
REPLACEMENT OF THE
NETTLE CREEK AQUEDUCT
exp.

AGENDA

1. INTRODUCTION
2. PROJECT DESCRIPTION
3. HISTORY OF THE CROSSING
4. HYDRAULICS OF THE AREA
5. MODELING AND DESIGN
    a) EXISTING CONDITIONS
    b) PROPOSED CONDITIONS
6. PERMITTING
    a) IDNR
    b) USACE
7. CURRENT PROJECT STATUS
8. QUESTIONS

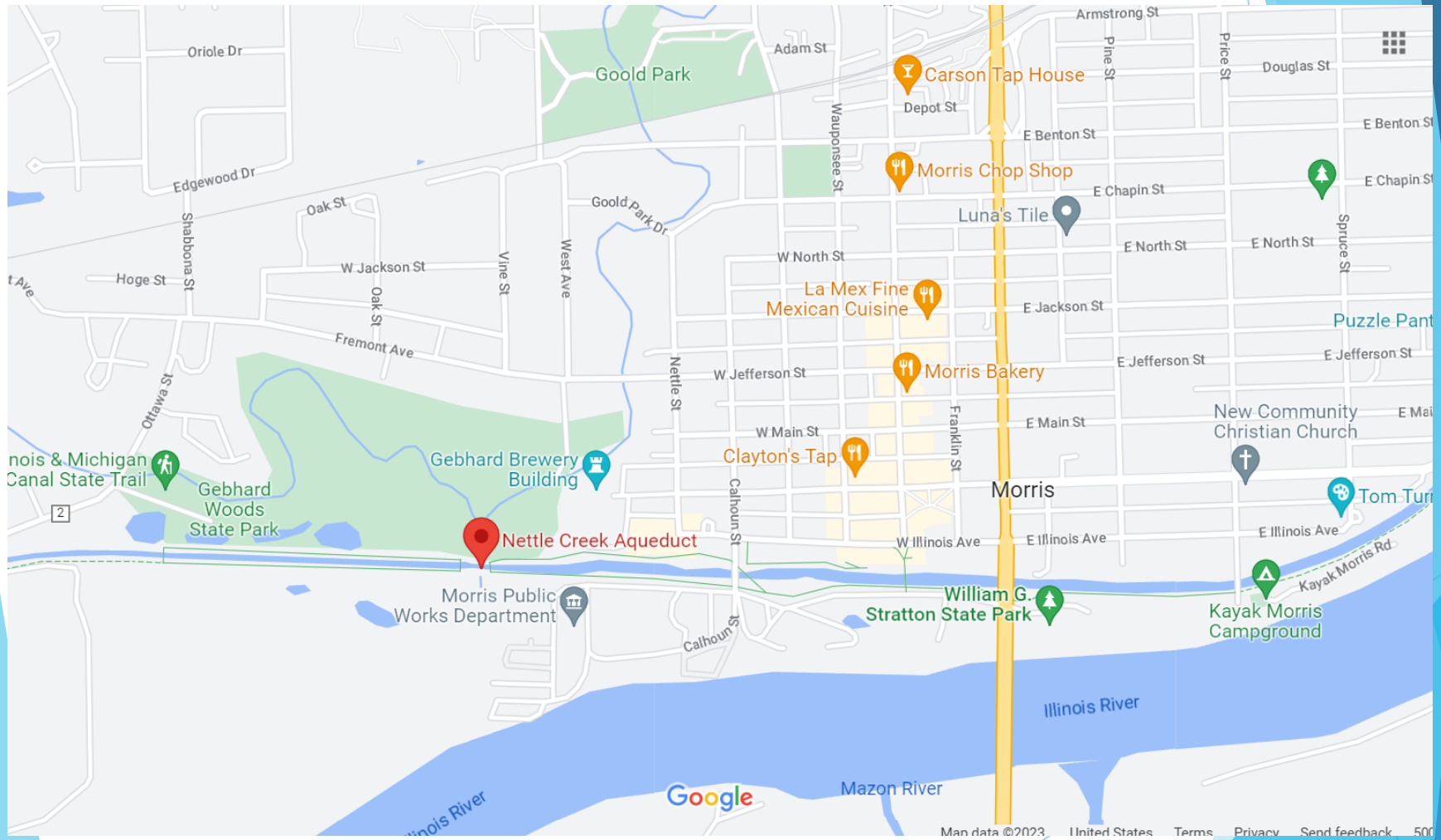
1. INTRODUCTION

Sandy Homola P.E., CFM
Department Manager, Water Resources

Brian Olson, P.E., CFM, CPESC
Senior Water Resources Engineer

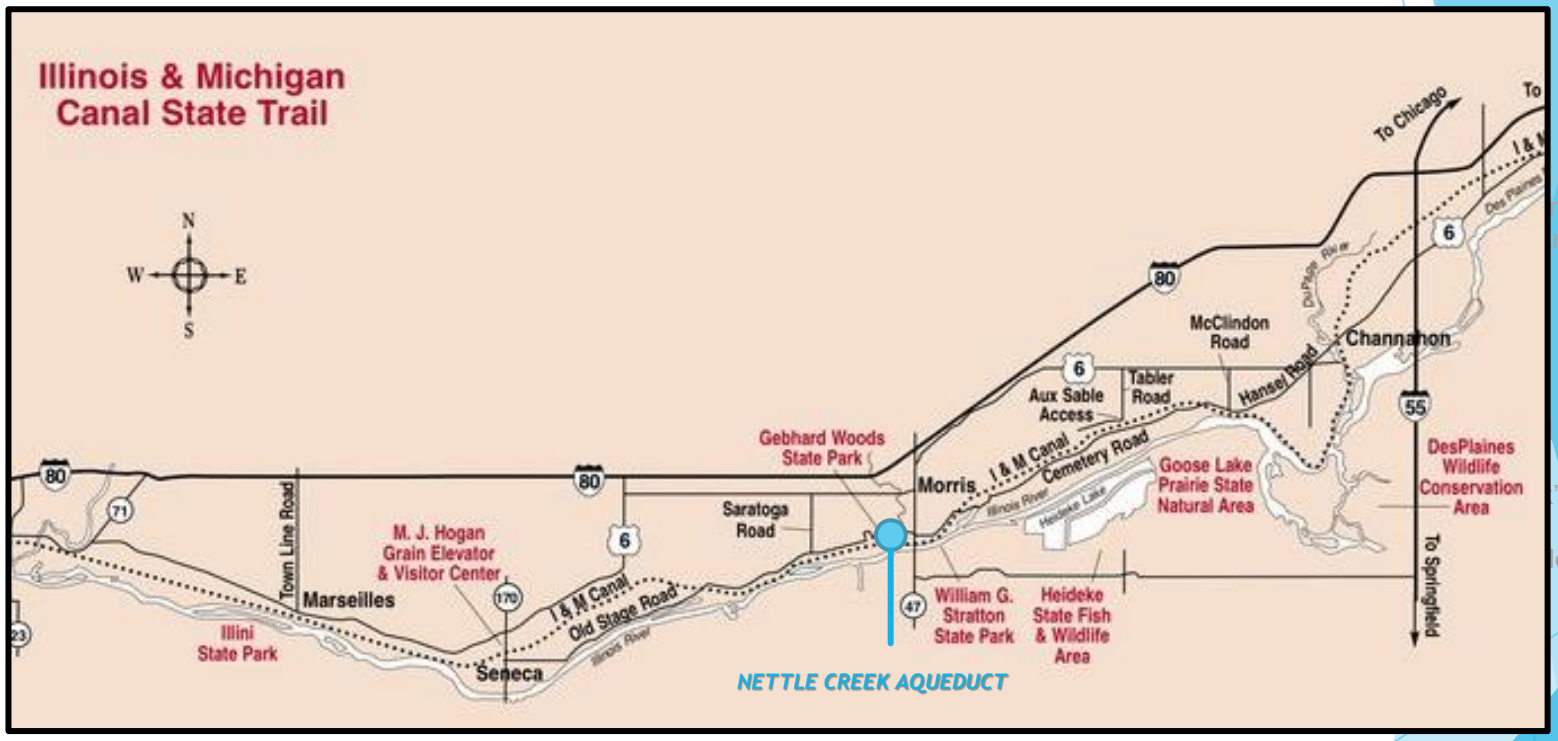
2. PROJECT DESCRIPTION

- Located on the southwest side of Morris, IL (Grundy County).
- The aqueduct carries the Illinois & Michigan (I&M) Canal over Nettle Creek.



The aqueduct also carries the Illinois and Michigan Canal State Trail

- The trail traverses the I&M Canal National Heritage Corridor.
  - Designated in 1984 and the first National Heritage Area in the U.S.
- Pathway runs along the old canal towpath for 61 miles from LaSalle to Lemont.



The Illinois & Michigan Canal State Trail with the location of Nettle Creek Aqueduct located on the map.
Source: https://www.mobilemaplets.com/showplace/4627 & https://www.traillink.com/trail/illinois--michigan-canal-state-trail/

The crossing has been problematic since the first aqueduct was constructed in 1847. Hydraulic conditions have required frequent repairs to and several replacements of the aqueduct.

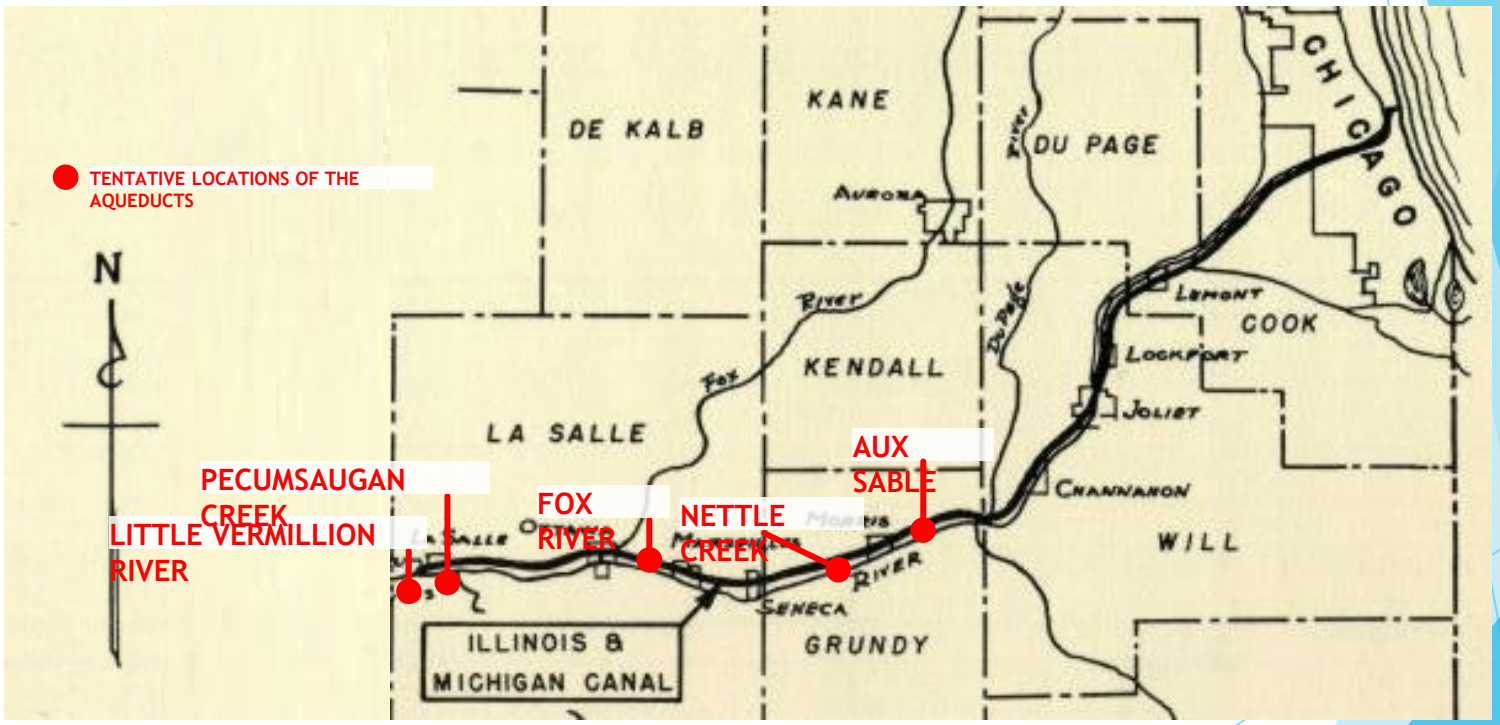
In 2013, the last aqueduct at the crossing collapsed due to overtopping. The I&M Canal was capped at either side of this crossing and the remaining structure was removed. Only the west abutment of the aqueduct remained prior to this project

Nettle creek Aqueduct, after 2013 collapse.

3. HISTORY OF THE CROSSING

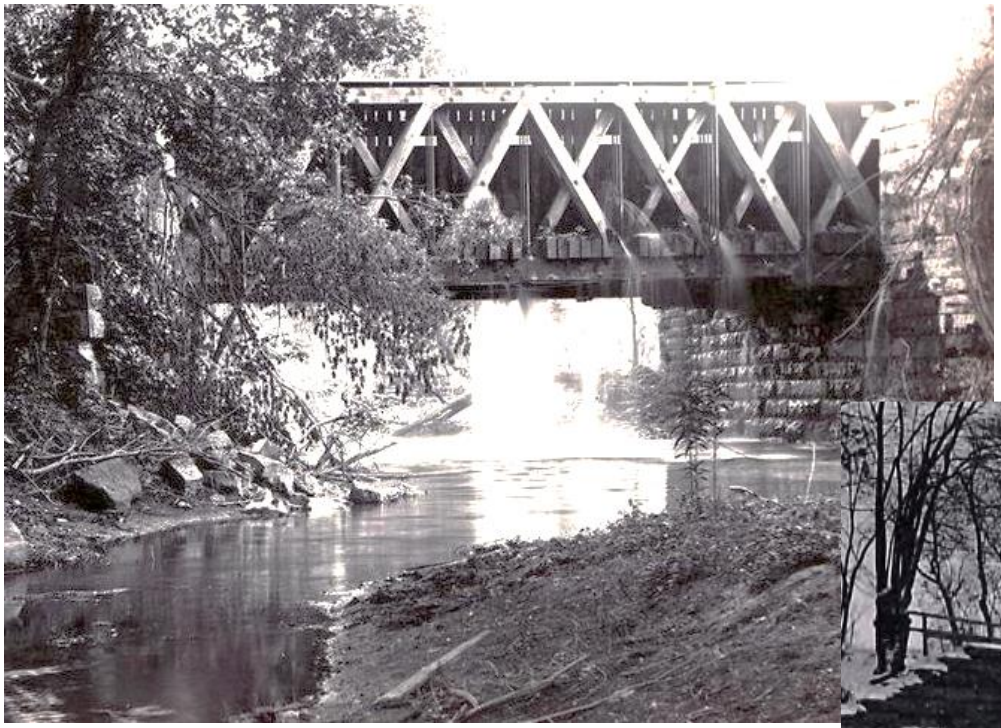
The I&M Canal

- Dug to connect Lake Michigan to the Illinois River (and eventually the Mississippi River).
- Completed in 1848.
- The Nettle Creek Aqueduct was 1 of 5 aqueducts that carried the I&M Canal across major waterways along its route.



Map of the I&M Canal..

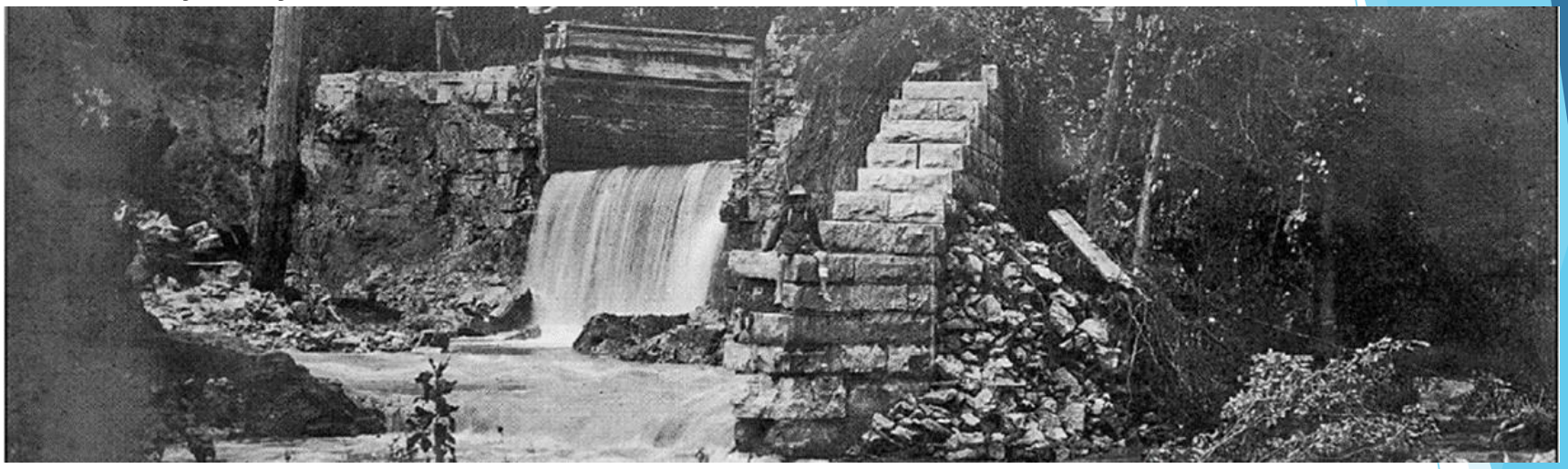
- Aqueduct was original built in 1847 out of wood and sandstone.
- Between 1847 and 1938, at least 7 major reconstructions occurred, including replacements in 1850, 1859, 1868, 1877, 1889, 1910, and 1938.



Photograph of the Nettle Creek Aqueduct, likely dating from the late nineteenth century.

Nettle Creek Aqueduct showing the steel-frame structure that was installed in 1910.

- The most recent reconstruction in 1938-1939 was a to repair an earlier aqueduct destroyed by a flood.



Nettle Creek Aqueduct after a break in the canal in the spring of 1910.

Photograph of the Nettle Creek Aqueduct, taken circa 1974.

- In April 2013, the aqueduct collapsed after a period of extreme flooding.

North elevation of aqueduct showing collapse from 2013 flood; taken from HAER report

View of the rear side of the northern wing wall of the east abutment after collapse.

- In 2017 the entire deck, prism, and eastern abutment were dismantled due to safety concerns. Only a partial west abutment remained.

2020 condition of Nettle Creek Aqueduct.

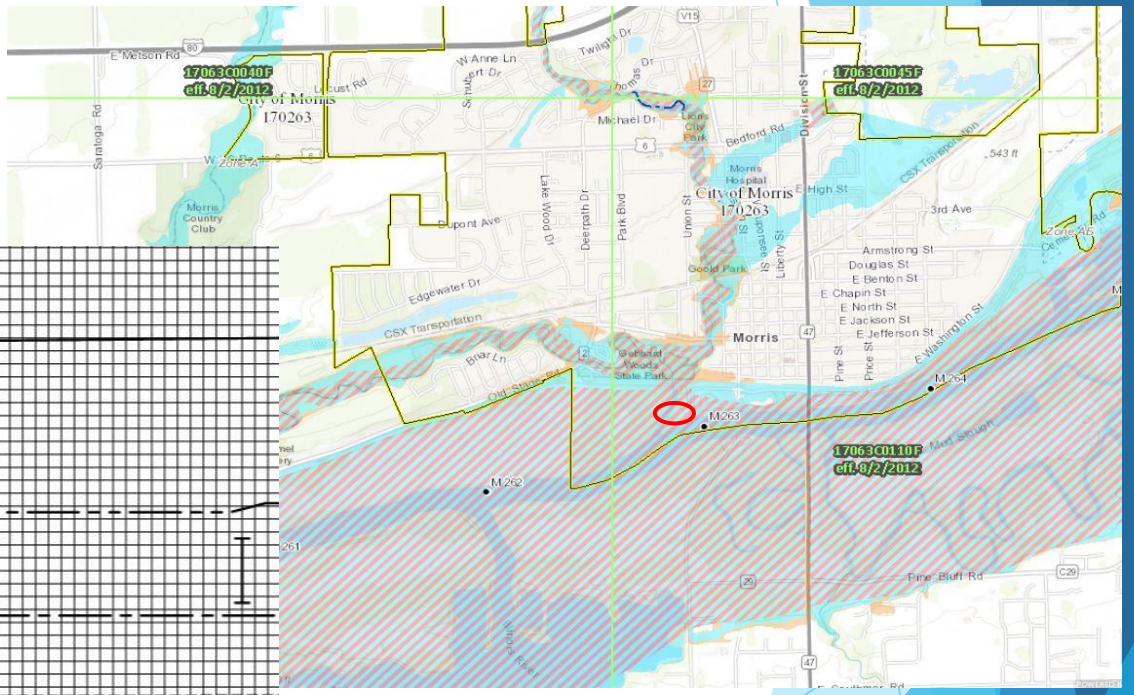
2020 condition of Nettle Creek Aqueduct (Wing-wall) .

4. HYDRAULICS OF THE AREA

Existing Conditions:

- Downstream water surface elevation (WSE) controlled by the Illinois River during storm events (100-Year = 503.00 ft)
- Previously existing aqueduct caused a 2.8 ft jump in WSEs
- I&M Canal flow path/bottom of canal prism is at 498.00 ft

FEMA FIS Flood Profile for Nettle Creek.

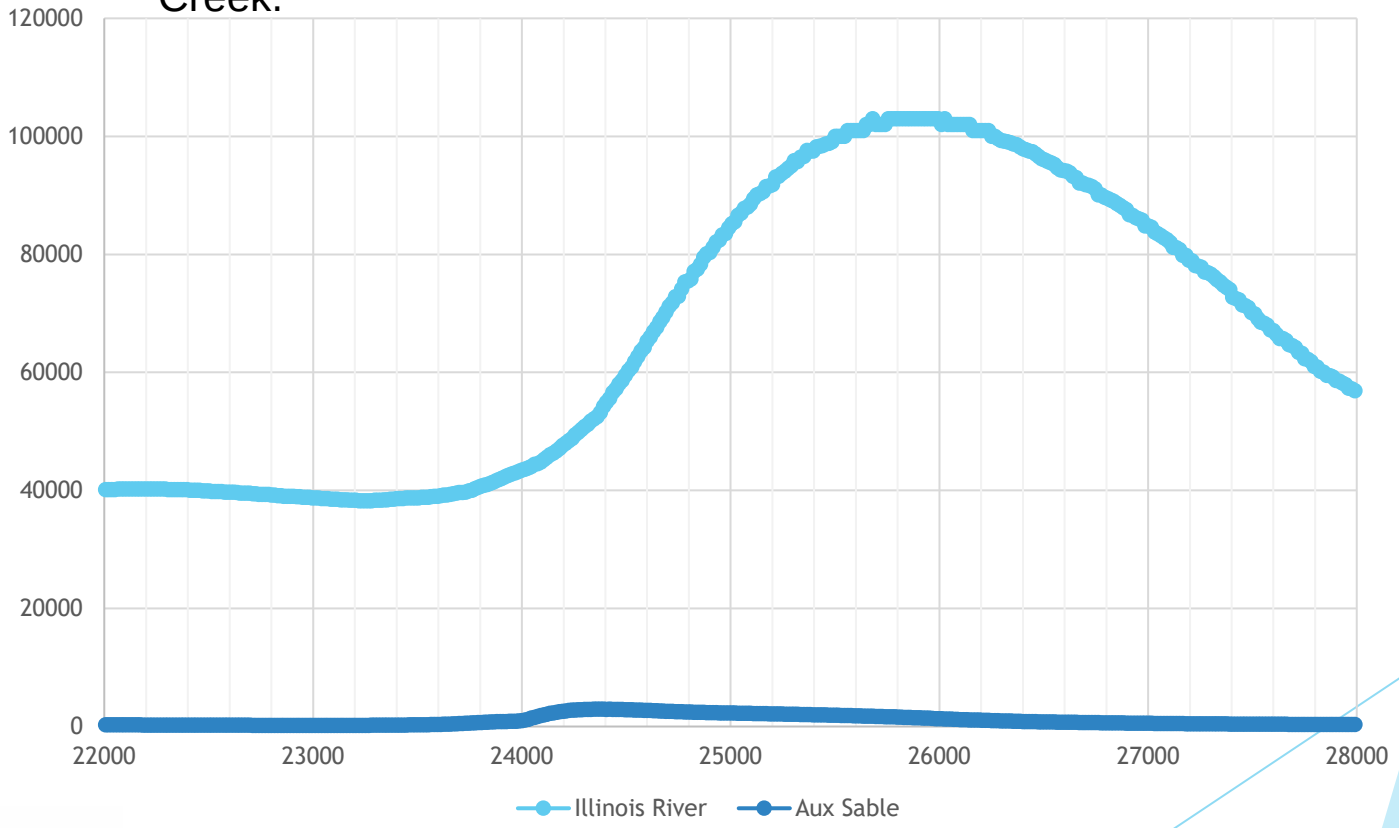


FEMA National Flood Hazard Layer.

4. HYDRAULICS OF THE AREA - Tailwater

Coincidental Tailwater Analysis

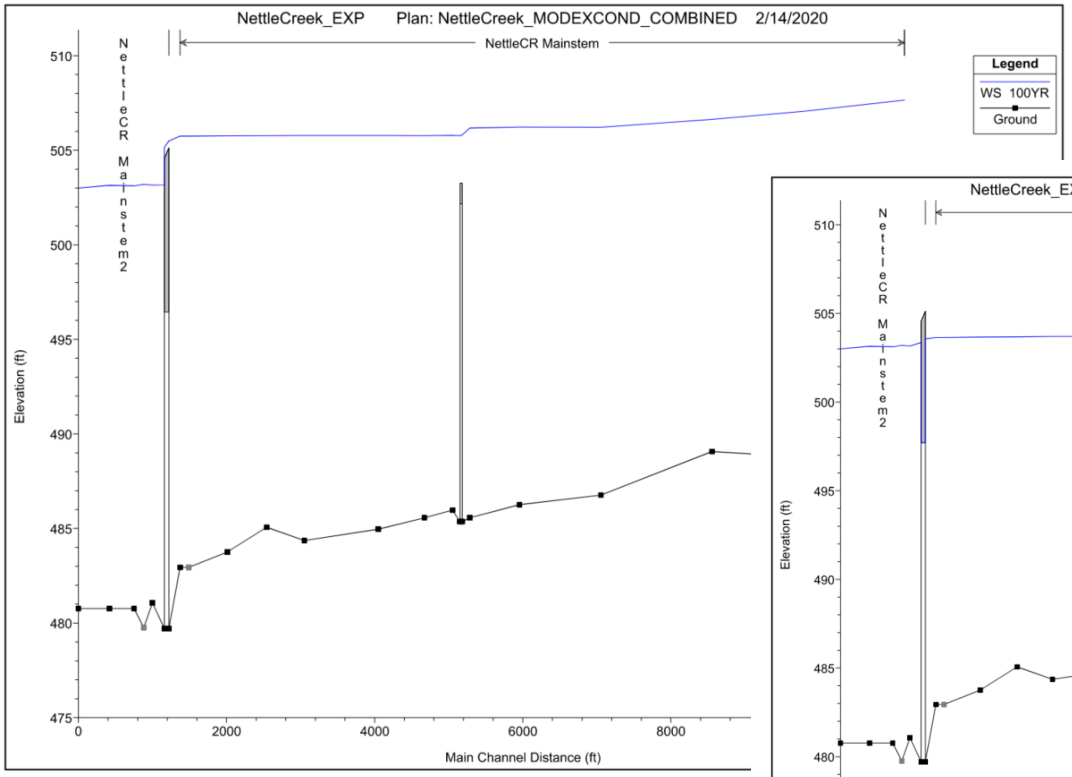
- Conducted an in-depth tailwater analysis.
- Utilized the Illinois River and Aux Sable (no gauge on Nettle Creek).
- Confirmed evidence of peak Nettle Creek flow reaching the Illinois River before peak 100YR elevation of 503.0 is reached at the aqueduct.
- Worse case scenario: 100YR with 10YR tailwater, vice versa, on Nettle Creek.

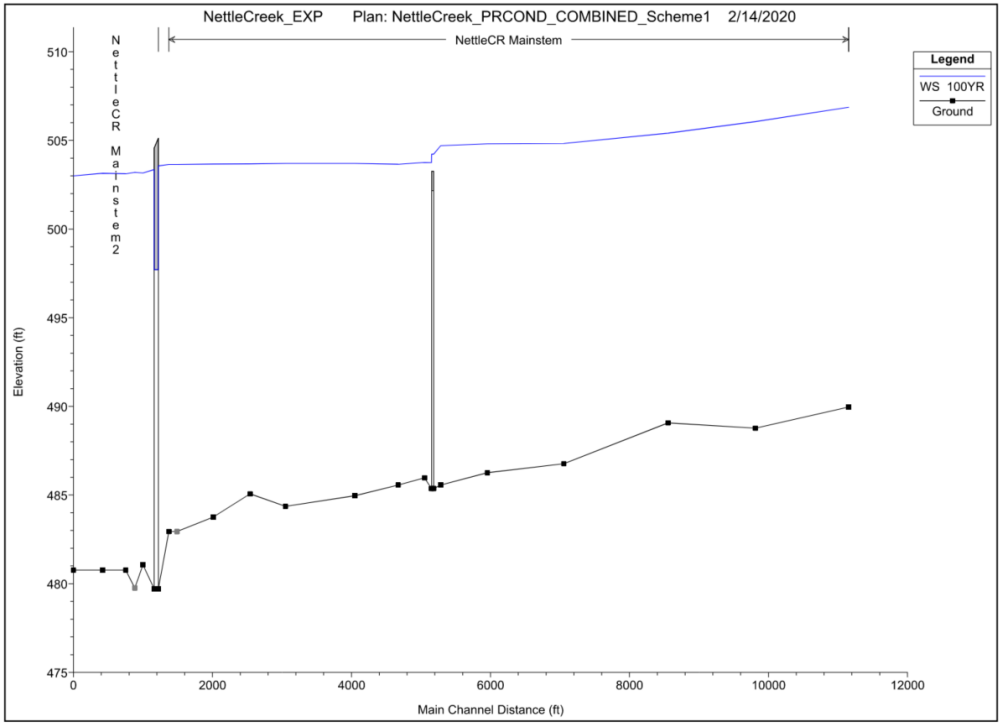


5. MODELING

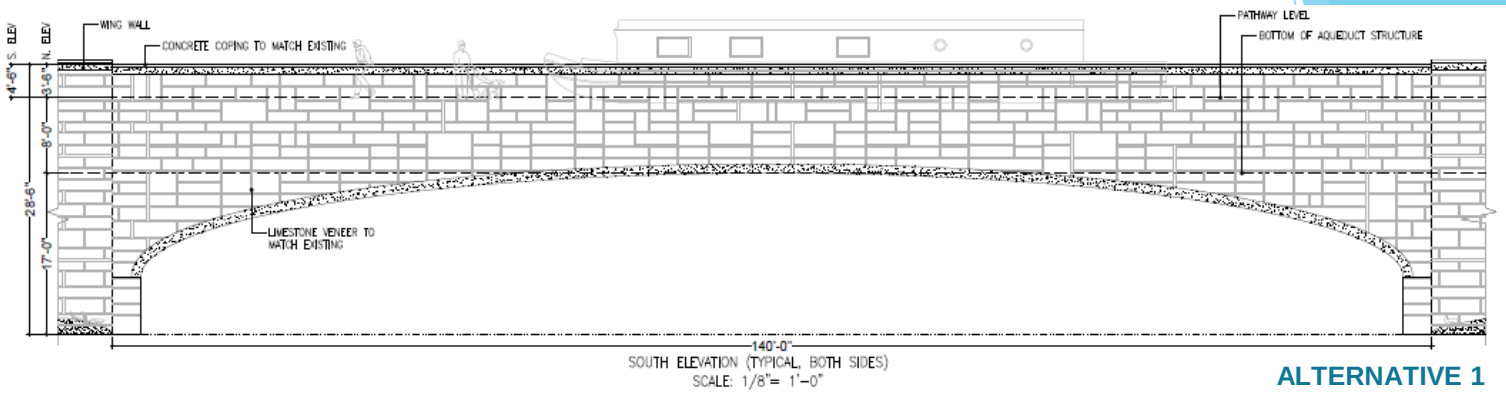
Proposed Conditions Analysis

- Numerous proposed conditions model runs completed.
- Looked at increase in opening area width as compared to hydraulic results.
- A 140-foot width was ultimately chosen, as reductions in water surface elevations started to level off at greater widths.

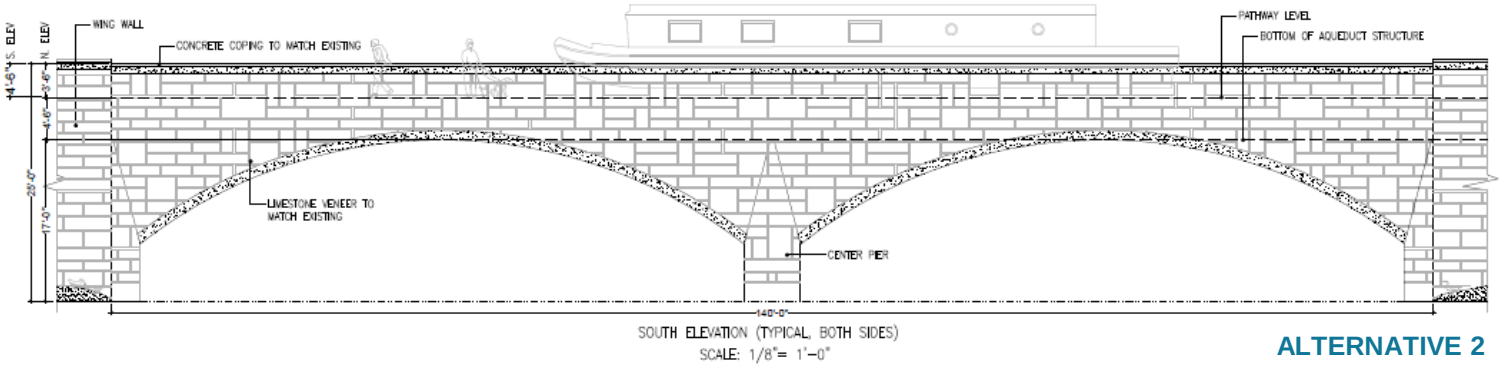




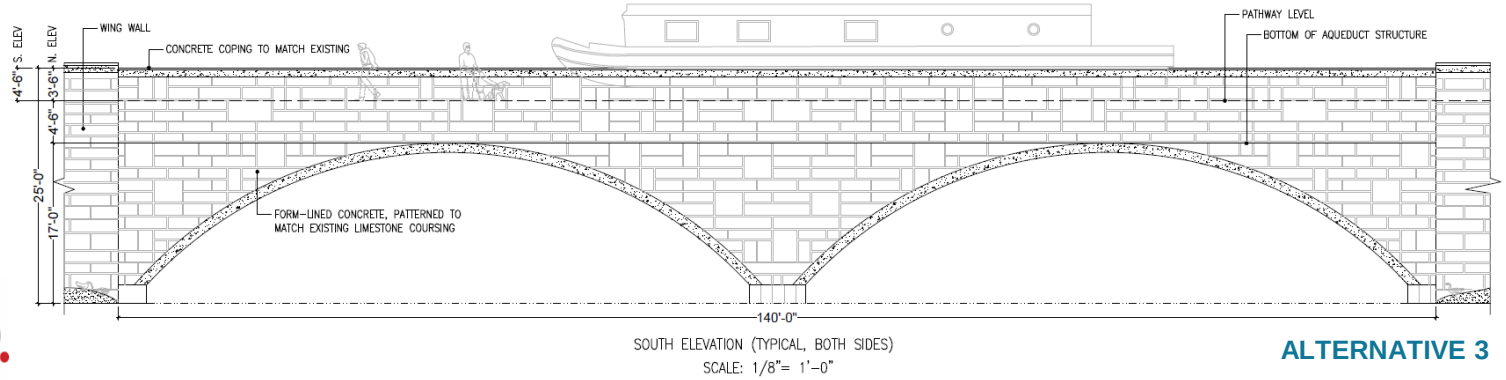
DESIGN ALTERNATIVES



ALTERNATIVE 1



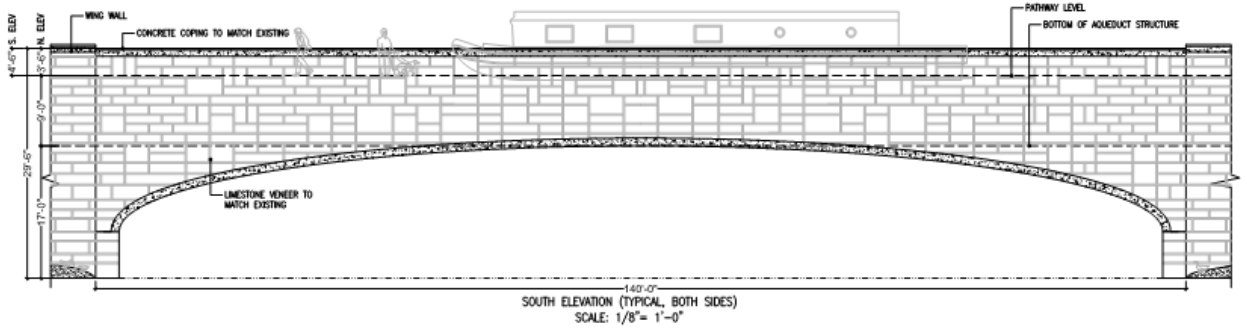
ALTERNATIVE 2



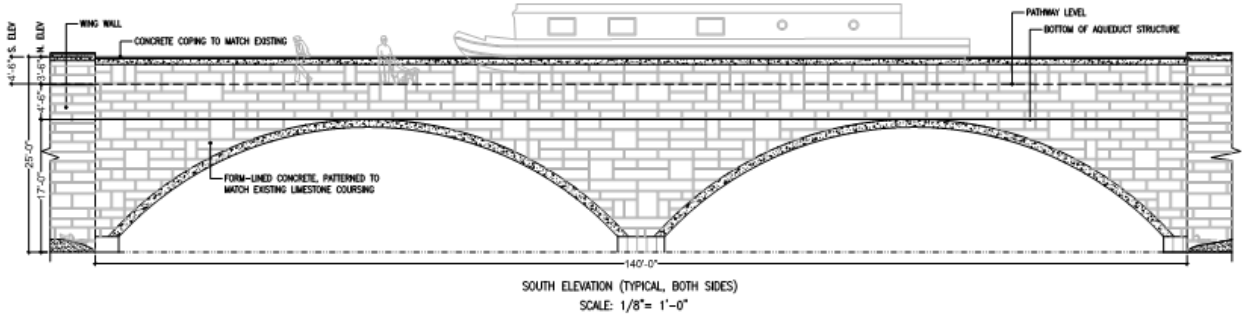
ALTERNATIVE 3

Proposed Alternatives:

- Single span, 140-ft opening lowers upstream WSE by 2.10 ft to 503.65



- Double span, 140-ft opening lowers upstream WSE by 1.98 ft to 503.77



6. PERMITTING

IDNR-OWR

- Floodway Construction Permit under Part 3700 Rules
  - Did not meet rules for reconstruction as the previously existing structure was a source of flood damages, had to apply as new construction.
  - Rules for new construction require that the proposed structure not increase flood elevations more than 0.5 ft over natural conditions at the structure.
    - The proposed structure increased flood elevations by 0.56 ft.
  - If the elevation requirements for new construction cannot be met, it must be shows that the project is reducing flood elevations to the fullest extent possible.
    - The proposed structure reduces flood elevations by 1.8 ft from modified-existing conditions.

USACE

- Permit required for in-stream work within Nettle Creek (WOUS).
- Permit issued under:
  - Nationwide Permit 13: Bank Stabilization (Permanent Impacts)
  - Nationwide Permit 30: Temporary Construction, Access, and Dewatering

7. CURRENT PROJECT STATUS:

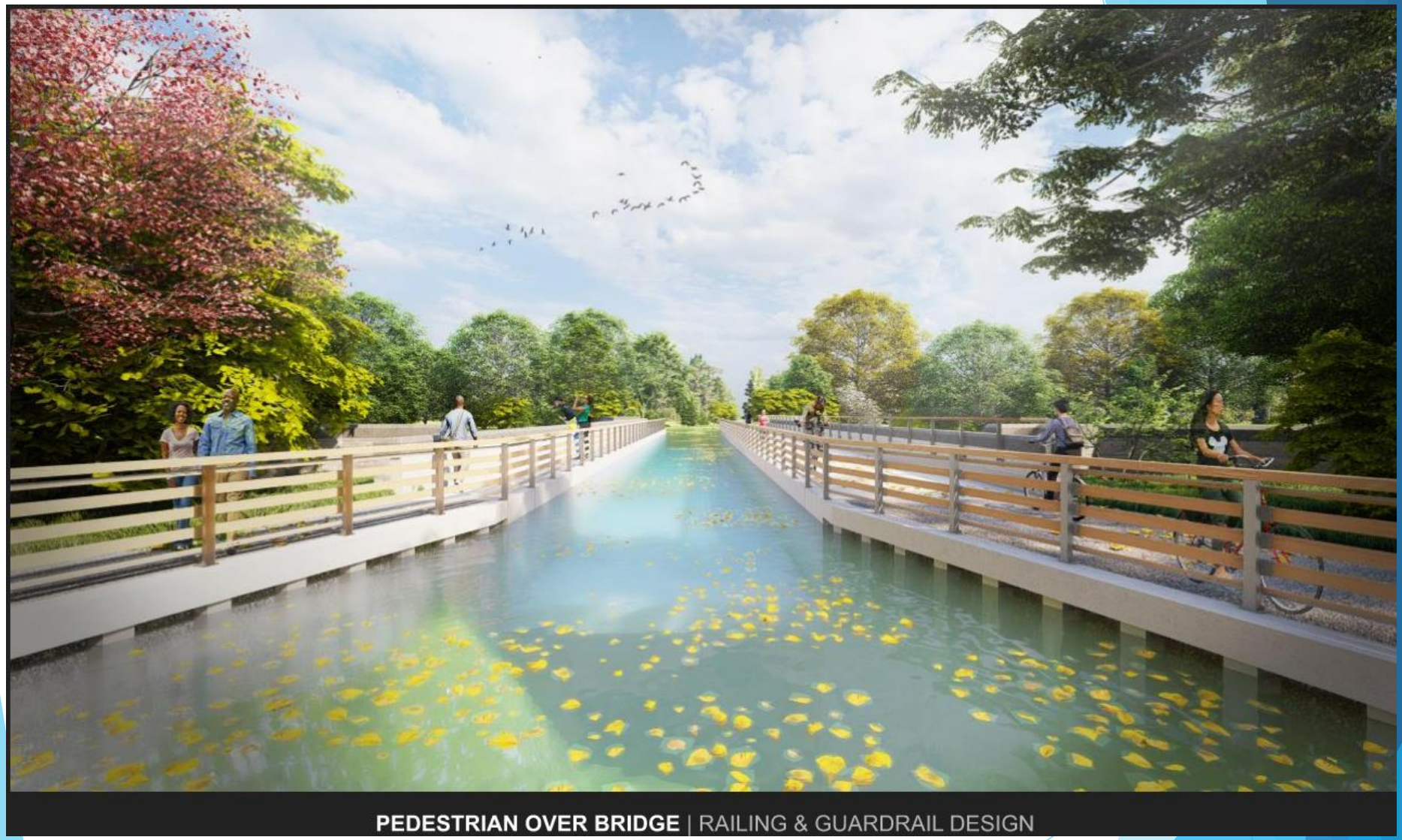
Under Construction: Framing to pour the west abutment

Construction drone photo: October 27, 2022.

Construction drone photo: October 27, 2022.

AQUEDUCT ELEVATION | SOUTH VIEW

Rendering prepared by JLK Architects.



Rendering prepared by JLK Architects.

QUESTIONS?