City of Chicago
Department of Transportation

Albany Park
Stormwater Diversion Tunnel
Chicago's New Flood Mitigation Asset

Stantec

Agenda

1. Area History
2. Project Overview
3. Hydraulic Modeling
4. Construction
5. Media Coverage

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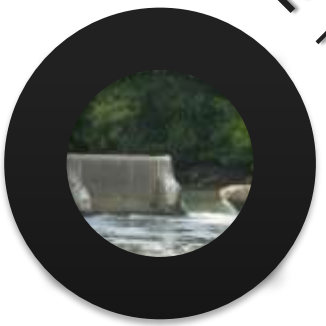
Area History

Area History Timeline

North Branch of the Chicago River (NBCR)
Pre-Dam 1901

NBCR and Creation of the North Shore Channel (NSC)
Post-Dam 1929

NBCR and NSC
Today



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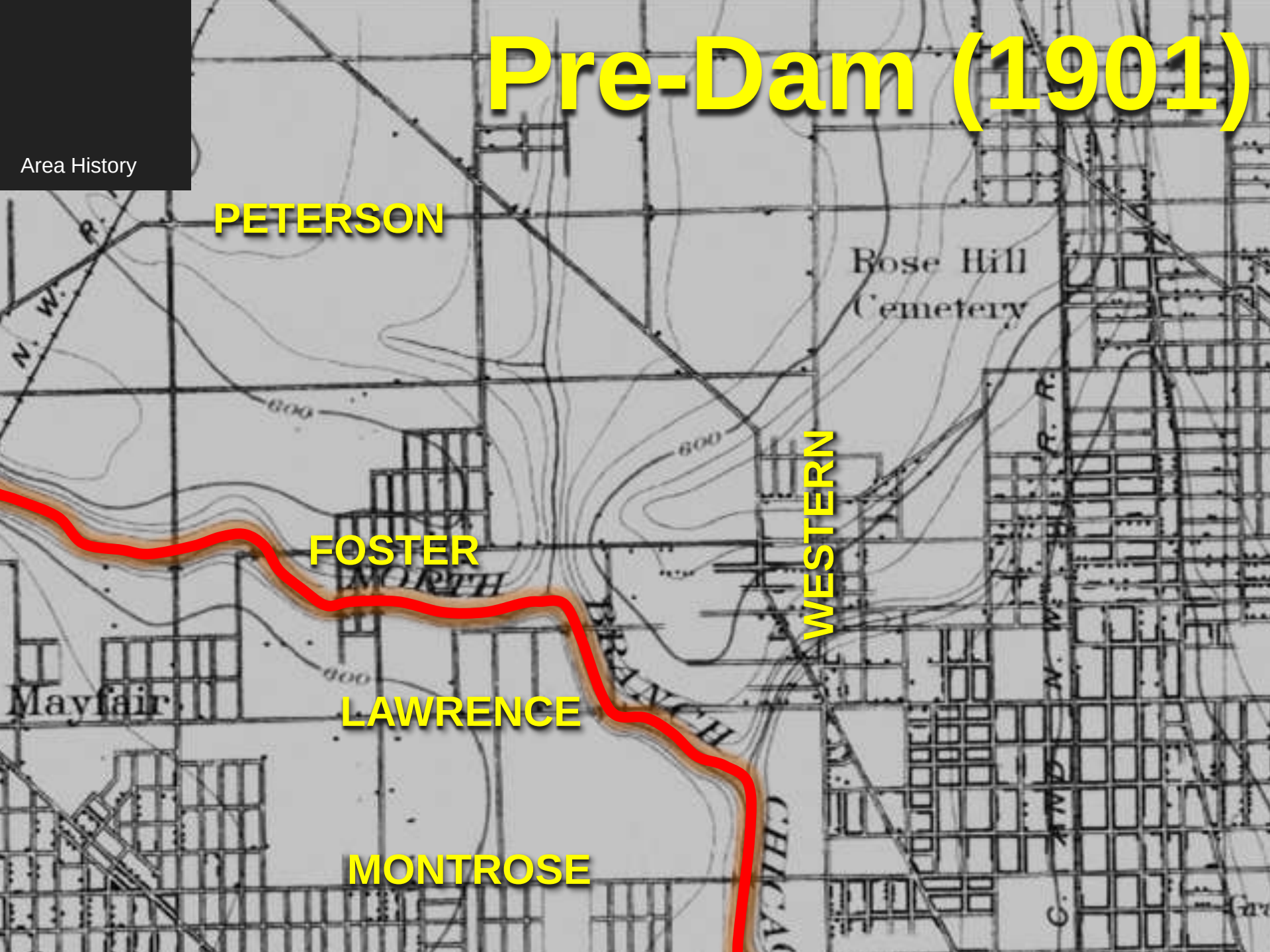
Pre-Dam (1901)


PETERSON
FOSTER
LAWRENCE
MONTROSE
WESTERN
Rose Hill
Cemetery
Mayfair
NORTH
BRANCH
600
600
600

Area History

Post-Dam (1929)

PETERSON

1901

FOSTER

1929

LAWRENCE

MONTROSE

WESTERN

North Branch Dam

Installed for Grade Control

Area History

Today (2015)

PETERSON

North Branch Dam

1901

FOSTER

1929 to Today

LAWRENCE

MONTROSE

WESTERN

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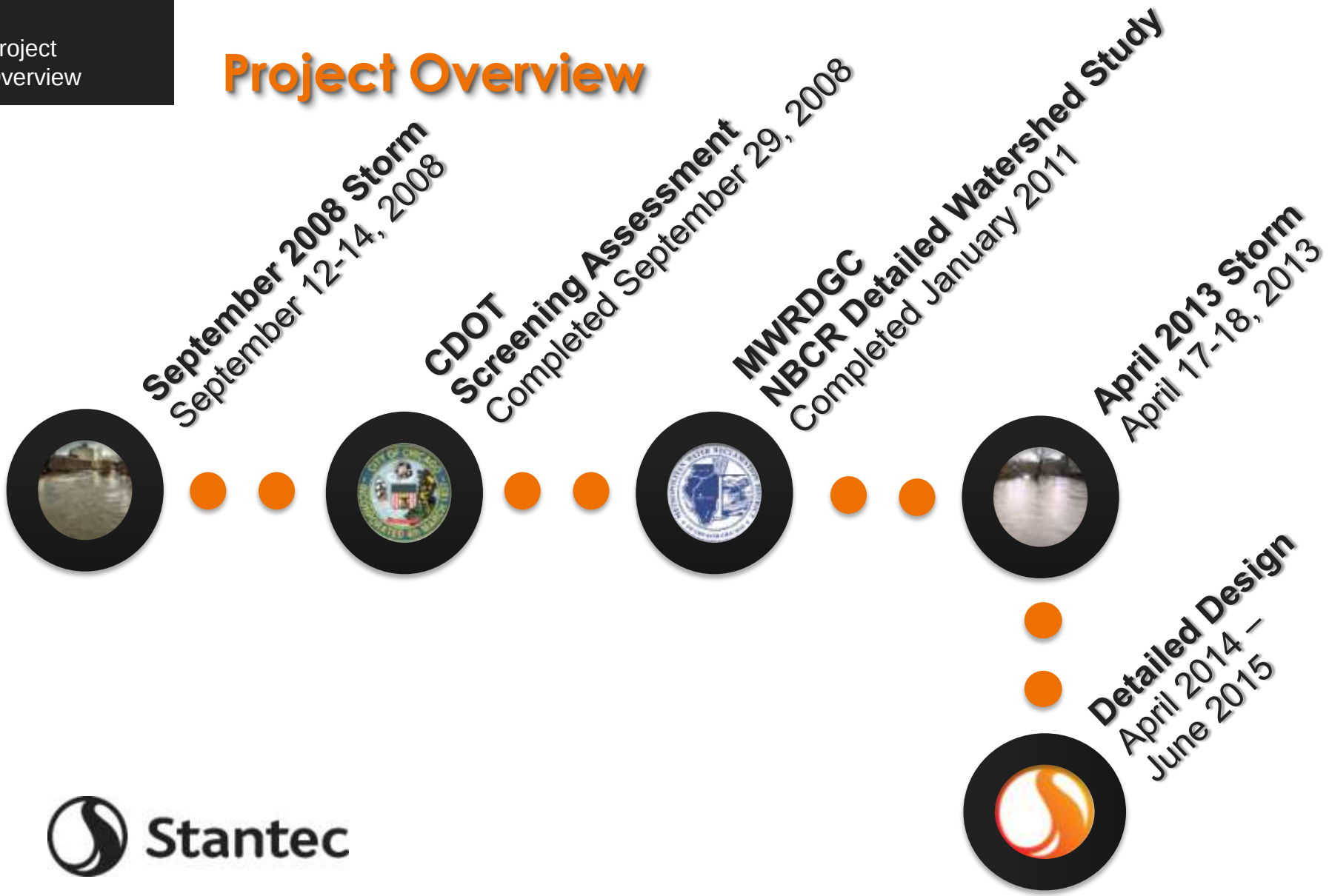
Project Overview

September 2008 Storm – 7.3 Inches (48 hrs)
April 2013 Storm – 5.5 Inches (24 hrs)

Project Overview



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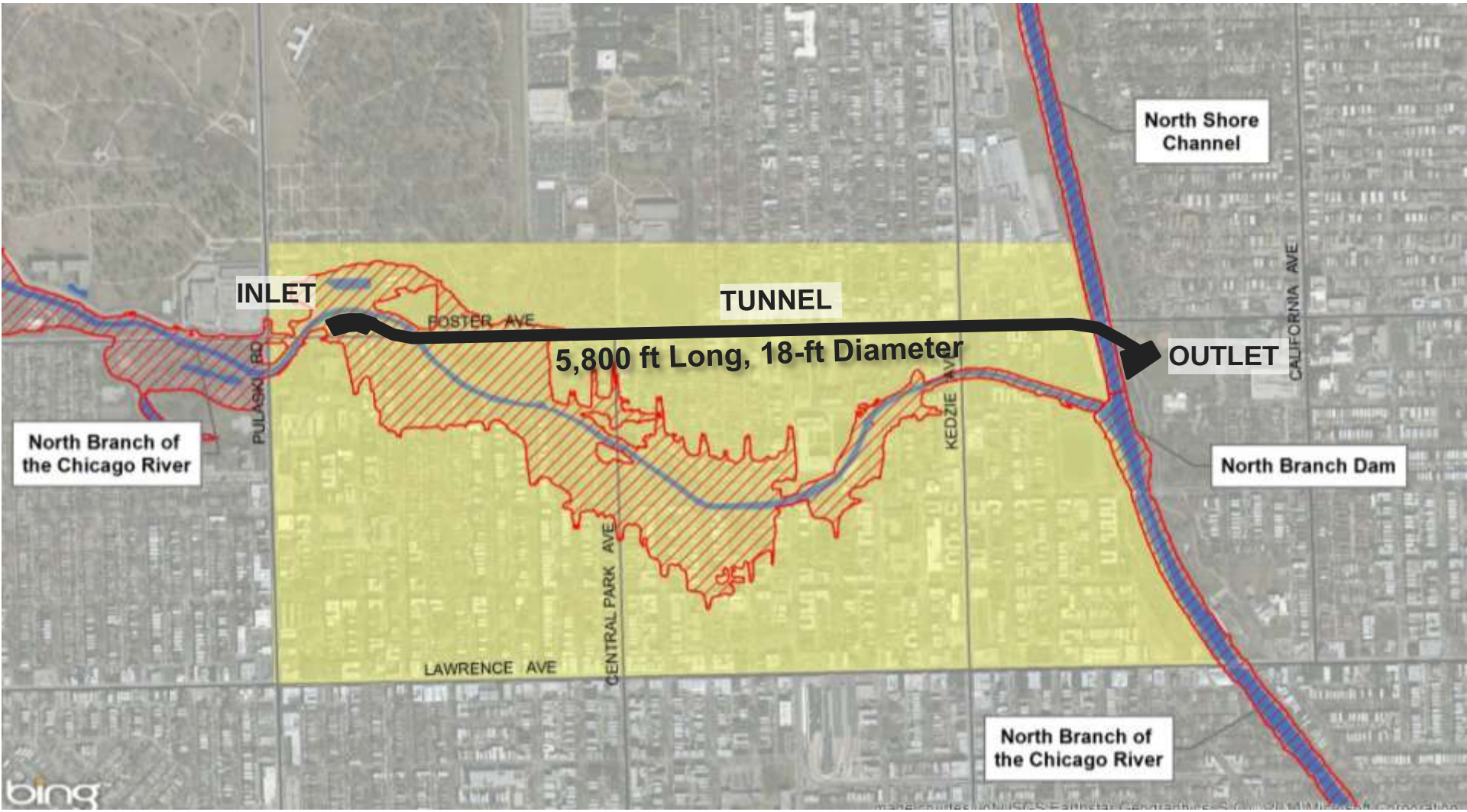
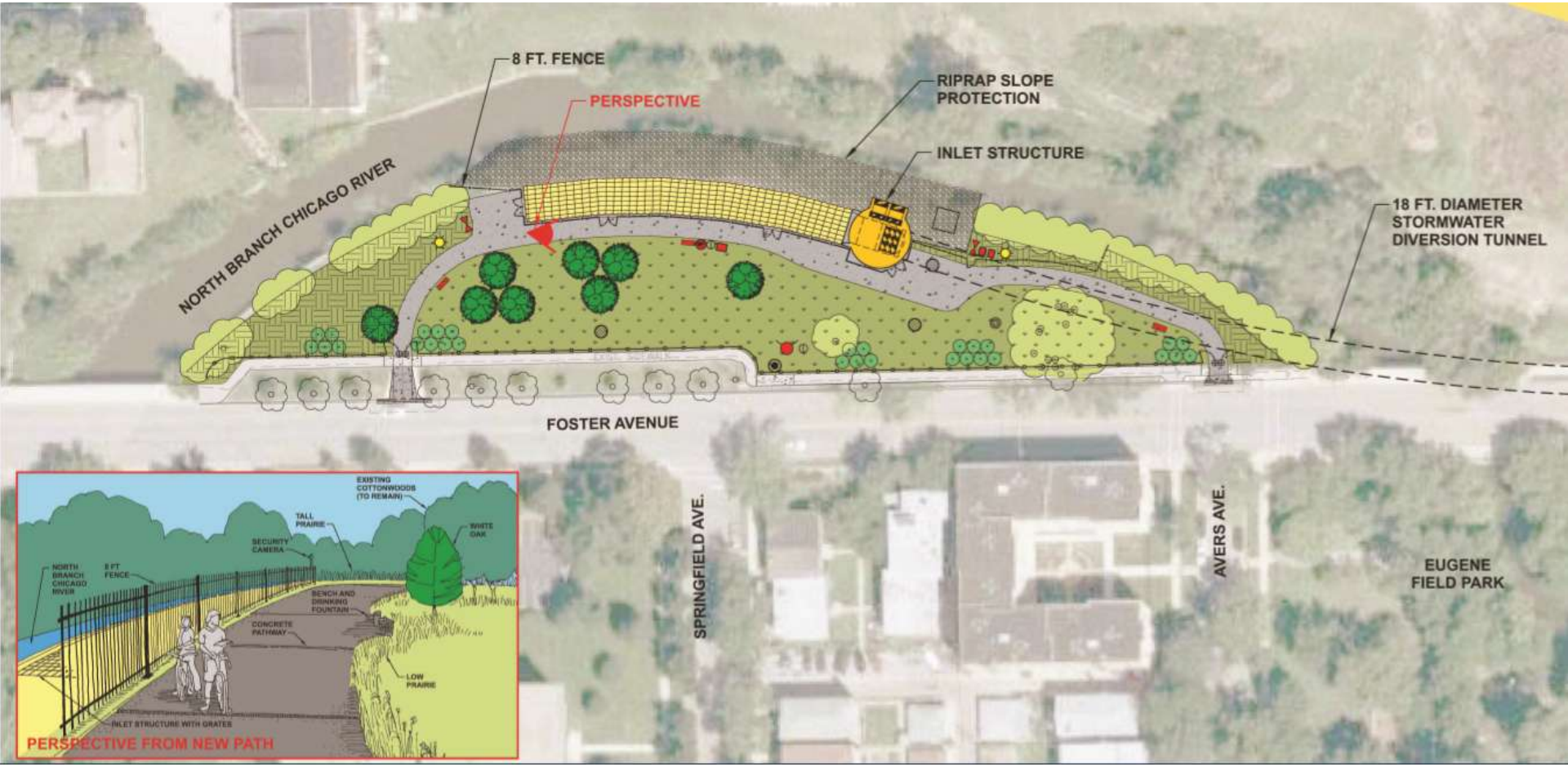
Proposed Project

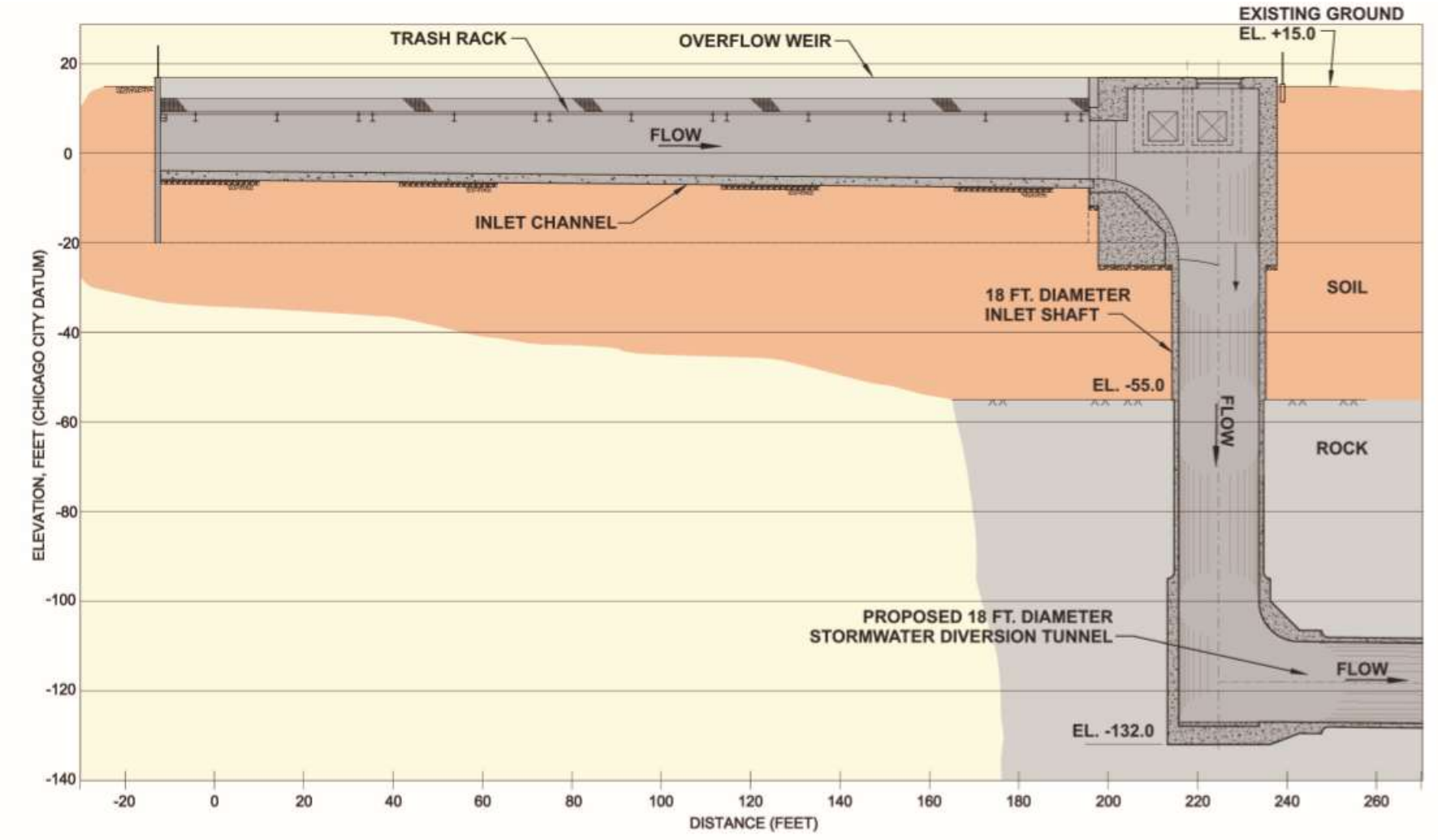


Project
Overview

Inlet Site – Plan View

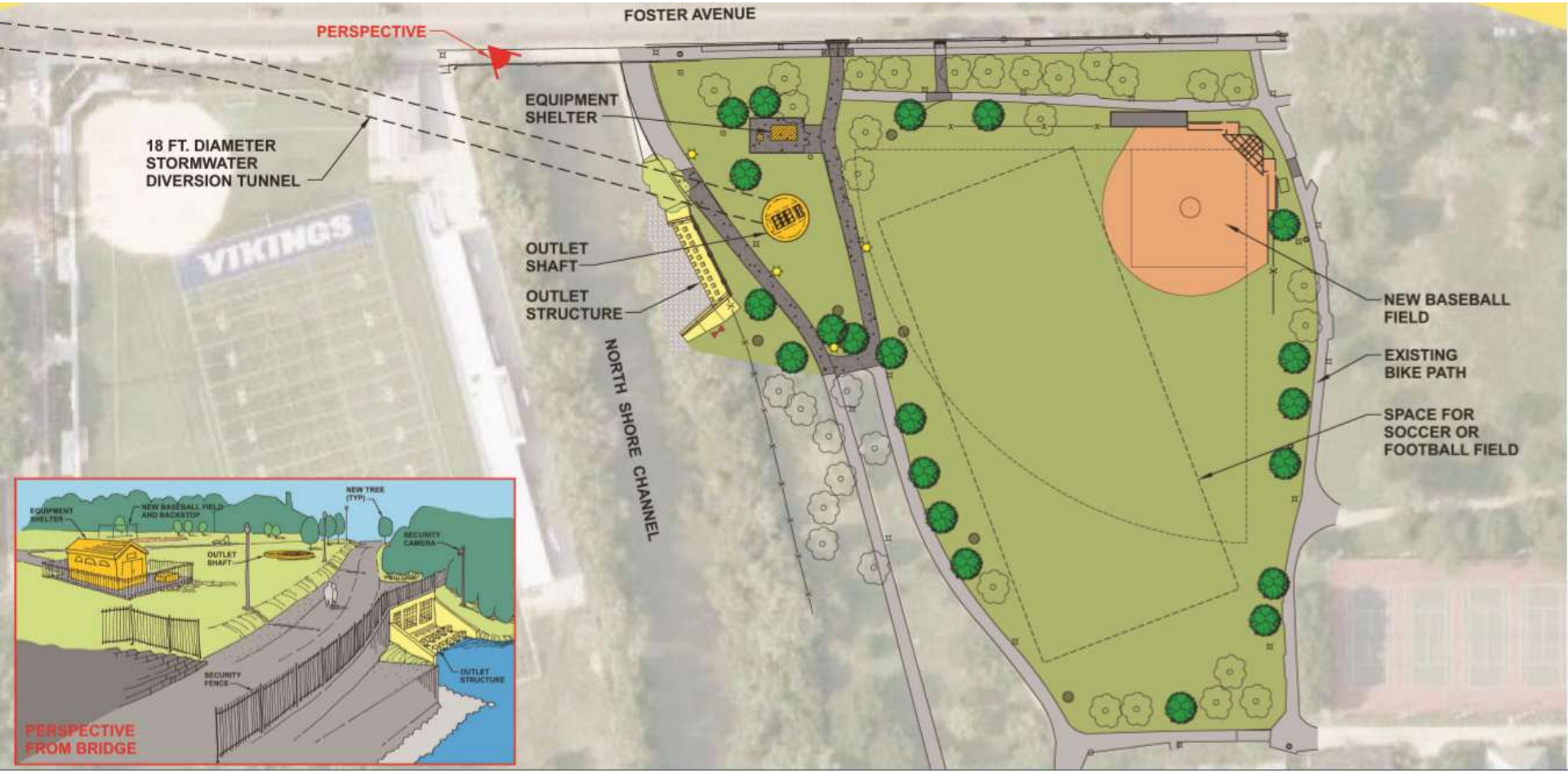


Inlet Structure – Profile View

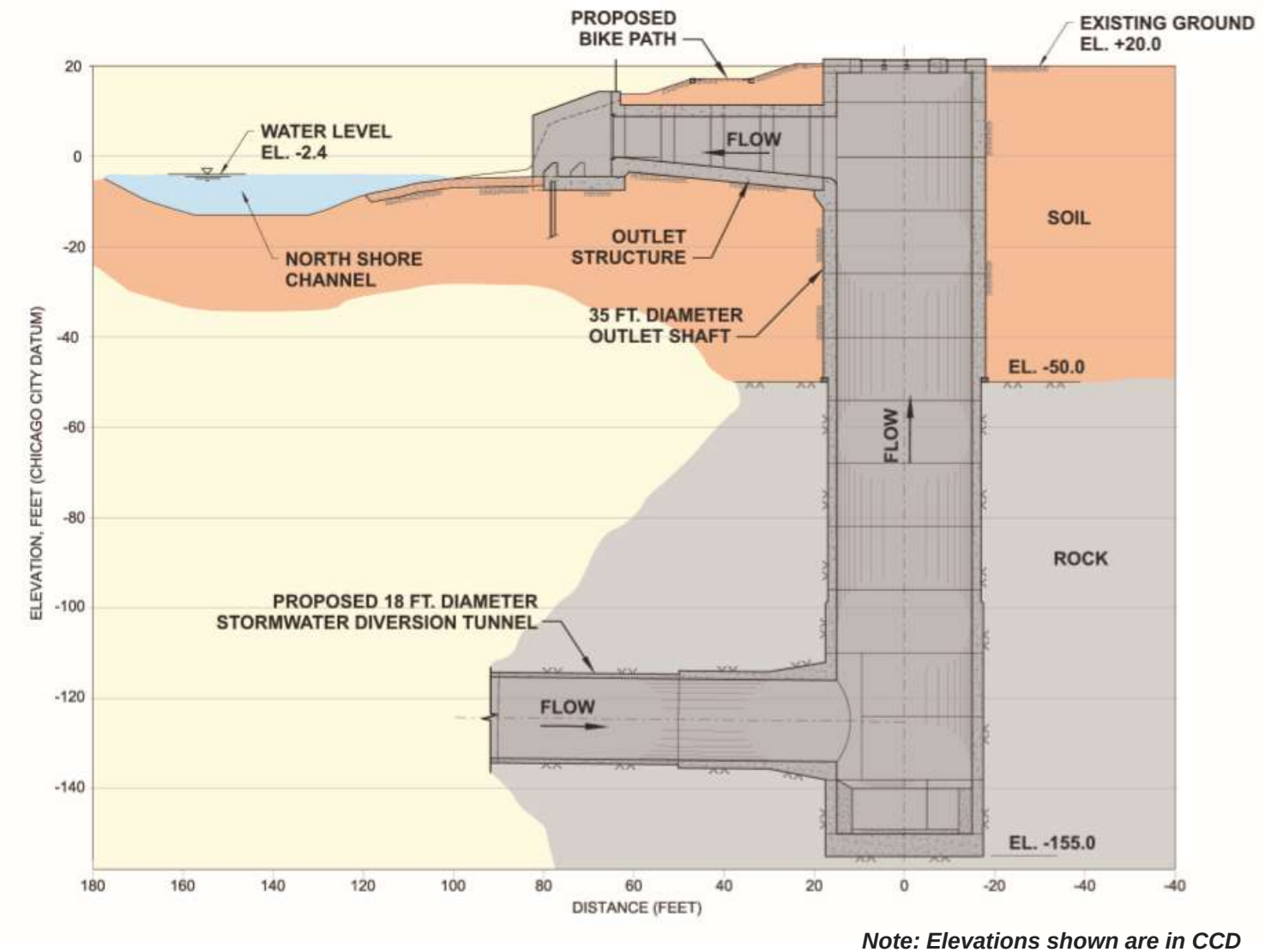


Note: Elevations shown are in CCD

Outlet Site – Plan View



Outlet Structure – Profile View

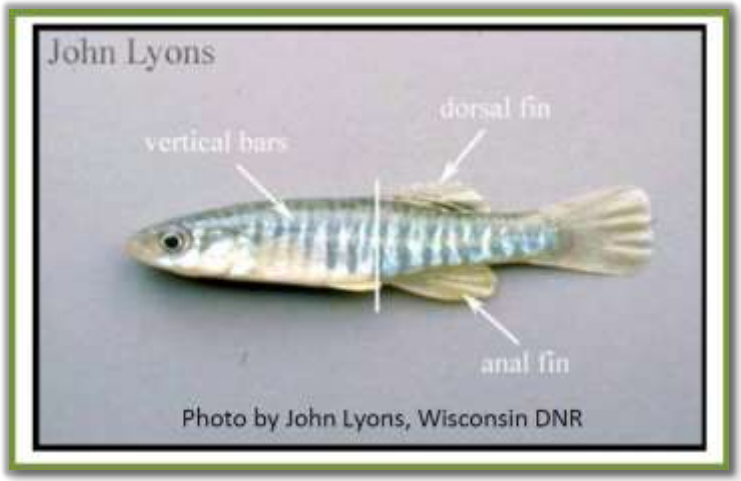


Note: Elevations shown are in CCD

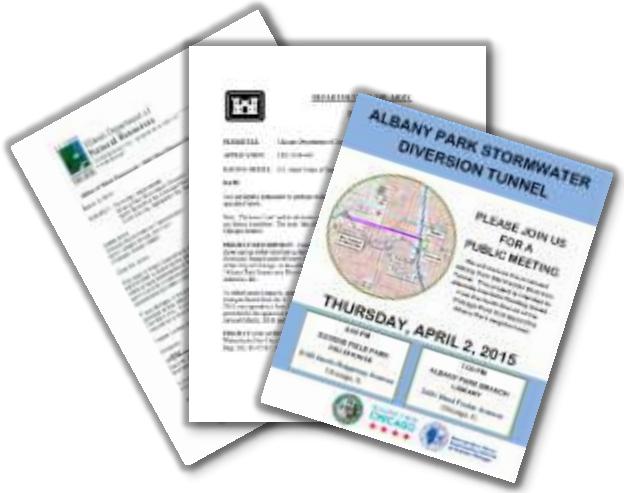
Permitting and Stakeholder Engagement

- **Permitting Challenges**
  - Fish Entrainment
  - Endangered Fish Species
  - Water Quality Impacts
  - Recreation Impacts

- **Obtained Multiple Permits**
  (USACE, IEPA, IDNR, MWRDGC,
  City of Chicago DOB & OUC, NCCSWCD, and more….)



Endangered Fish Species - Banded Killifish



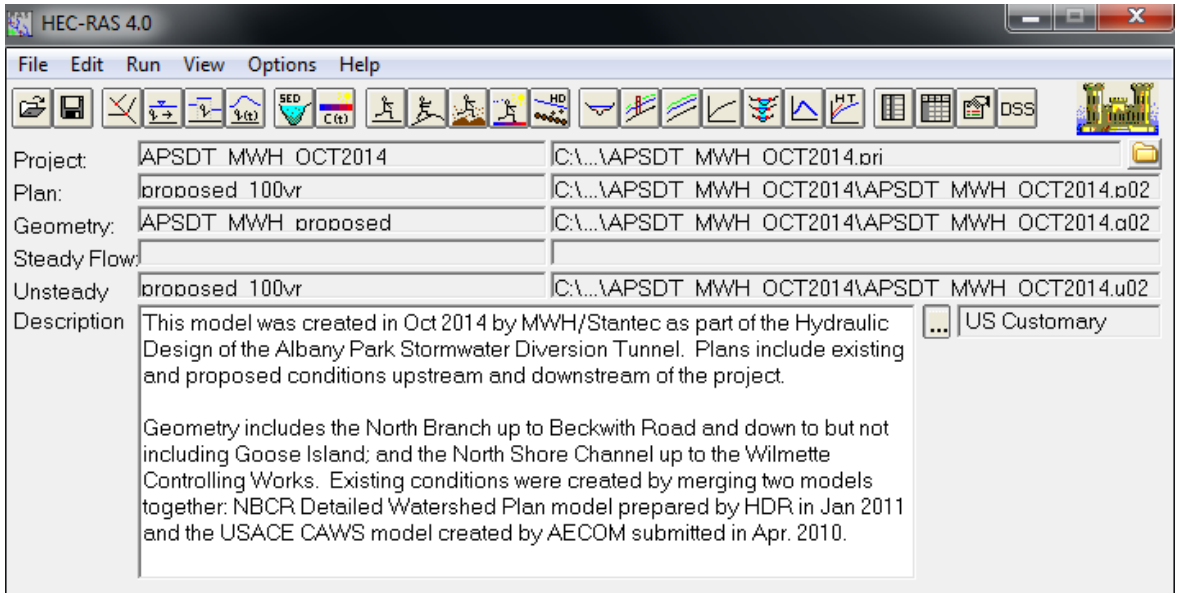
- **Stakeholder Engagement Meetings**
- **Public Workshops**

Hydraulic Modeling

Hydraulic Modeling

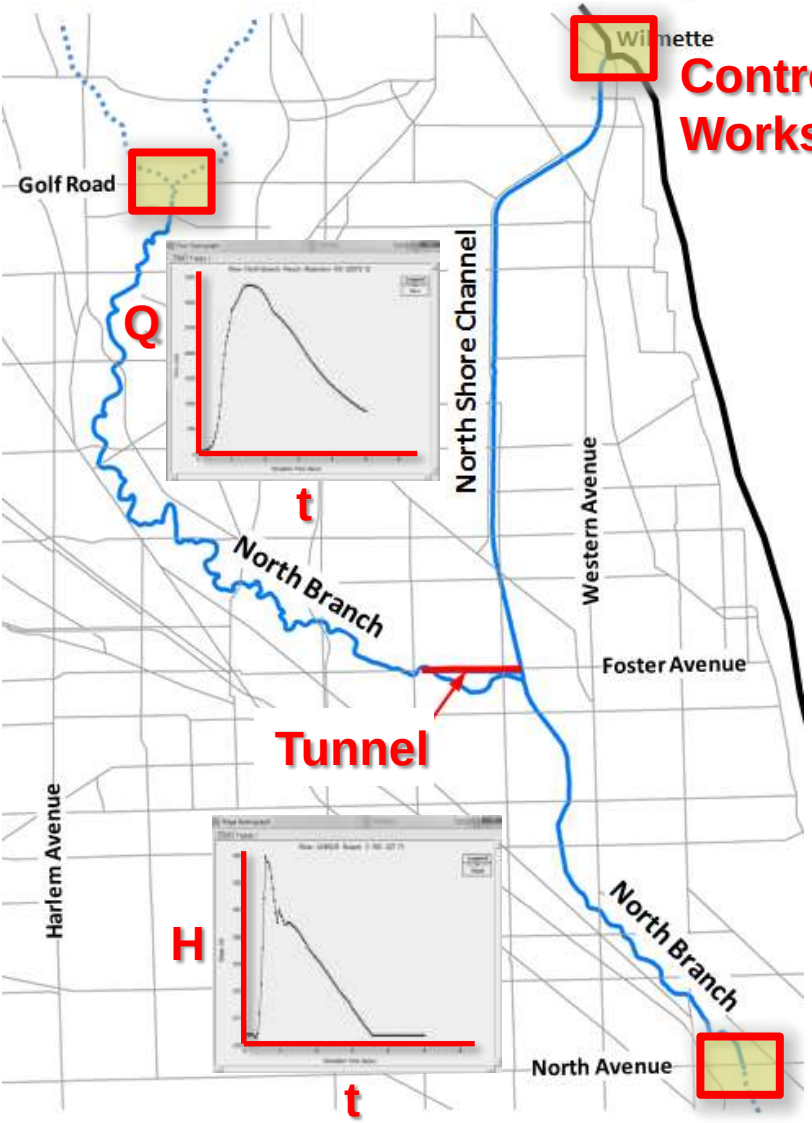
Riverine Modeling (1-D Unsteady)

Used HEC-RAS (v4.1) Developed by the USACE Hydrologic Engineering Center



- **Used to :**
  - Provide the initial sizing and elevations of the tunnel inlet and outlet structures
  - Assess the impacts the project will have on water levels and flows within the NBCR and NSC

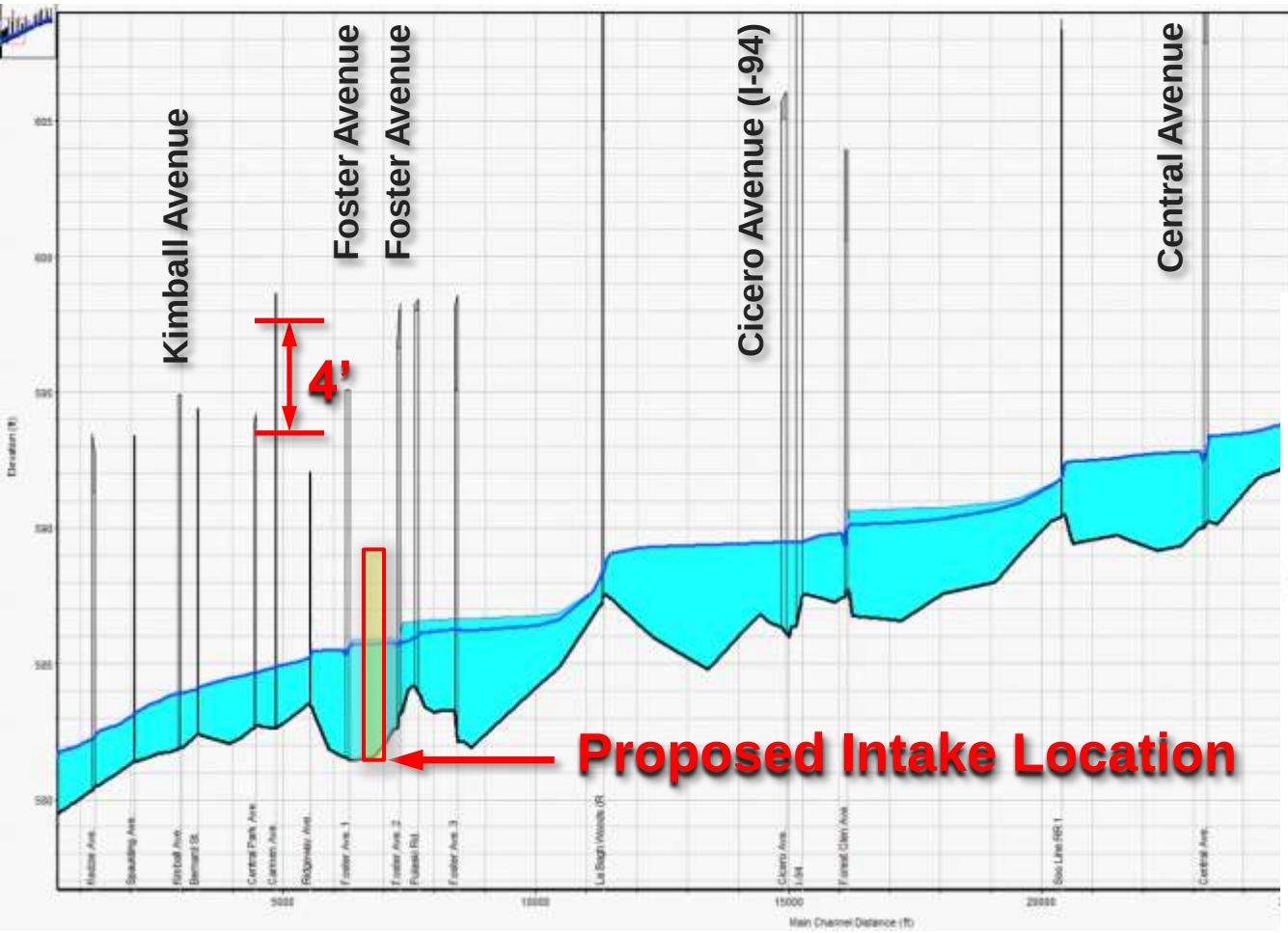
HEC-RAS (1-D Unsteady Flow)

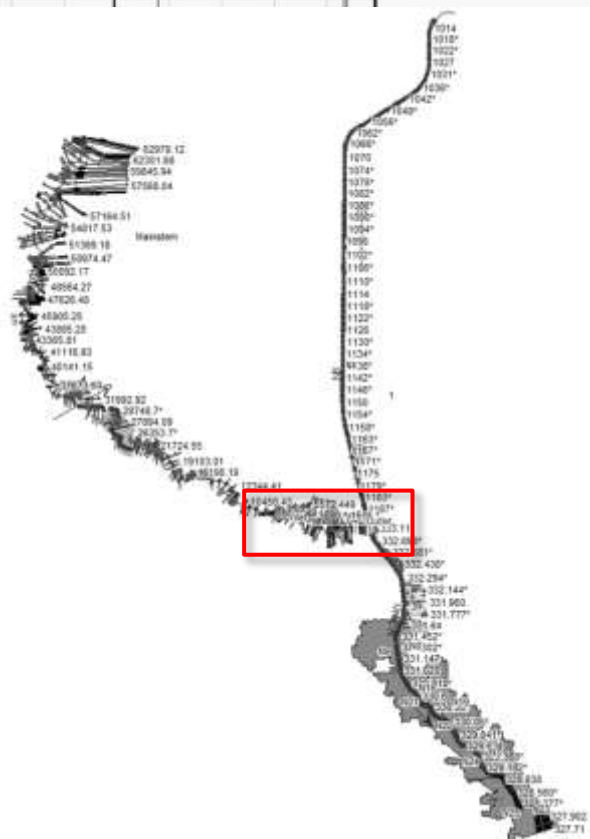


- **Model combined two existing HEC-RAS models at the North Branch Dam:**
  - **NBCR Portion**
    - Detailed Watershed Plan Model (MWRDGC - 2011)
  - **NSC Portion**
    - The Chicago Area Waterway System Model (USACE - 2010)
- **Evaluated the 2-, 10- and 100-yr events**
- **Flow through the tunnel was modeled as lidded cross sections with fixed weirs and artificial gates at both ends of the diversion**

Hydraulic Modeling

100-yr Water Surface Profiles (Animated)

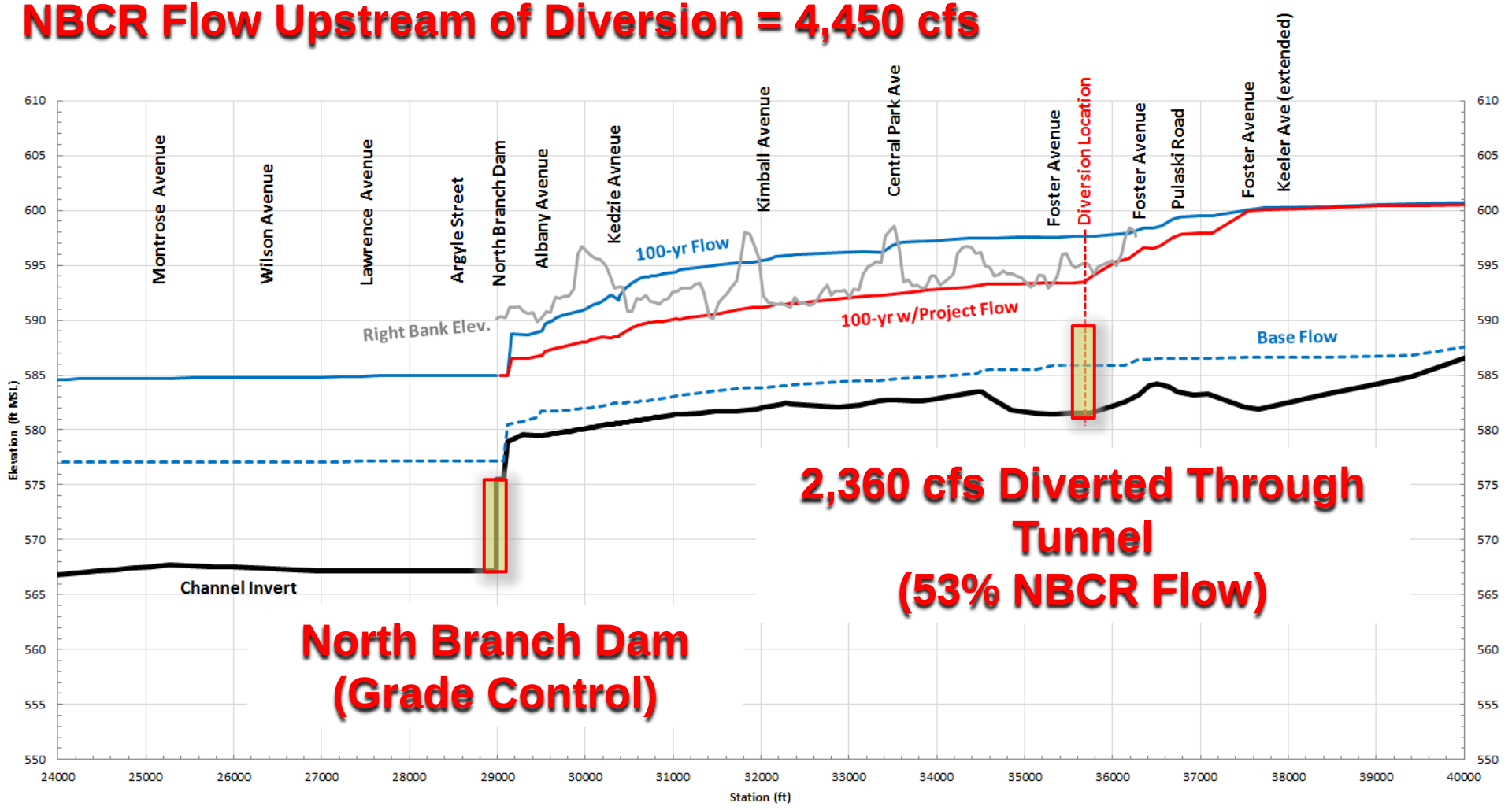




Hydraulic Modeling

100-yr Water Surface Profiles

NBCR Flow Upstream of Diversion = 4,450 cfs



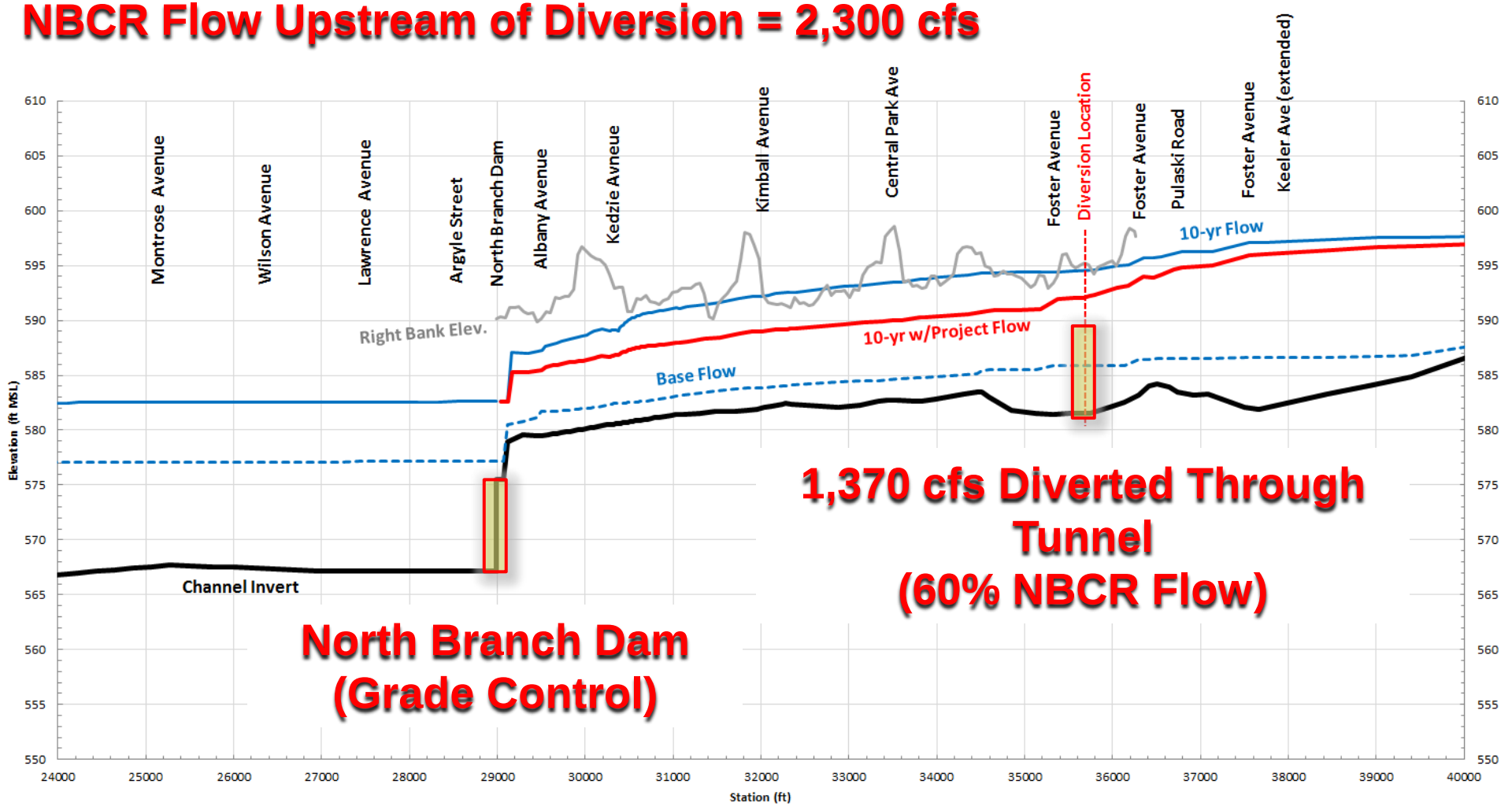
2,360 cfs Diverted Through Tunnel (53% NBCR Flow)

North Branch Dam (Grade Control)

Hydraulic Modeling

10-yr Water Surface Profiles

NBCR Flow Upstream of Diversion = 2,300 cfs



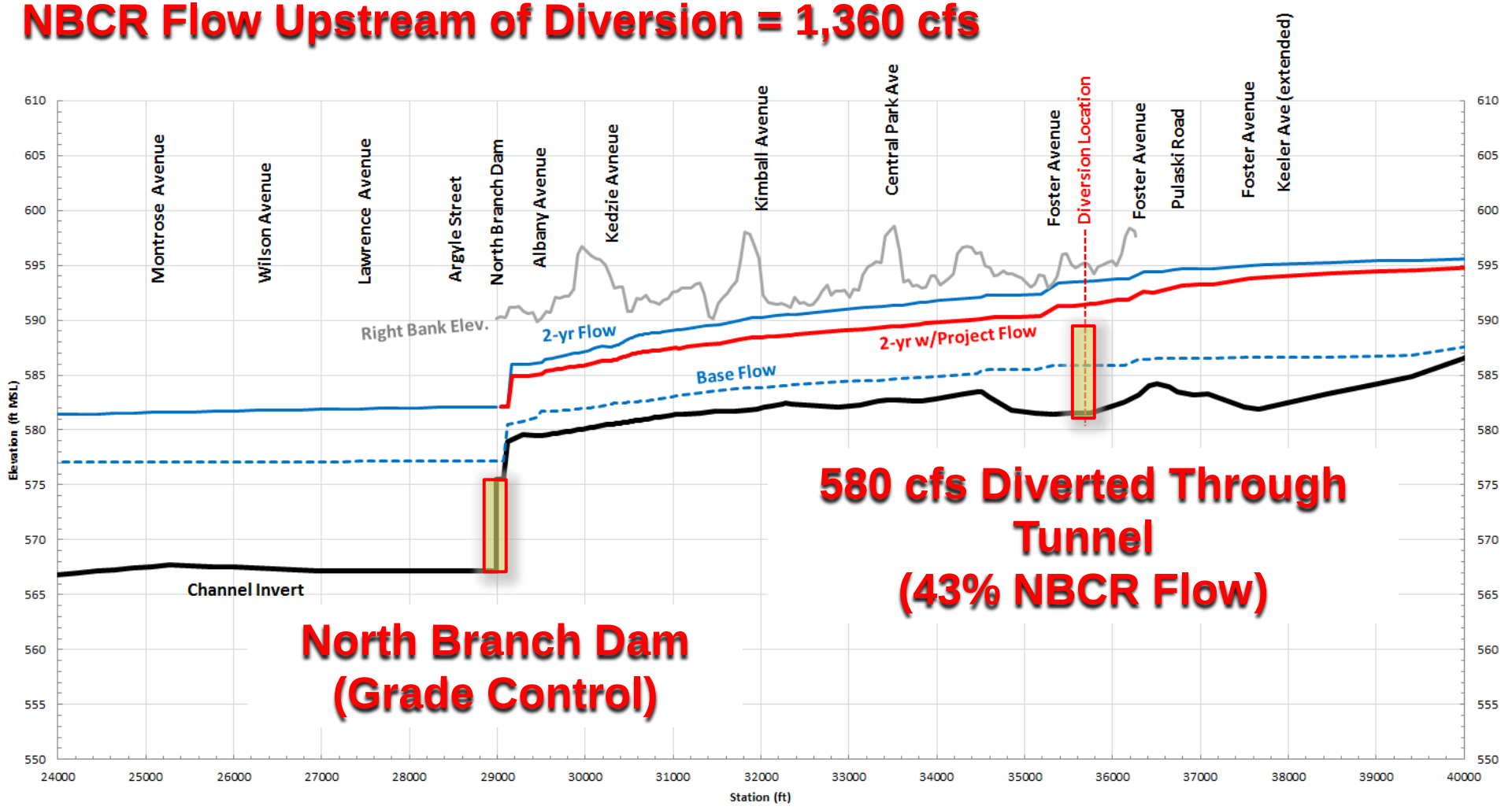
1,370 cfs Diverted Through Tunnel (60% NBCR Flow)

North Branch Dam (Grade Control)

Hydraulic Modeling

2-yr Water Surface Profiles

NBCR Flow Upstream of Diversion = 1,360 cfs

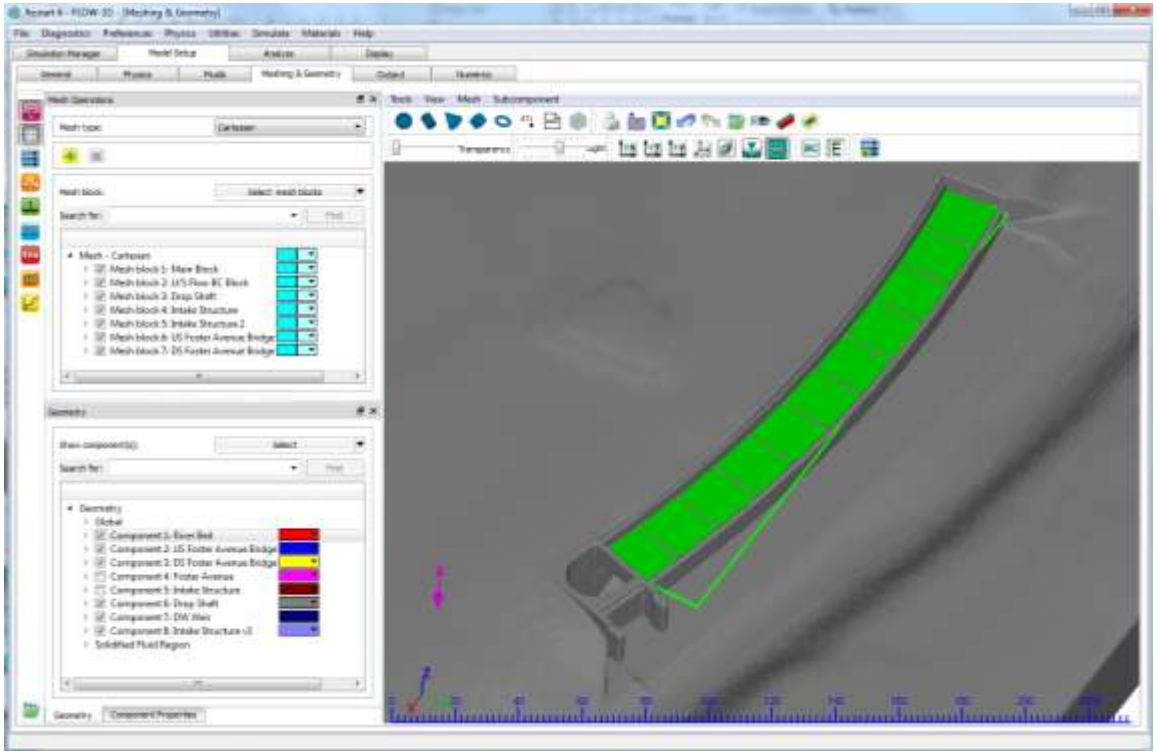


580 cfs Diverted Through Tunnel (43% NBCR Flow)

North Branch Dam (Grade Control)

Computational Fluid Dynamics (CFD)

Used Flow-3D (v11) Developed by Flow Science, Inc.

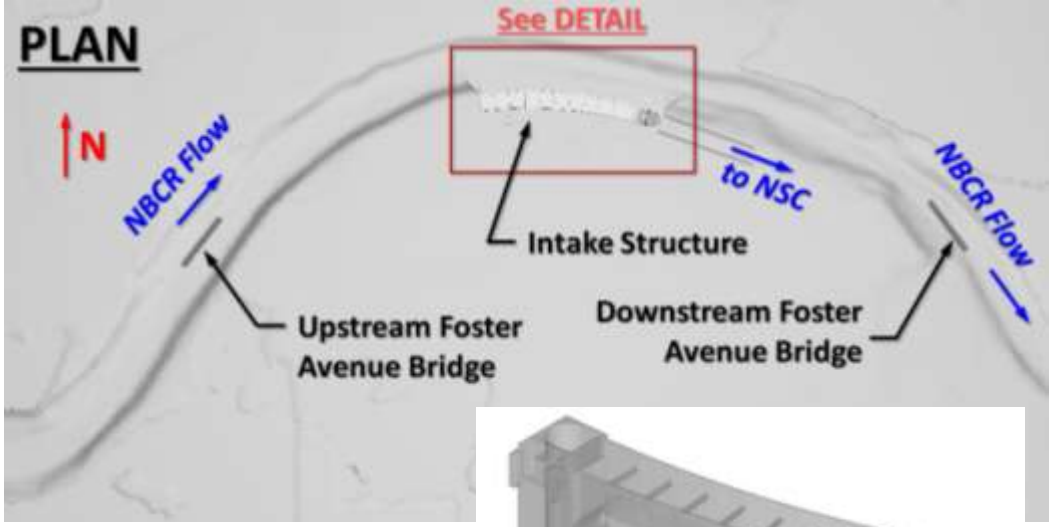


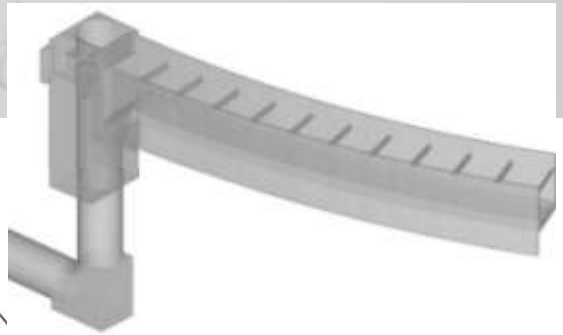
Used to assess:

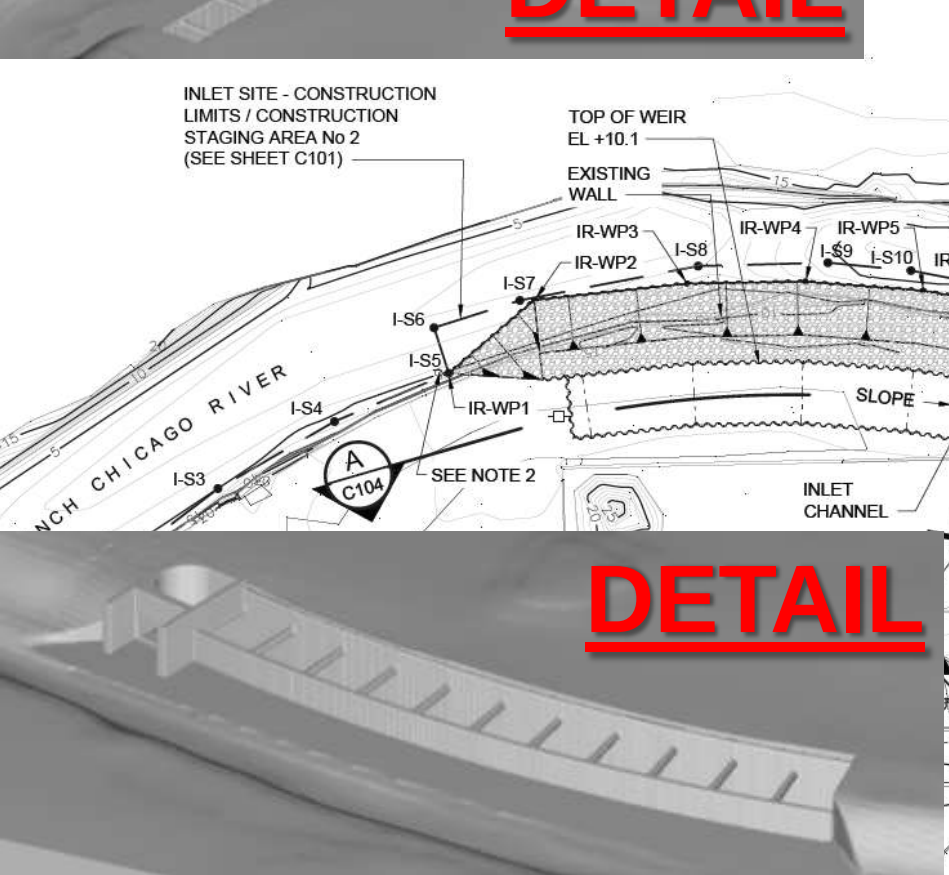
- The head loss through the inlet and outlet structures
- Discharge capacities of both structures
- The approach conditions to the inlet structure (Fish Entrainment)
- The departure conditions from the outlet structure (Scour Protection)

Hydraulic Modeling

Inlet Structure CFD Model

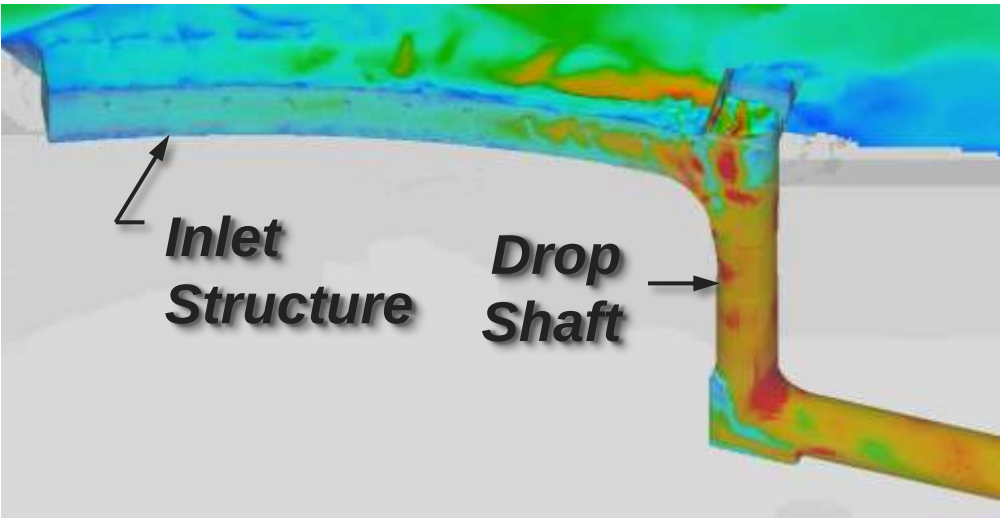


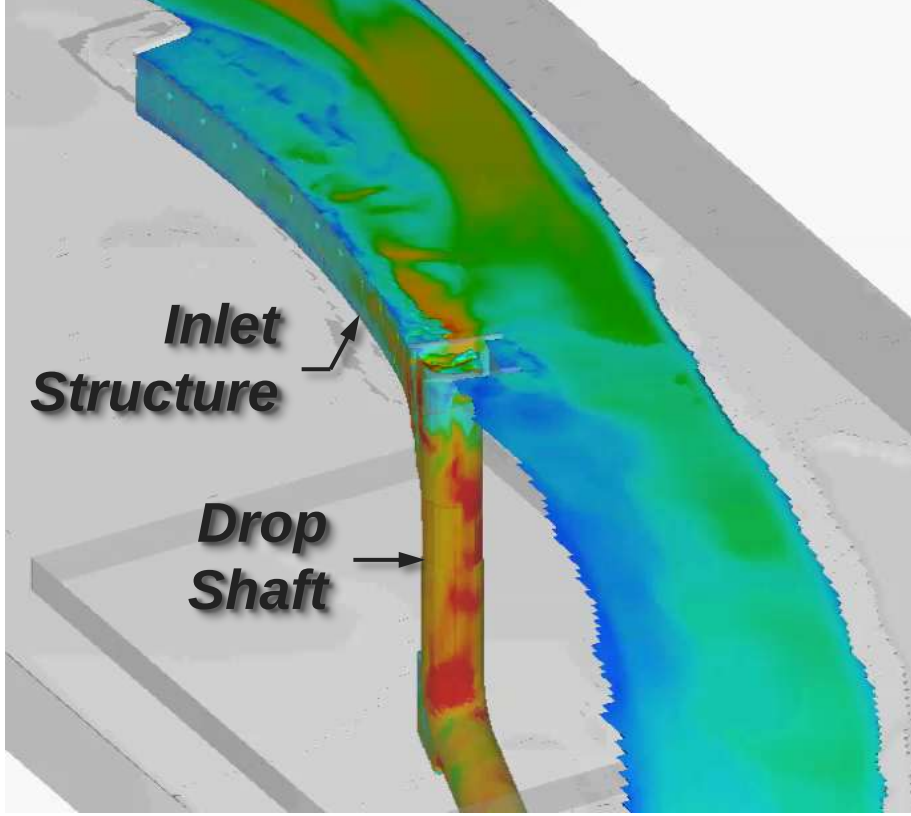


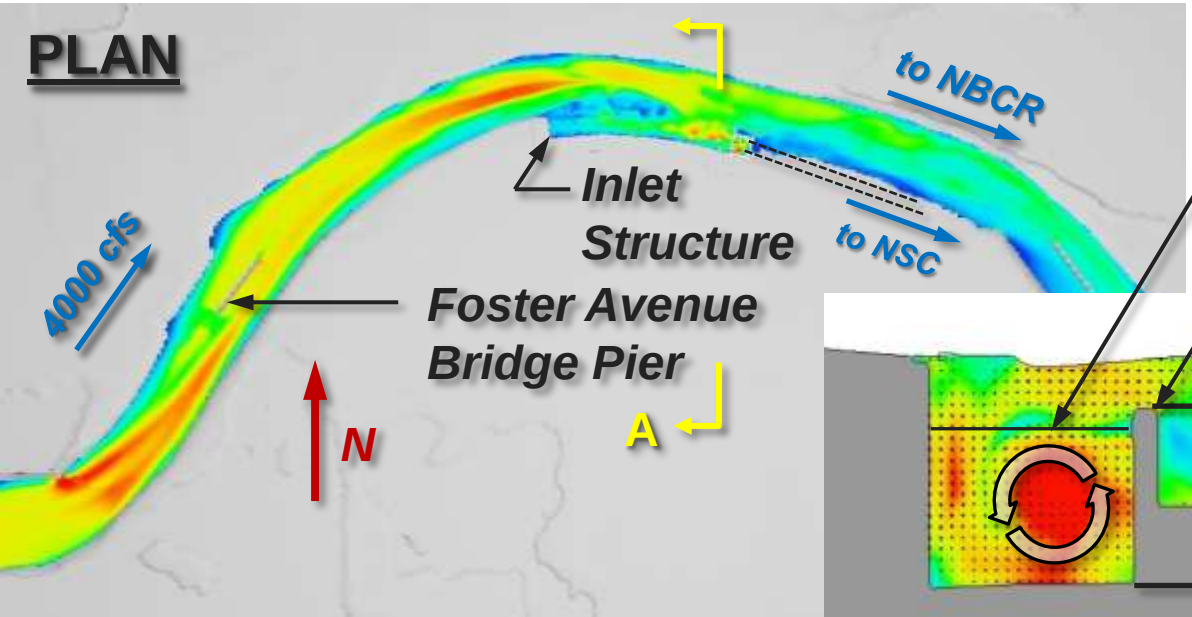


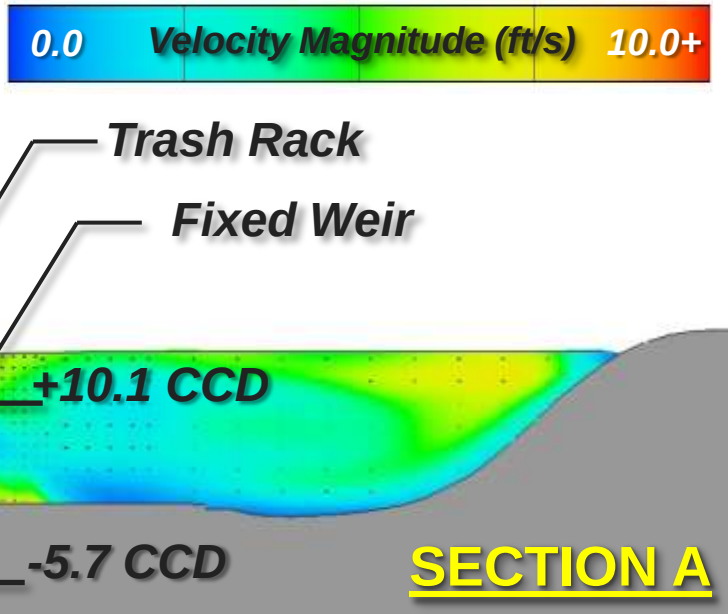
Hydraulic Modeling

Inlet Structure CFD Results – Velocities



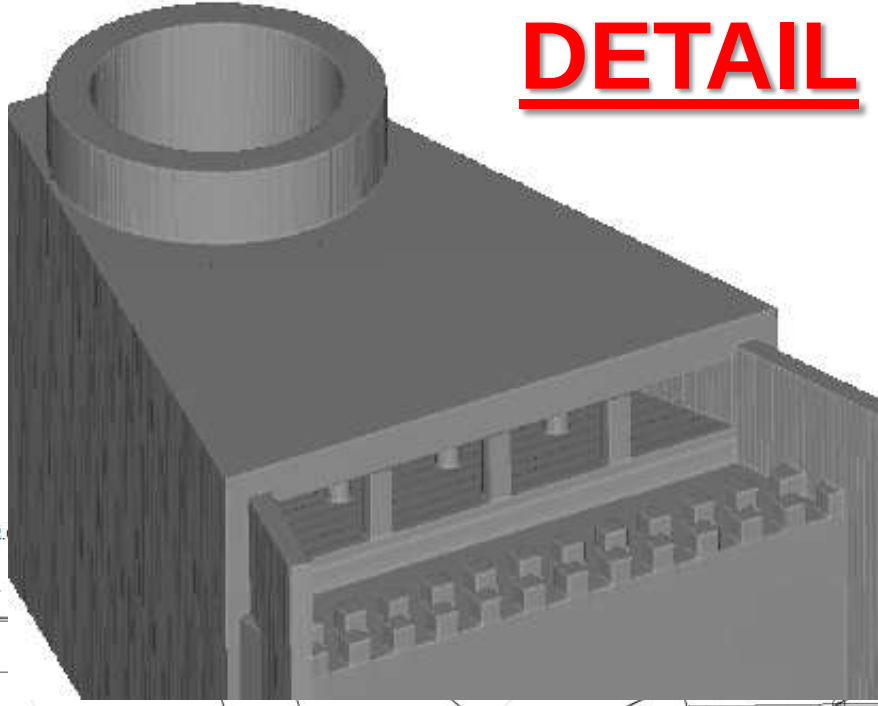


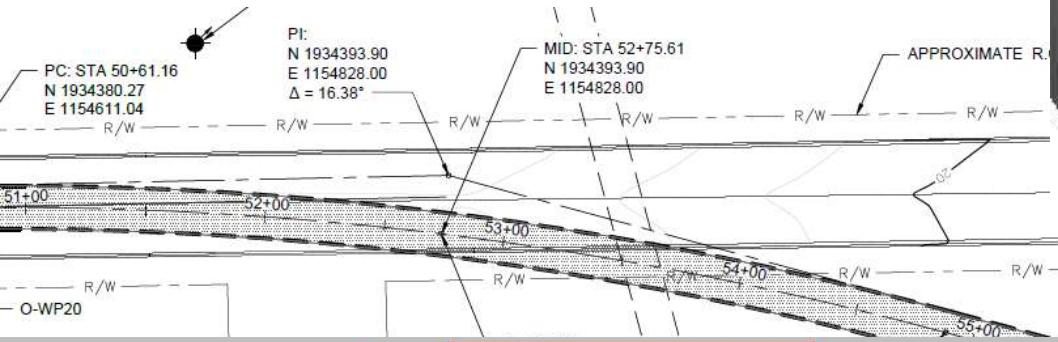


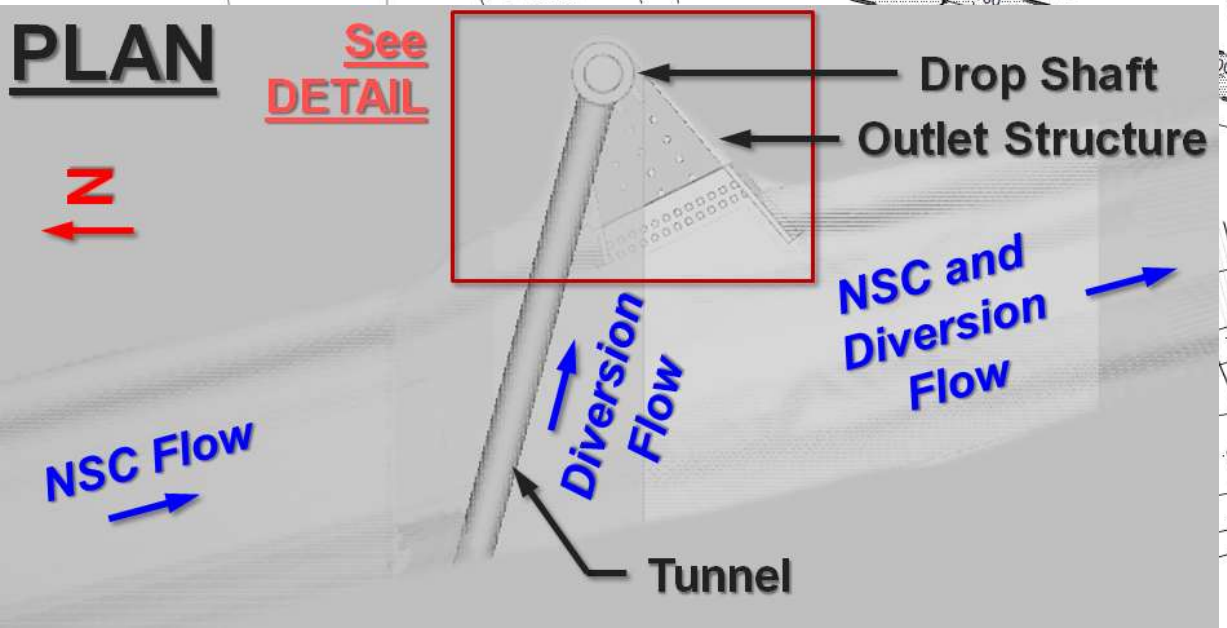


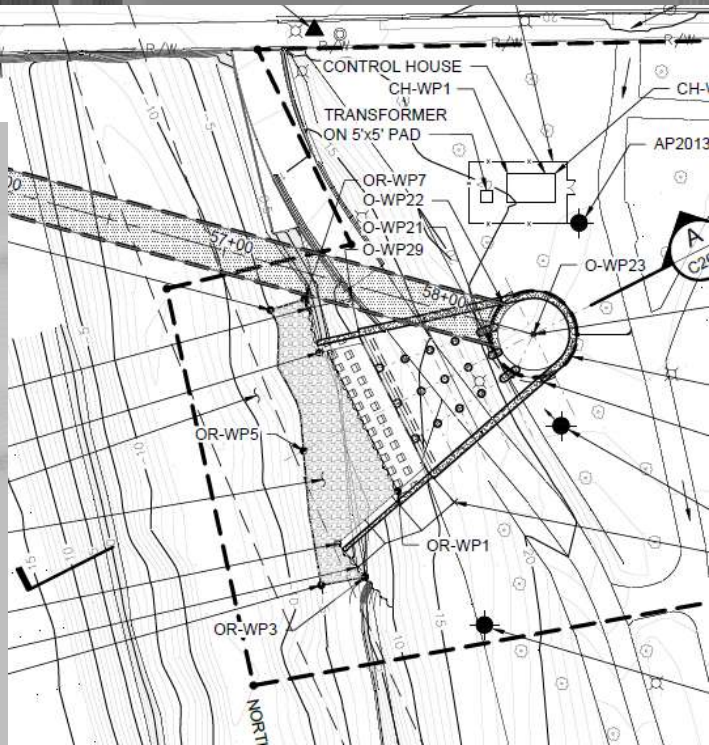
Hydraulic Modeling

Outlet Structure CFD Model



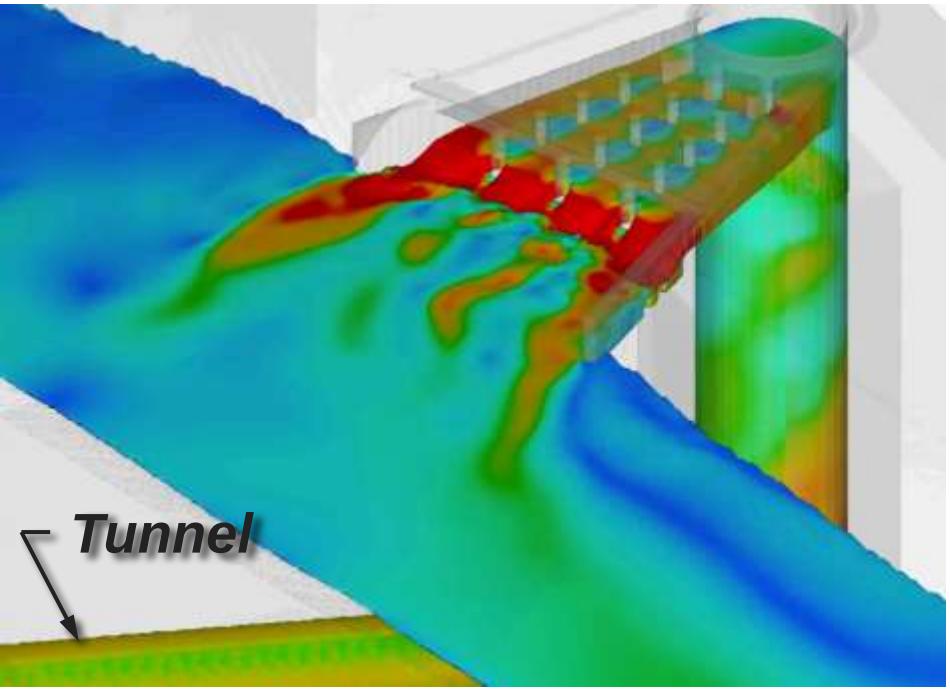


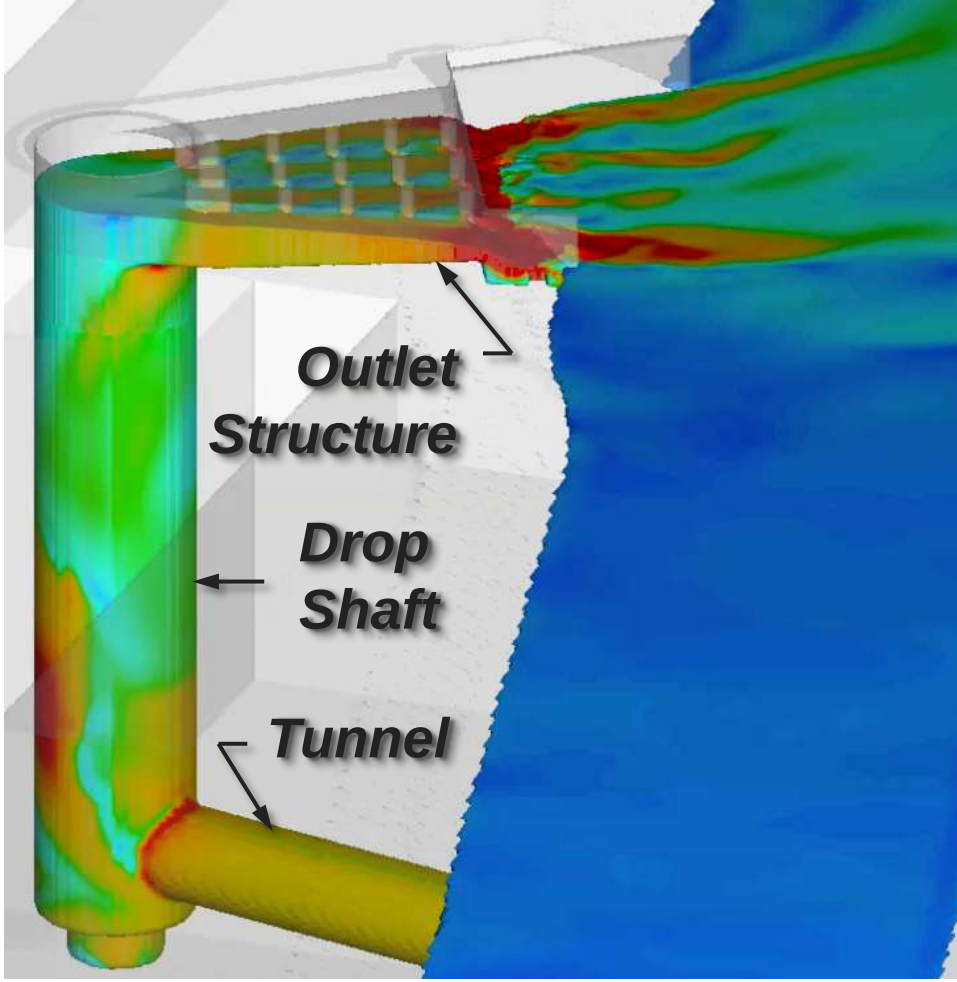


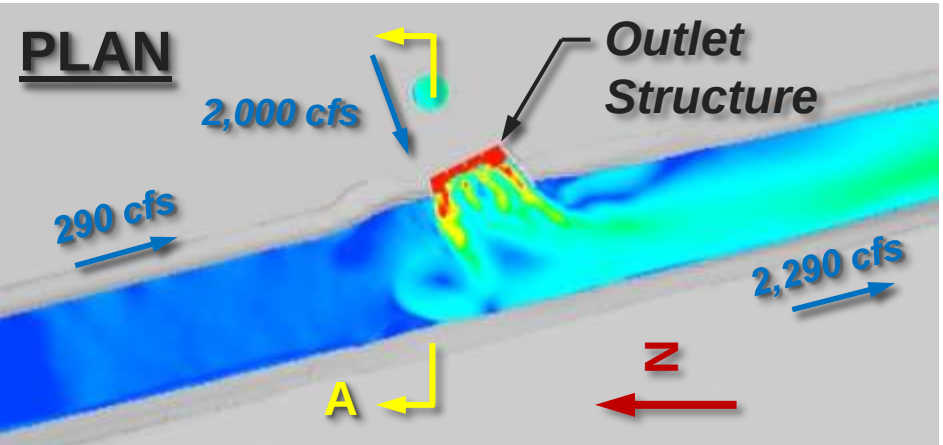


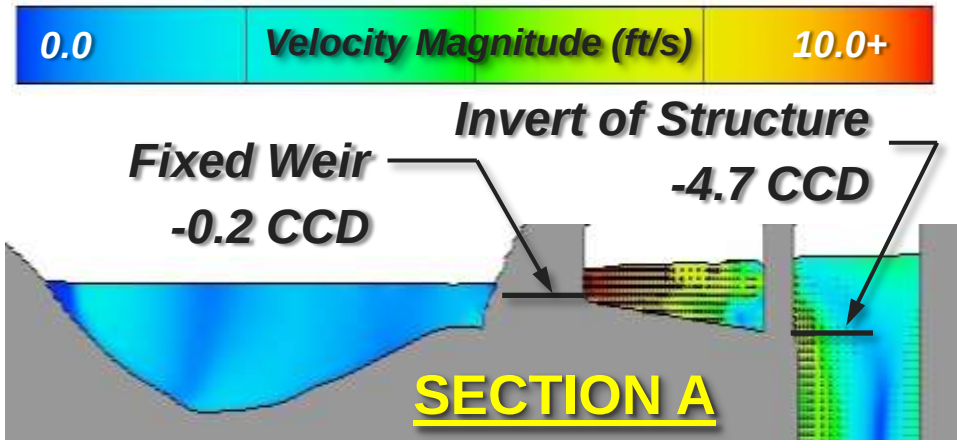
Hydraulic Modeling

Outlet Structure CFD Results – Velocities



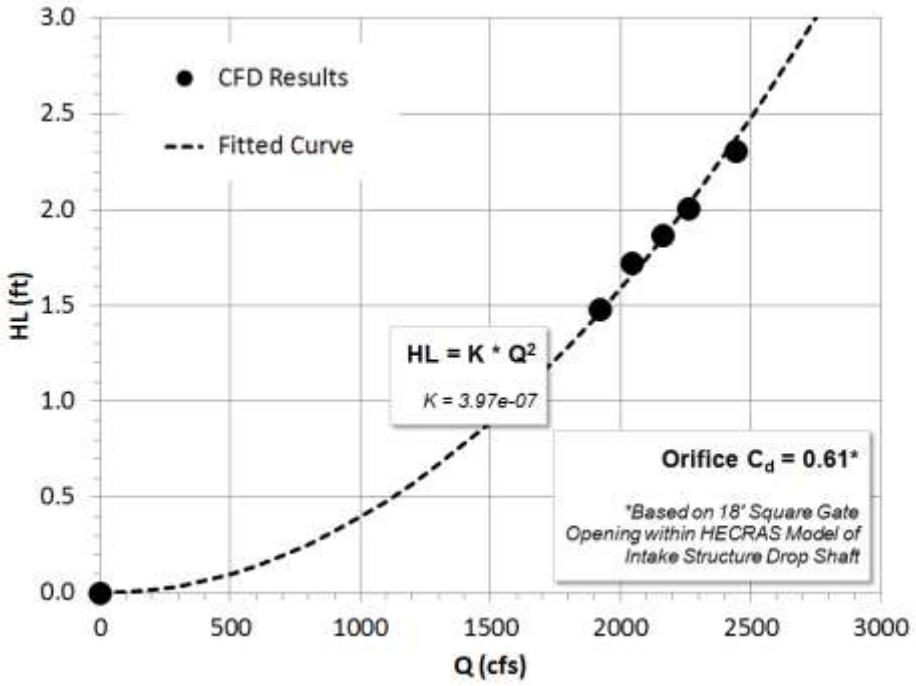






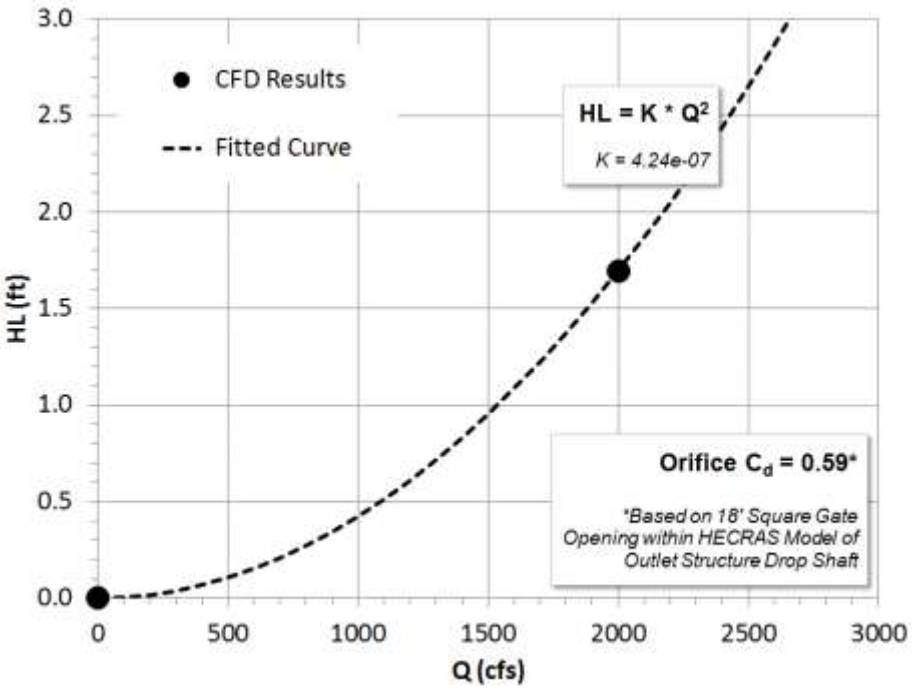
Hydraulic Modeling

Inlet and Outlet Structure CFD Results Head Loss Estimates



Inlet Structure

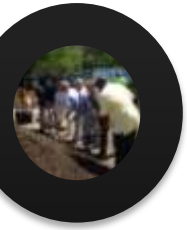
Outlet Structure



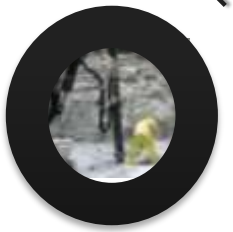
Construction

Construction Timeline

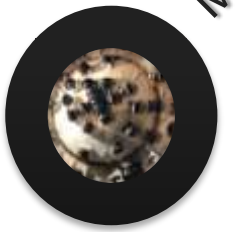
Ground Breaking
May 21, 2015



Rock Blasting at Shafts
November 2016 – May 2017



TBM Assembly begins at Site
March 2017



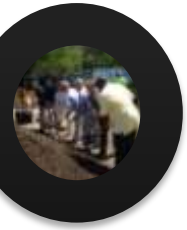
TBM Break Through
September 7, 2017

Construction

Ground Breaking – May 21, 2015

Construction Timeline

Ground Breaking
May 21, 2015



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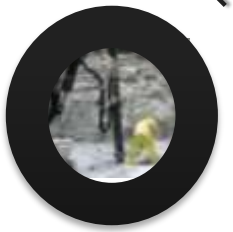

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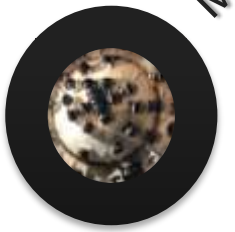
March 2017



TBM Break Through
September 7, 2017

Construction

Start of Rock Blasting at Outlet – November 2016

Construction

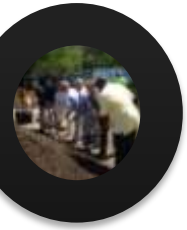
Shaft to Bottom

Construction

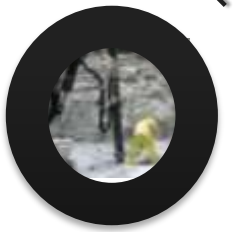
Tunnel Blasting

Construction Timeline

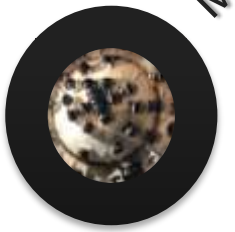
Ground Breaking
May 21, 2015



Rock Blasting at Shafts
November 2016 – May 2017



TBM Assembly begins at Site
March 2017



TBM Break Through
September 7, 2017

Construction

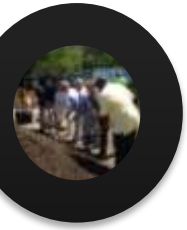
TBM Assembly Begins at Site

Construction

TBM Assembly Begins at Site

Construction Timeline

Ground Breaking
May 21, 2015



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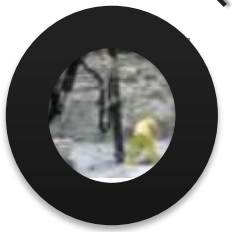
November 2016 – May 2017



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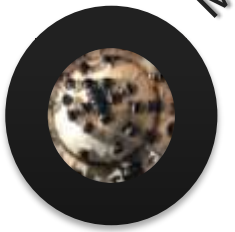
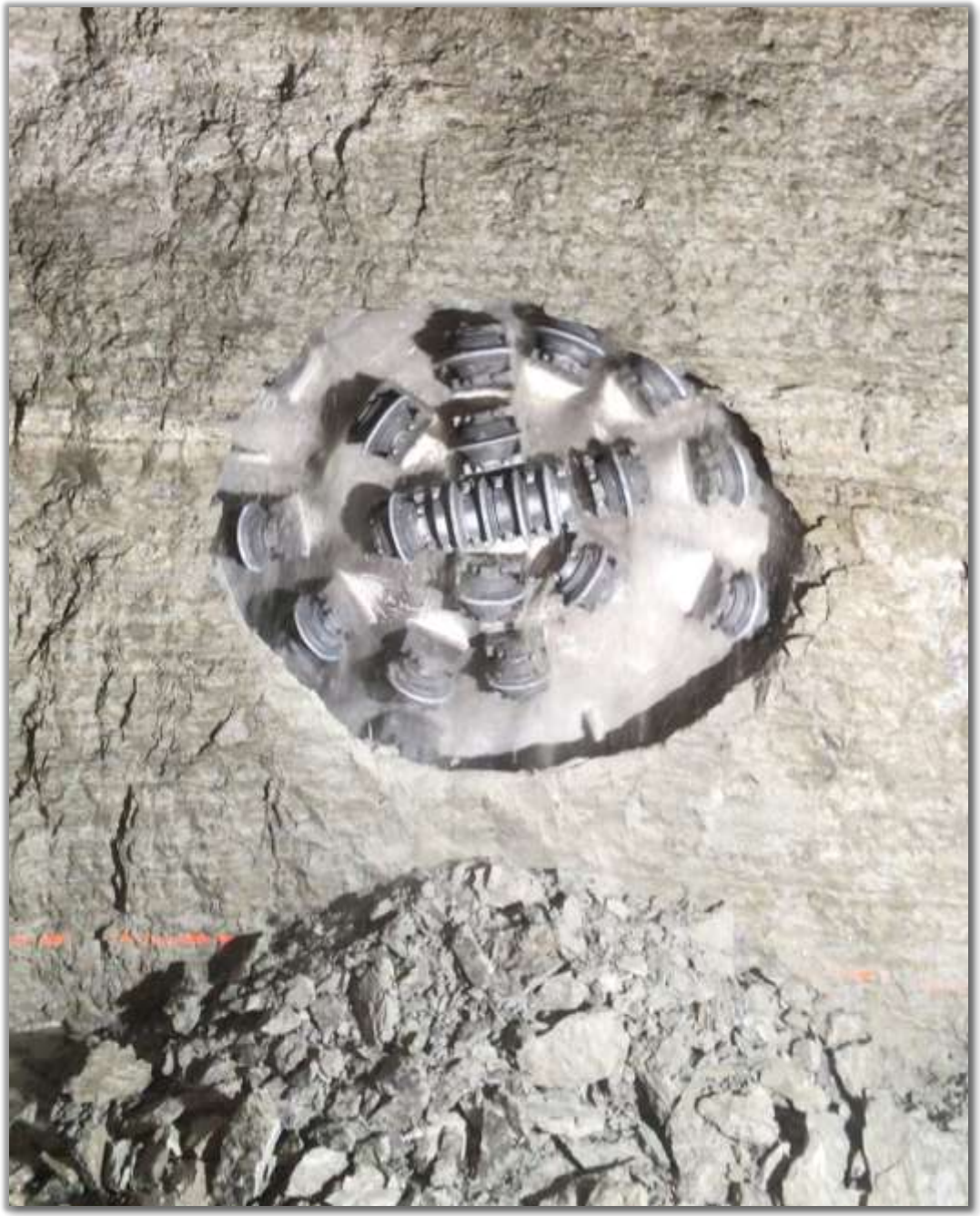
March 2017



TBM Break Through
September 7, 2017

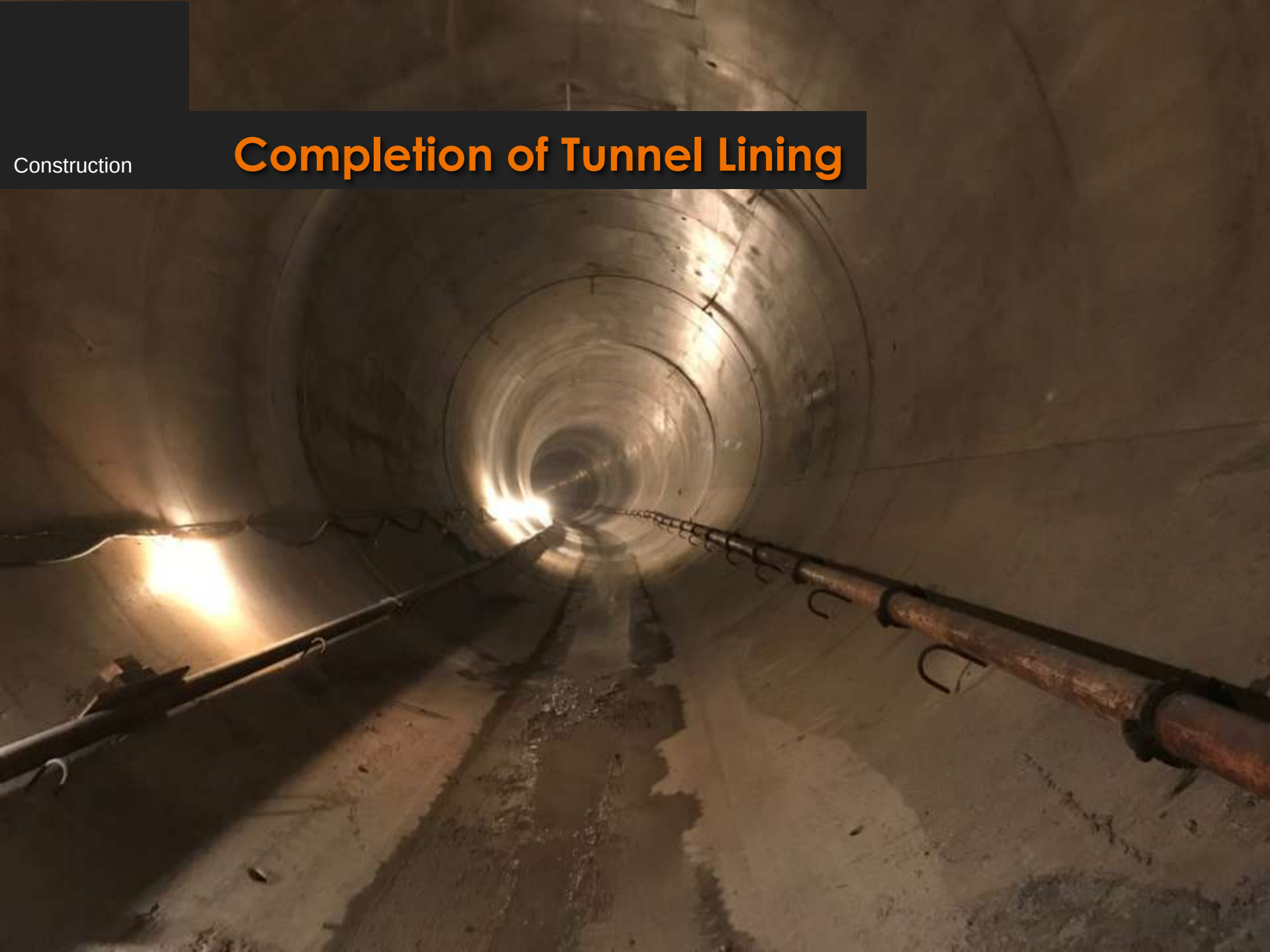
TBM Break Through



Construction Timeline

Construction

Completion of Tunnel Lining



Construction Timeline

Stantec

Media Coverage

Media Coverage

Albany Park Tunnel in the News…

- **WEF Stormwater Institute**
  Worldwater Stormwater Management Magazine Autumn 2016 Edition

- **Online News Media**
  Chicago Tribune, Chicago Suntimes, DNAInfo

- **Television Coverage**
  CBS, ABC

Stantec

Project Designer:

Stantec Consulting Services, Inc.

Construction Management Team:

WSP, USA

Globetrotters Engineering Corporation

Contractor:

Kenny Construction

Questions?