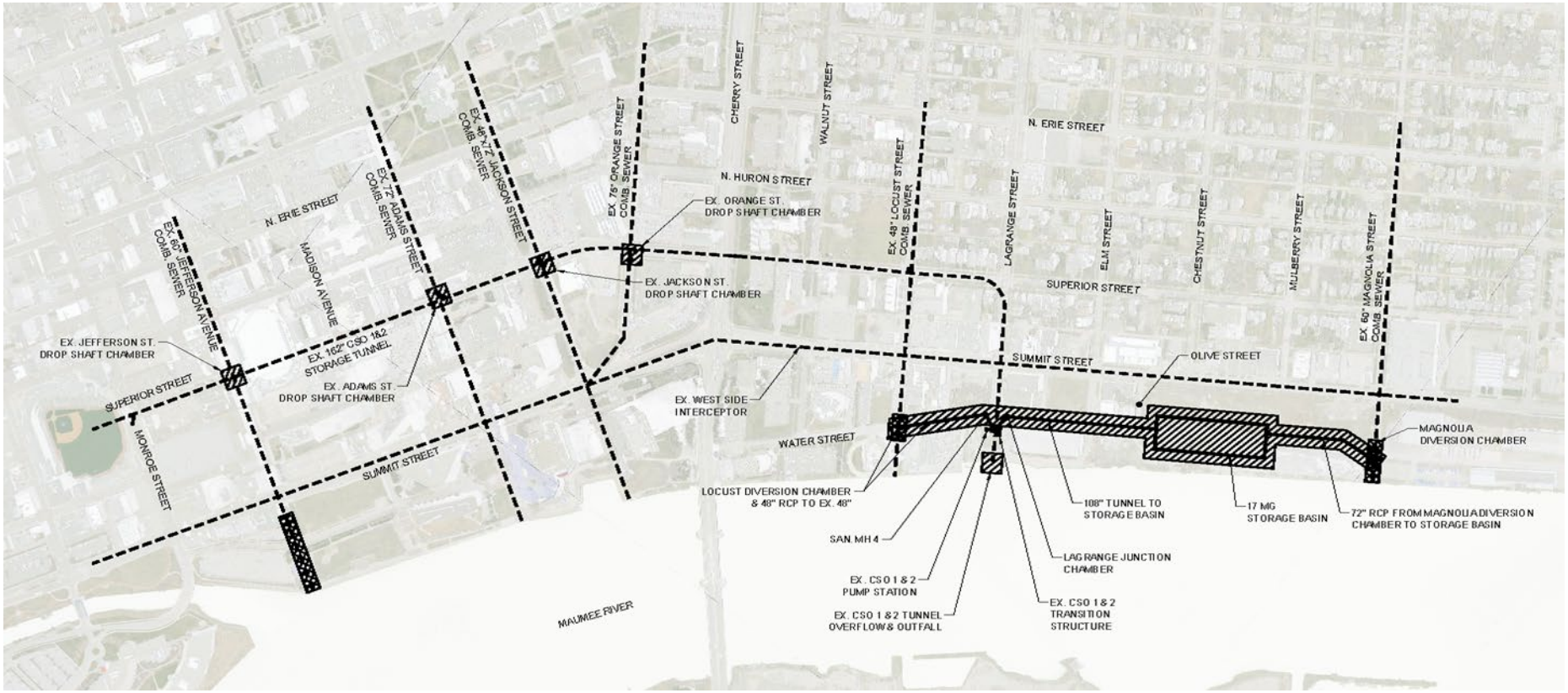


Figure 5.4. Jefferson Ave. modified layout model results - free surface coloured by water velocity

Final Design – Project Location

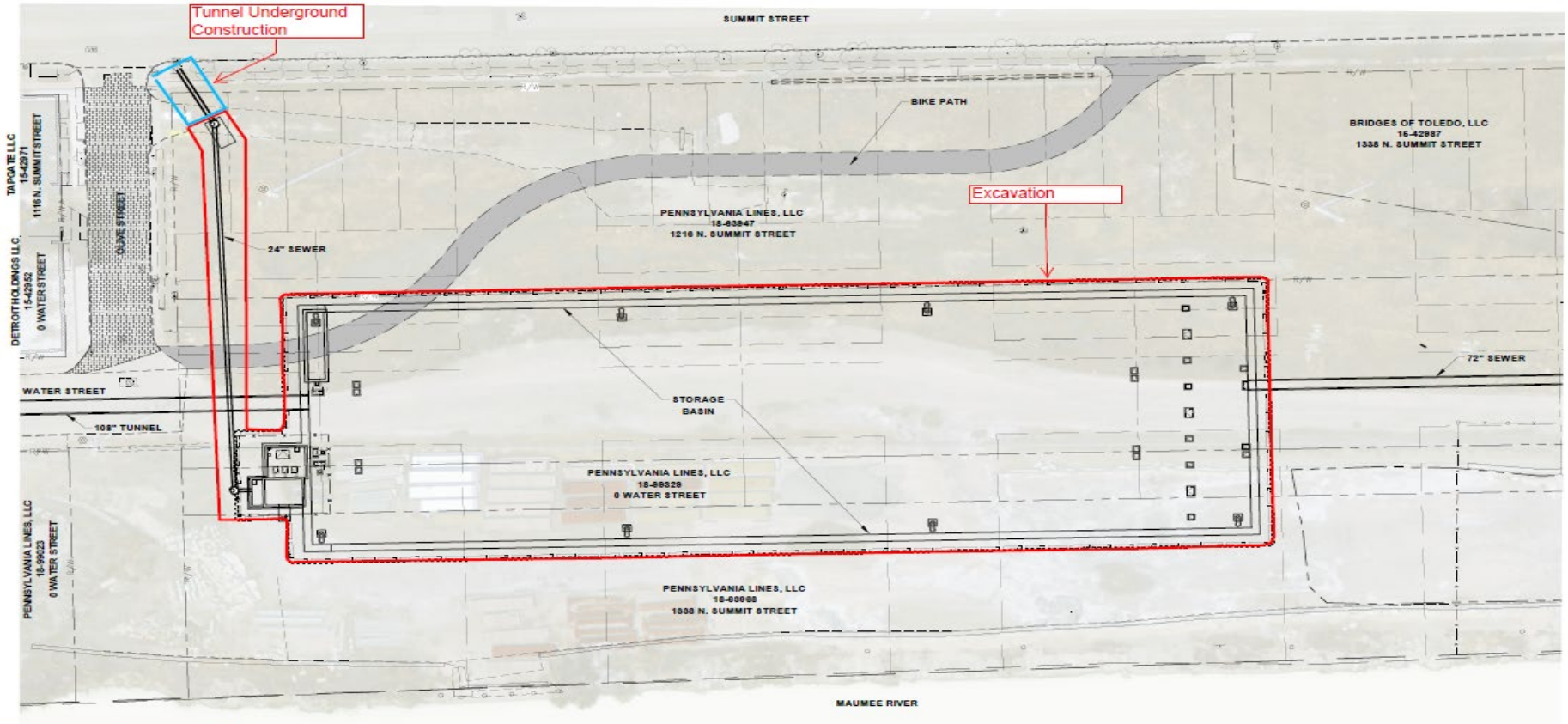


Final Design – Project Site



Final Design – Basin

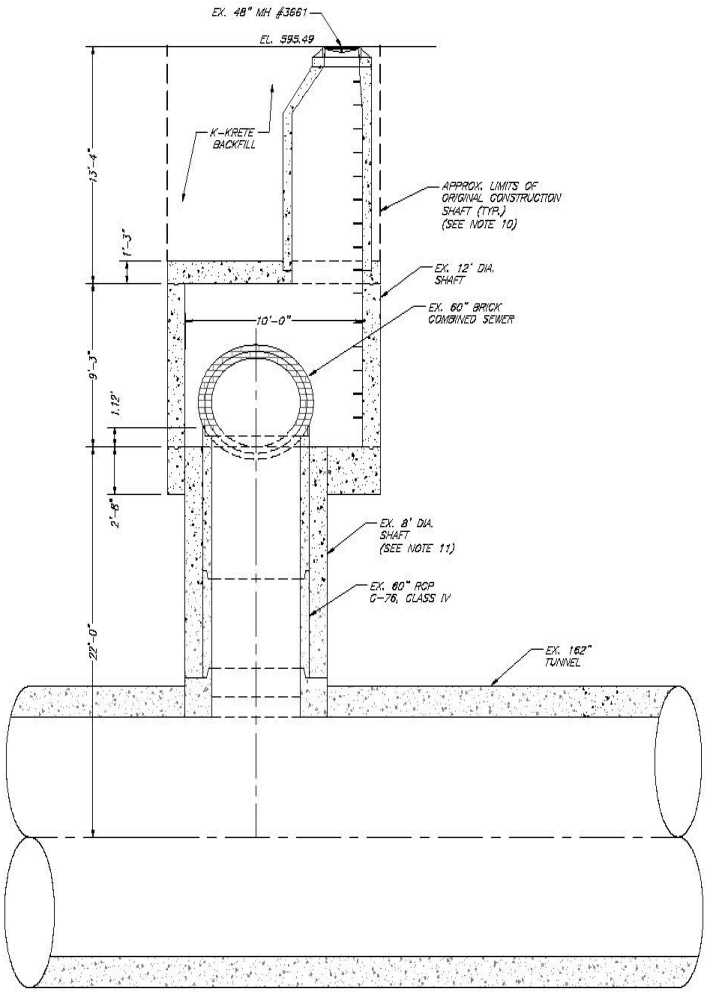
- Storage Basin and Bike Path
- Basin Dimensions 163'W x 552'L x 50'D



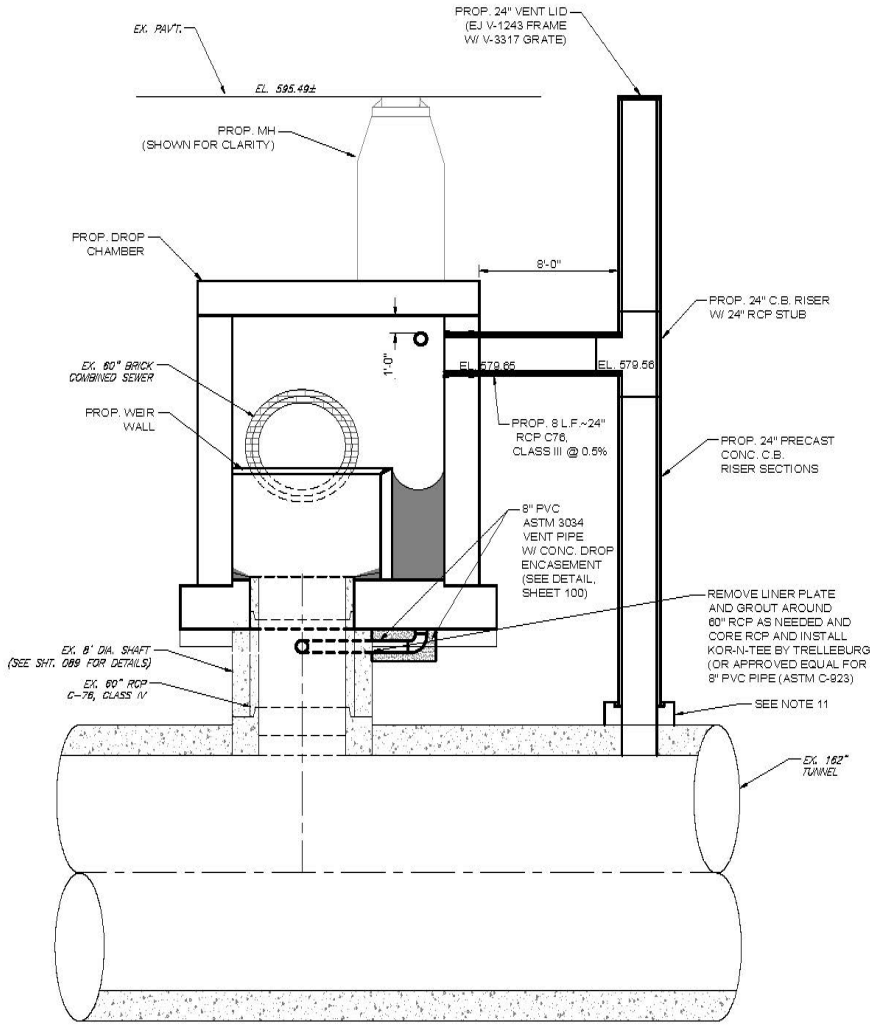
PRELIMINARY

STORAGE BASIN AND BIKE PATH

Final Design – Drop Shaft Structures

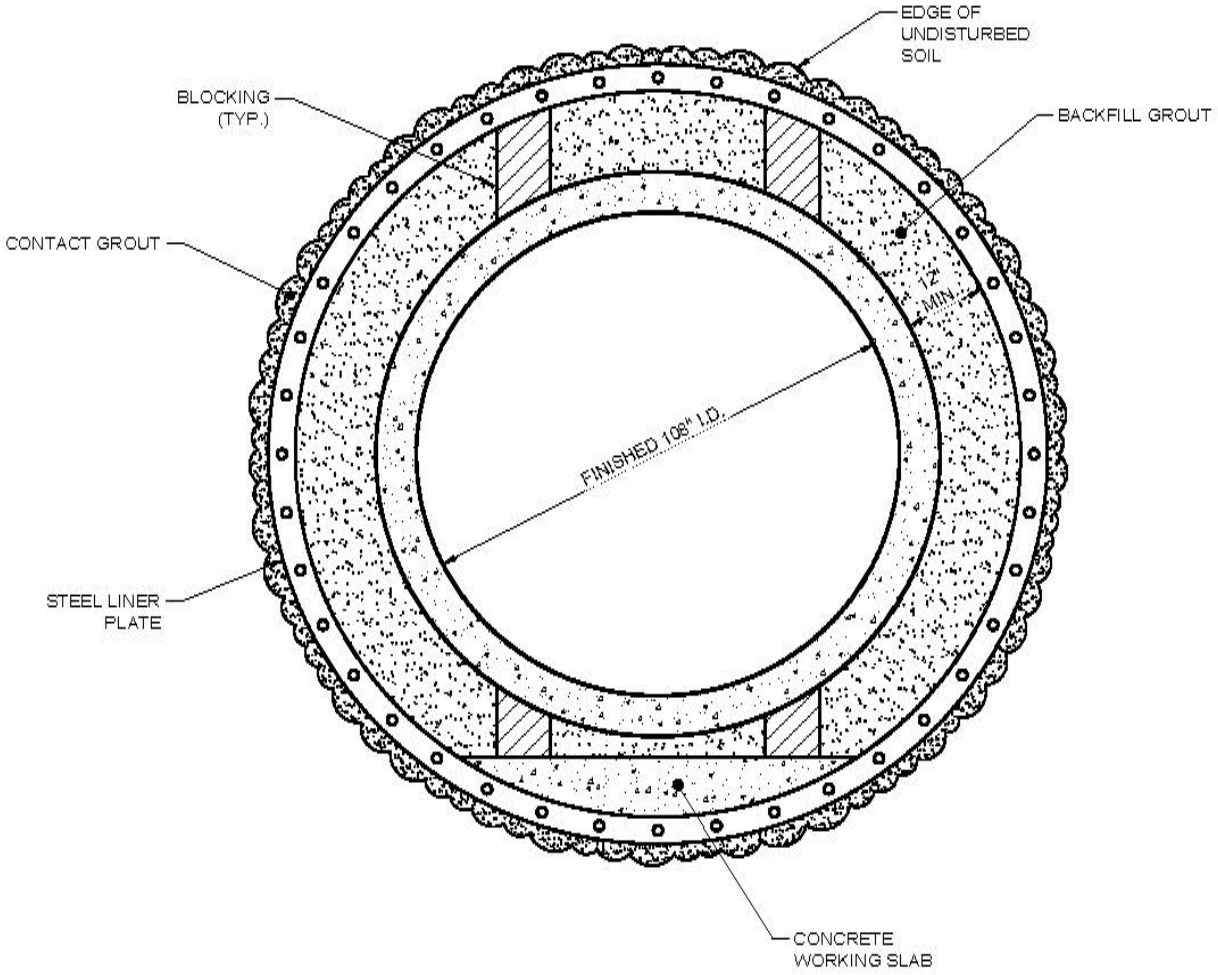


EXISTING JEFFERSON AVENUE DROP SHAFT CHAMBER SECTION A
SCALE: 1/4" = 1'-0"



PROPOSED JEFFERSON AVENUE DROP SHAFT CHAMBER SECTION A
SCALE: 1/4" = 1'-0"

Final Design – Tunnel



HAND MINED TUNNEL SECTION
N.T.S.

Final Design – Water Street Utilities

Construction Progress – Basin

Construction Progress – Basin

Construction Progress – Drop Shaft Structures

Jackson / Superior Drop Shaft Construction
Photo Taken by David Patch, Photographer for The Toledo Blade

Construction Progress – Drop Shaft Structures

Jefferson / Superior Drop Shaft Construction

Construction Progress – Tunnel

Construction Progress – Tunnel

Construction Progress – Tunnel

Construction Progress – Tunnel

Construction Challenges – Buried Infrastructure / Debris

Construction Challenges – Buried Infrastructure / Debris

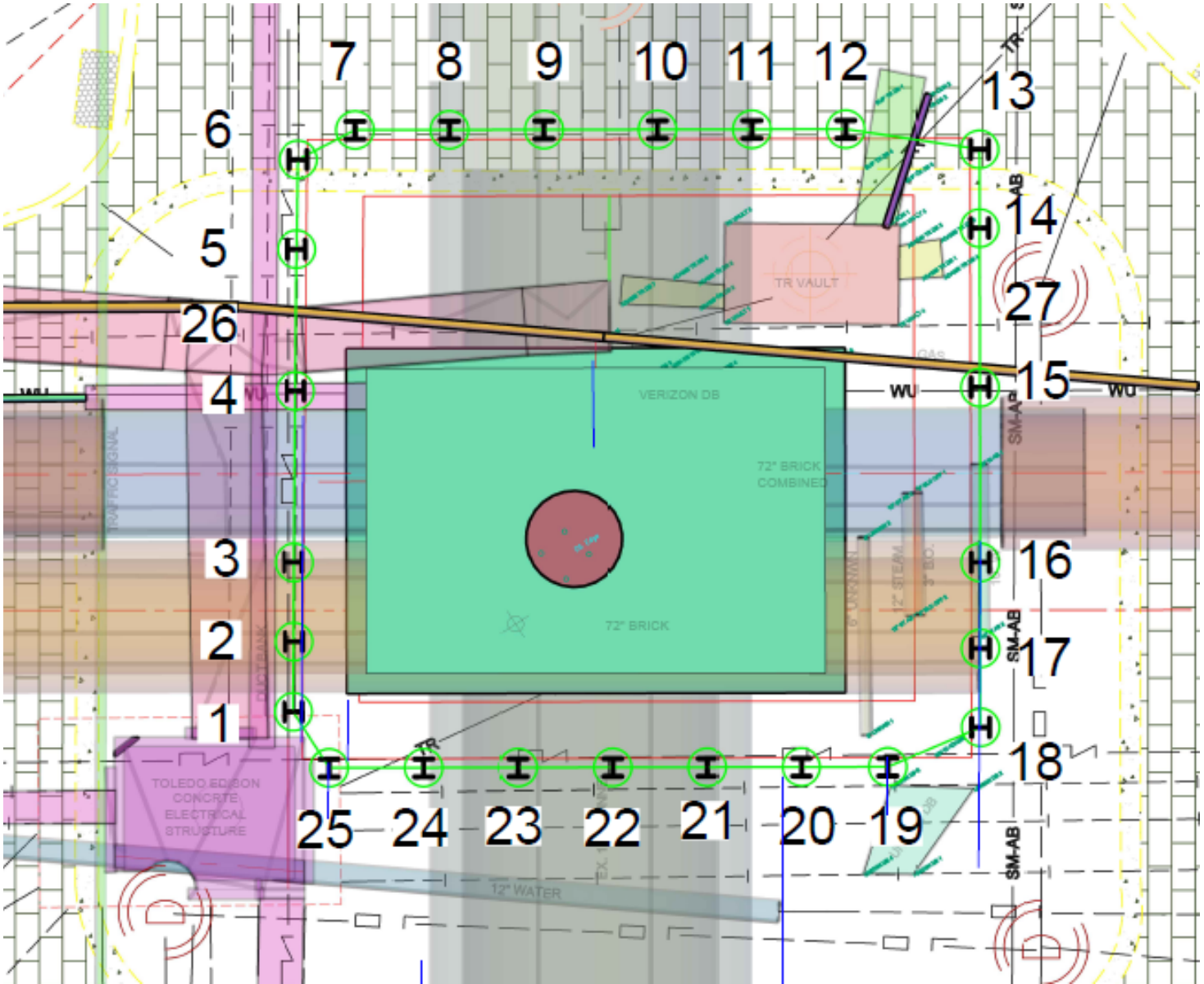
Construction Challenges – Buried Infrastructure / Debris

Construction Challenges – Buried Infrastructure / Debris

Construction Challenges – Dewatering

Construction Challenges – Dewatering

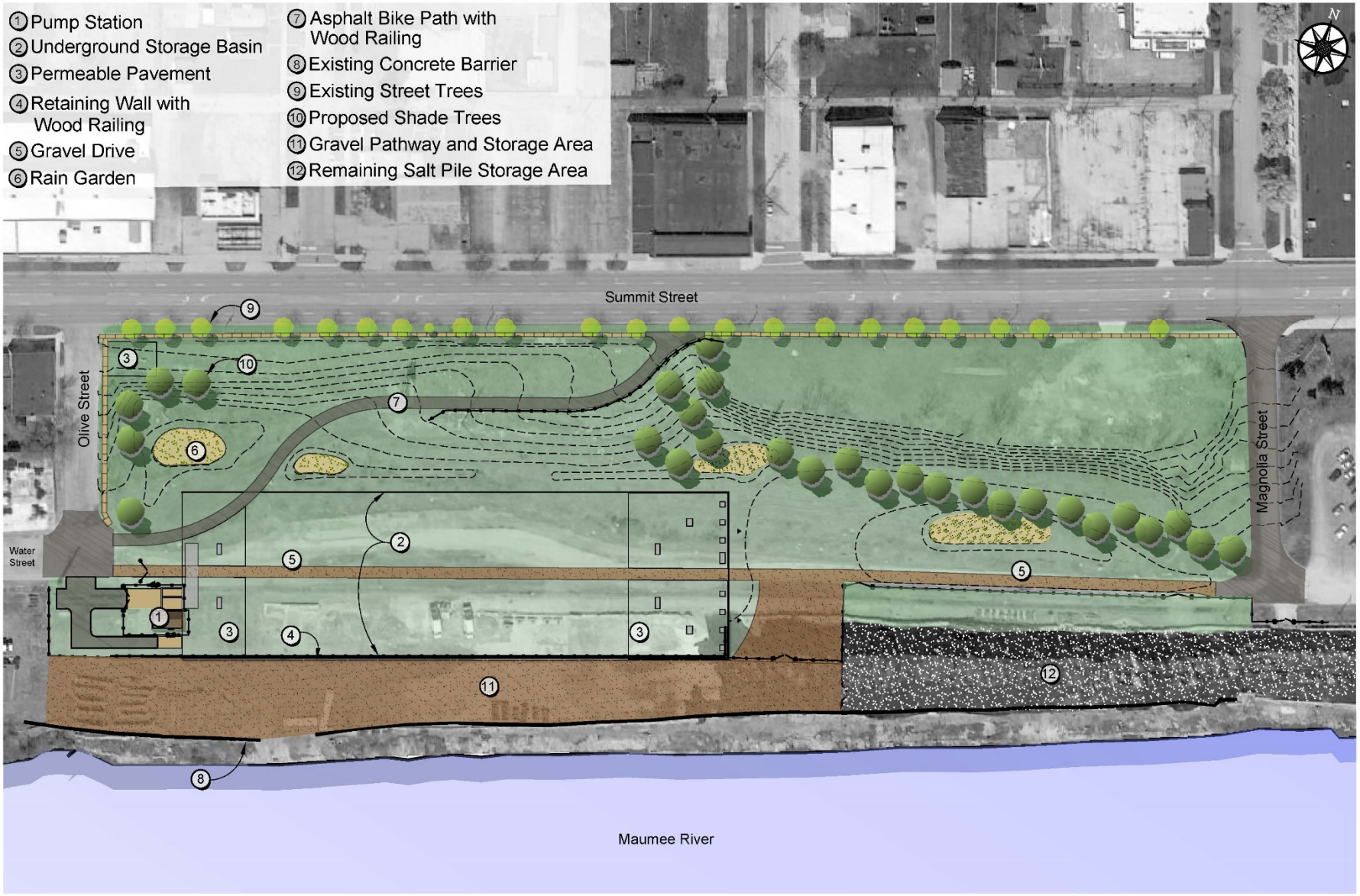
Construction Challenges – Urban Construction



Construction Challenges – Urban Construction

Construction Challenges – Geotechnical Instrumentation

Post Construction Rendering



Post Construction Rendering

Post Construction Rendering

Conclusions

- Planning and public outreach is critical.
  - Work with the nearby business and residents to communicate impacts to them.

- Pre-construction exploratory excavation.
  - Will prevent delays and minimize changes.

- A project team with a common goal of successfully completing the project.
  - A collaborative and flexible project team including the owner, contractor, construction manager, and engineer.

Questions ?


Toledo Municipal Court
Toledo History Museum
Imagination Station
Promenade Docks
Promenade Park
International Park
Huntington Center
Hensville Park
Real Seafood Company Toledo
Waite High School
Garfield Elementary Scho
National Museum of the Great Lakes
Maumee River
Maumee River
Toledo
DOWNTOWN TOLEDO
N Erie St
N Huron St
N Summit St
Lagrange St
Cherry St
Main St
Front St
E Broadway St
N St Clair St
Jackson St
Canton St
Spielbusch Ave
Google