Muskingum County
Philo Bridge

Replacing the Historic Truss

- Mark Eicher PE, PS – Muskingum County Engineer
- Shawn Johnson – Project Manager, MCEO
- Peter Narsavage PE – Geotechnical Manager, ELR
- Tim Sheldon PE – Bridge Engineer, ELR

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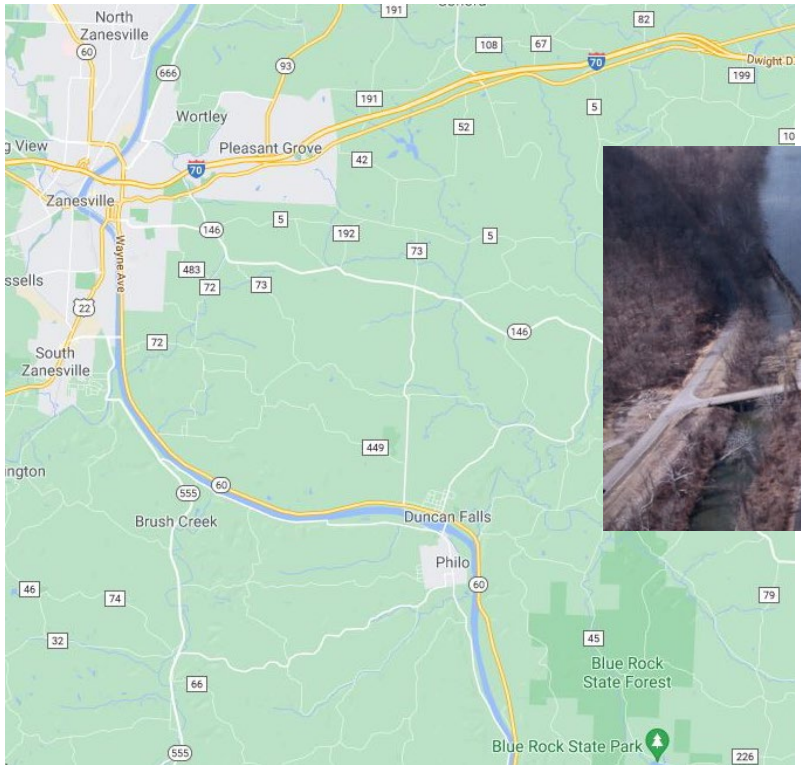
Bridge Location



9 miles south of Zanesville

Linking the Village of Philo and the unincorporated area of Duncan Falls

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Bridge History

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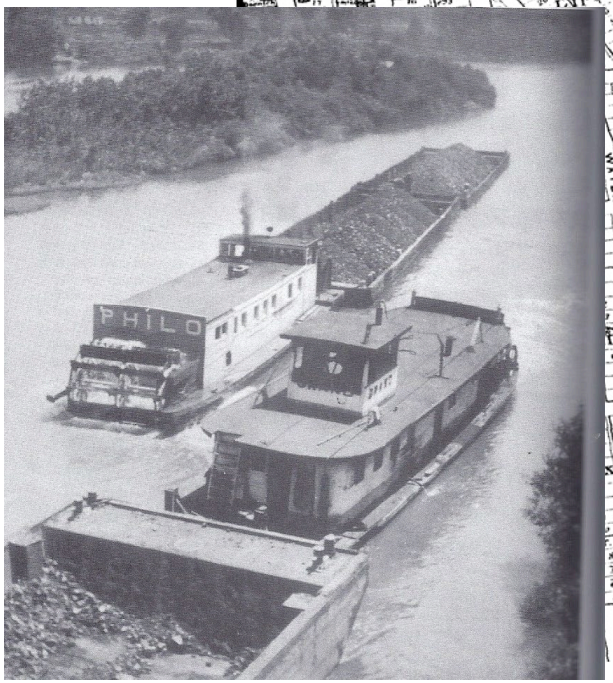
Bridge History

Original Dam built to power sawmill and gristmill in 1828.

Dam and property rights signed over to the State of Ohio as part of commercial navigation for Ohio and Erie Canal in 1836.

Original canal lock system built in 1840.



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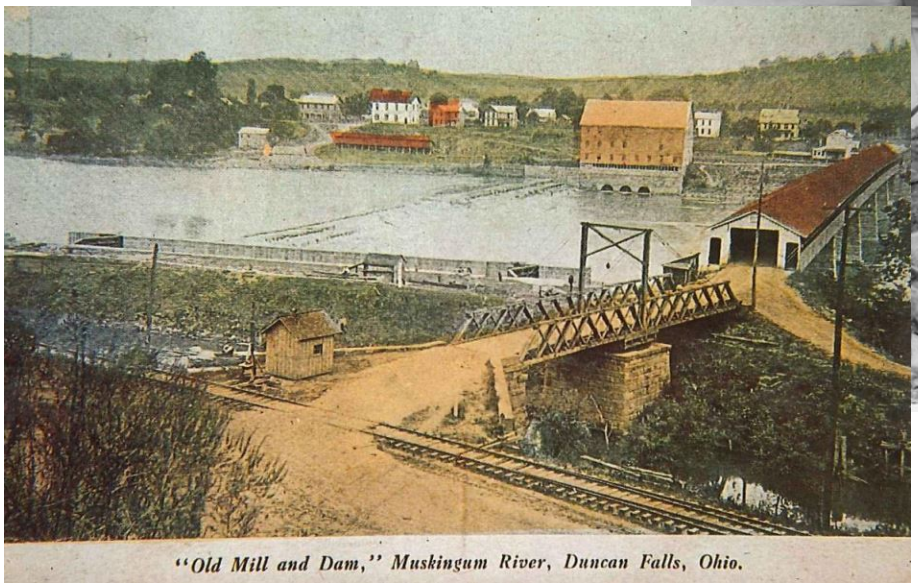
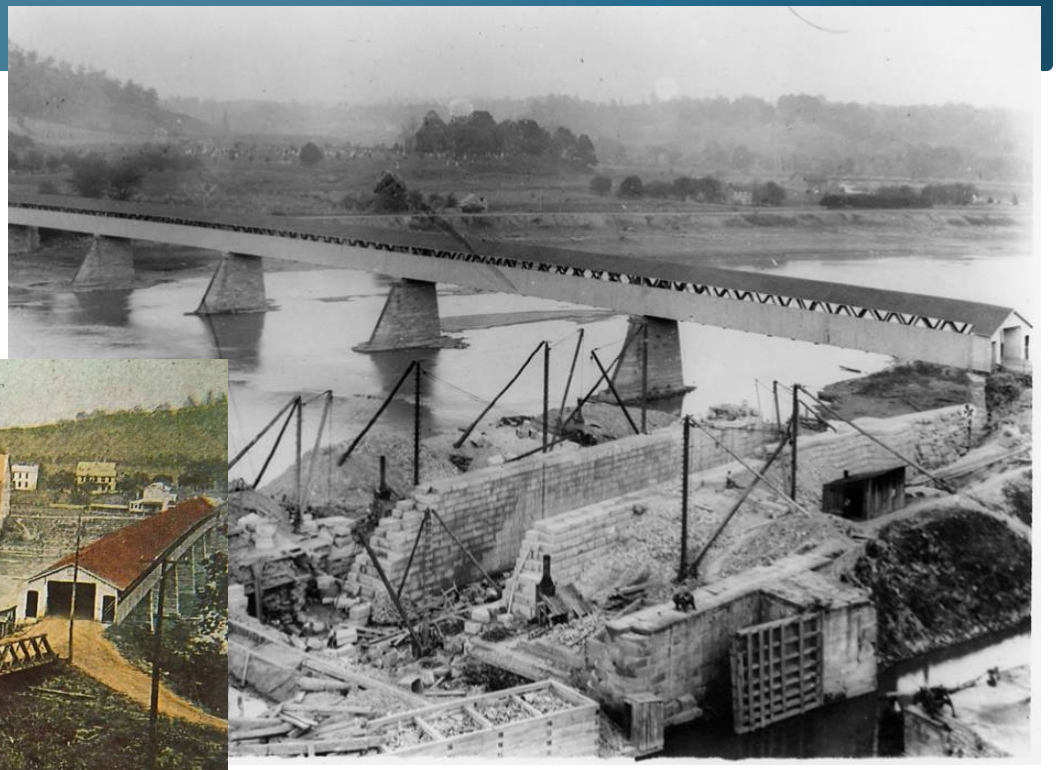
Bridge History

Original covered bridge and piers built in 1875.





New Lock#9 built in 1885.

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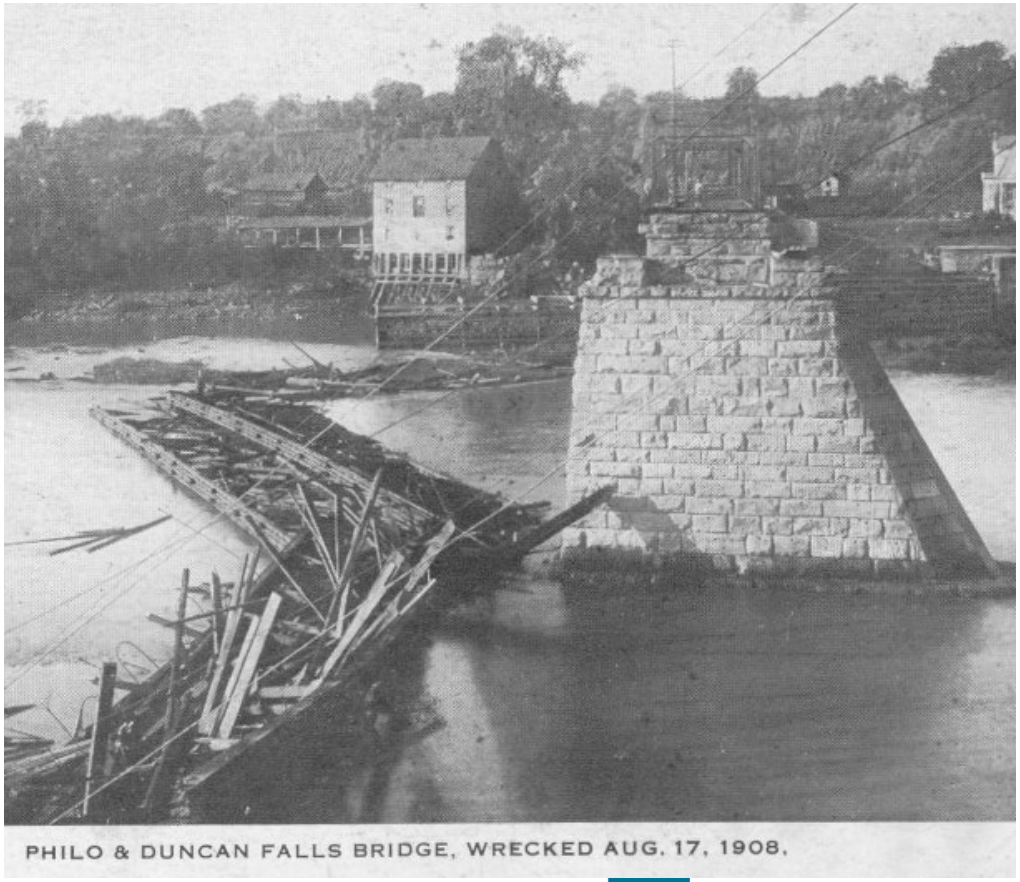
Bridge History

WRECKED BY CYCLONE AUG 27, 1908, MUSKINGUM RIVER



PHILO & DUNCAN FALLS BRIDGE, WRECKED AUG. 17, 1908.

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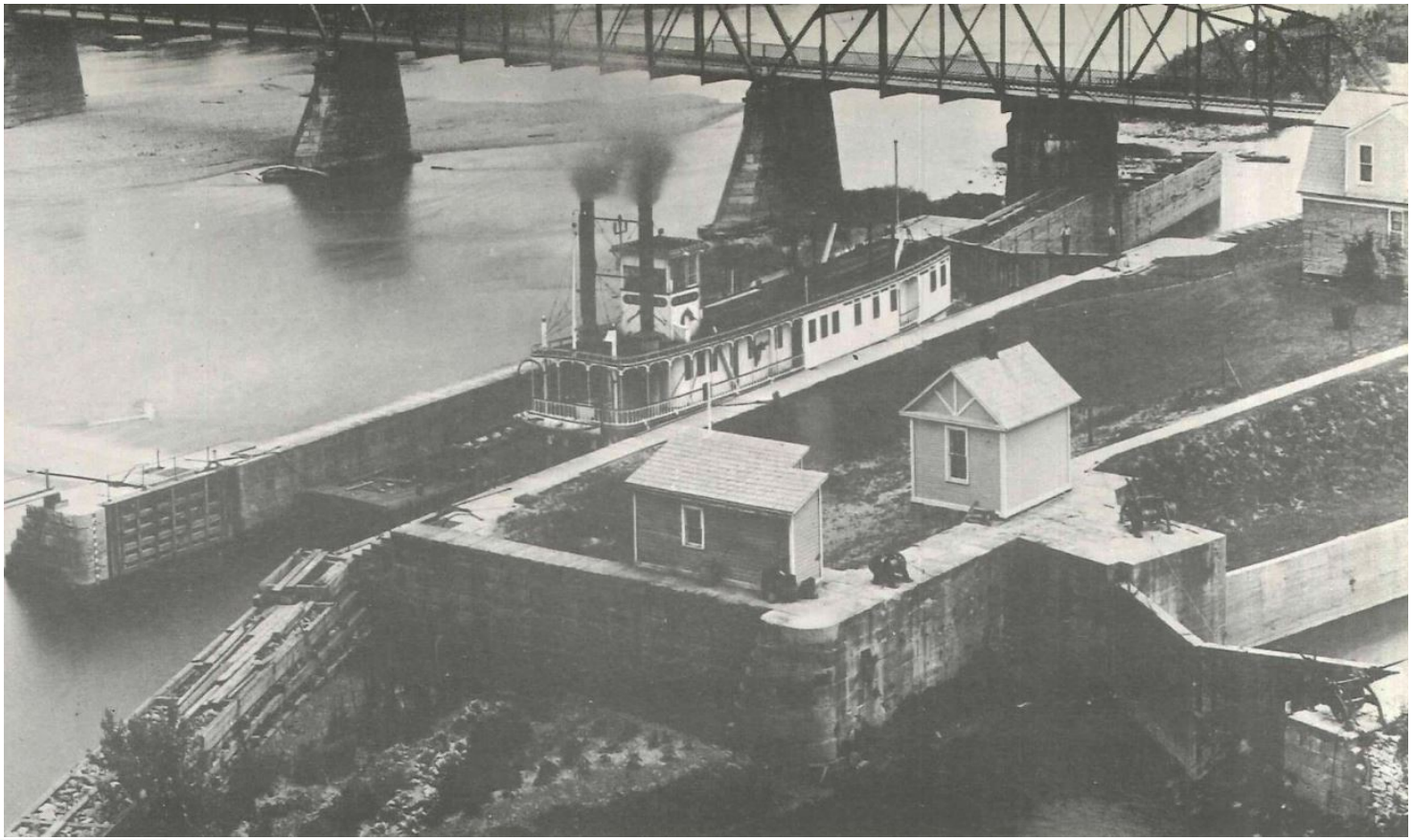
Bridge History



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Bridge History

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Bridge History

All spans rebuilt after 1913 flood

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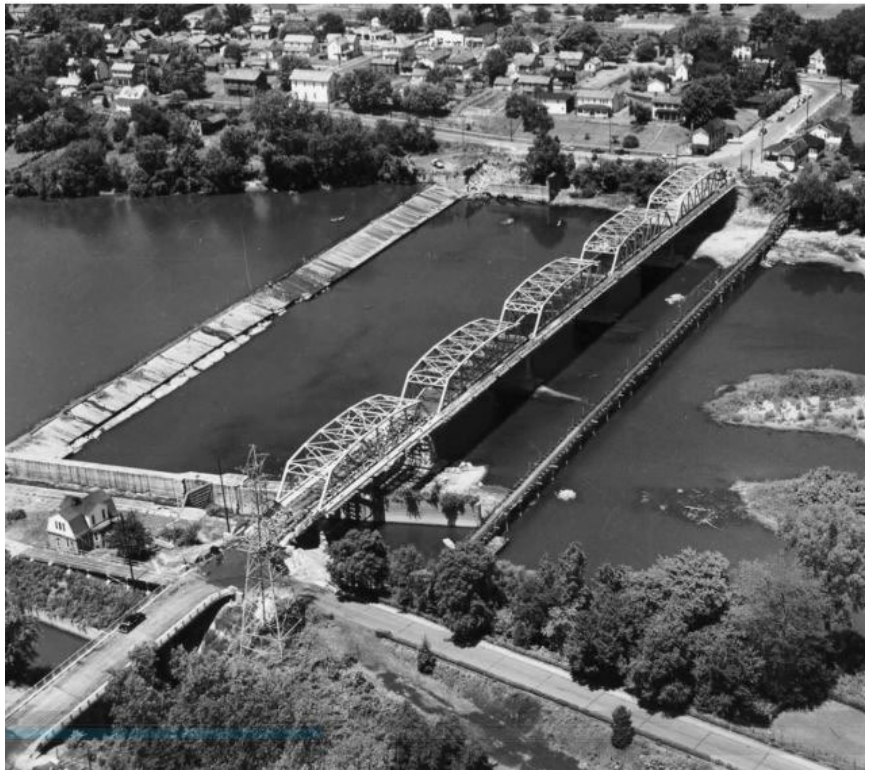
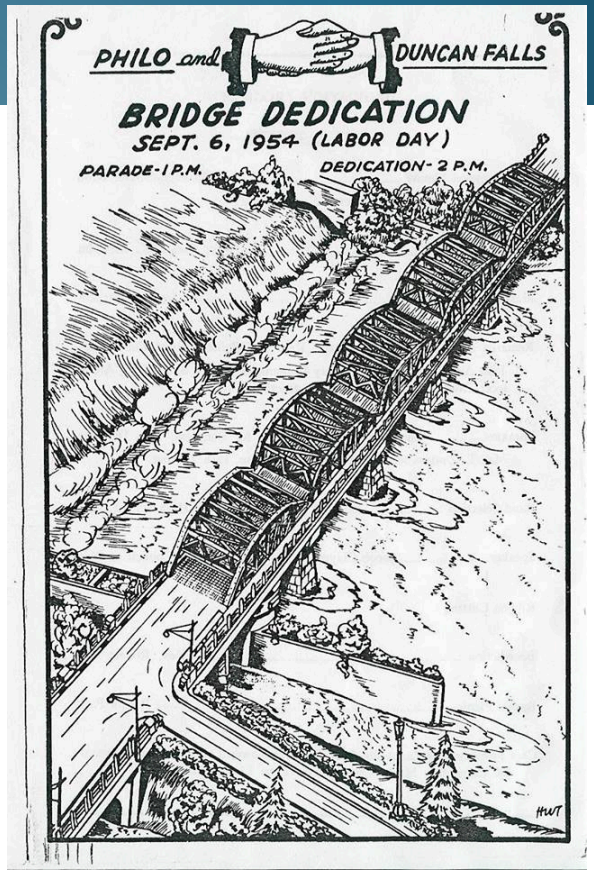
Bridge History





All spans and pier caps replaced in 1954 for $805,365.06

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Bridge Maintenance

Stringer beam replacement

Metal deck replacement

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Bridge Maintenance

MAINTENANCE & REPAIRS

Year	Description	Cost
1978	Removal of open grate decking from swing span, Ohio Bridge Corp.	$143,170.00
1989	Repainting of entire bridge, RIE Sandblasting and Painting	$86,250.00
1992	Repainting of floor beams and stringers, Ohio Bridge Corp.	$9,600.00
1992	Repair of stringers, Ohio Bridge Corp.	$7,292.52
1994	Replacement of curbs and 64 floor stringers, Ohio Bridge Corp.	$269,583.40
1995	Replacement of 4 sections of the deck, Ohio Bridge Corp.	$18,222.00
1995	Repainting of railings and repair of swing span supports, Ohio Bridge Corp.	$23,189.25
2006	Reinforcement of one floor beam and replacement of stringers on swing span, MCEO	$76,357.48
2007	Resurfacing of asphalt on entire bridge, Shelly and Sands, Inc.	$50,760.71
2011	Replacement of a portion of 1978 steel deck in north bound lane on swing span, MCEO	$91,100.01
2014	Replacement of a portion of 1978 steel deck in south bound lane, expansion joint on swing span, approach slab and expansion joint on Duncan Falls side, MCEO	$43,453.67
	Repairs Total	**$818,979.04**

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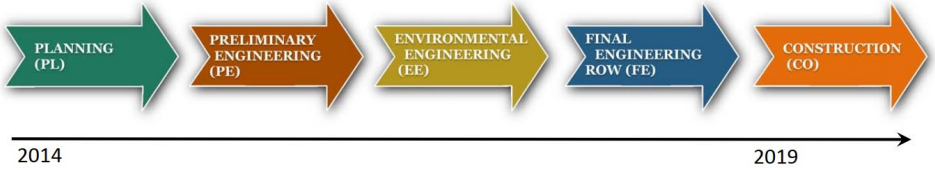
Funding/Project Timeline

2007 - Letter to Senator for $2,000,000 to sandblast and repaint.

2008-2012 - Explore various funding opportunities for replacement.

BRIDGE REPLACEMENT — KEY QUESTIONS

Where will the new bridge be located? The new bridge location is not yet determined. We are in the early planning portion of the bridge replacement process. There are many considerations; including traffic patterns, right of way impacts, economic effects, and environmental impacts. We want the community to understand the process and be involved. Multiple locations and a No-Build option will be evaluated. The analysis of various alternatives will be shared at a future public meeting before any decision is made. Pros and cons will be summarized for each option.



November 2013 - Received approval $5,000,000 federal funds from CEAO-LBR Program.

November 2014 - Public meeting held to discuss history, maintenance, funding. Selected consultant to evaluate location alternatives as required.

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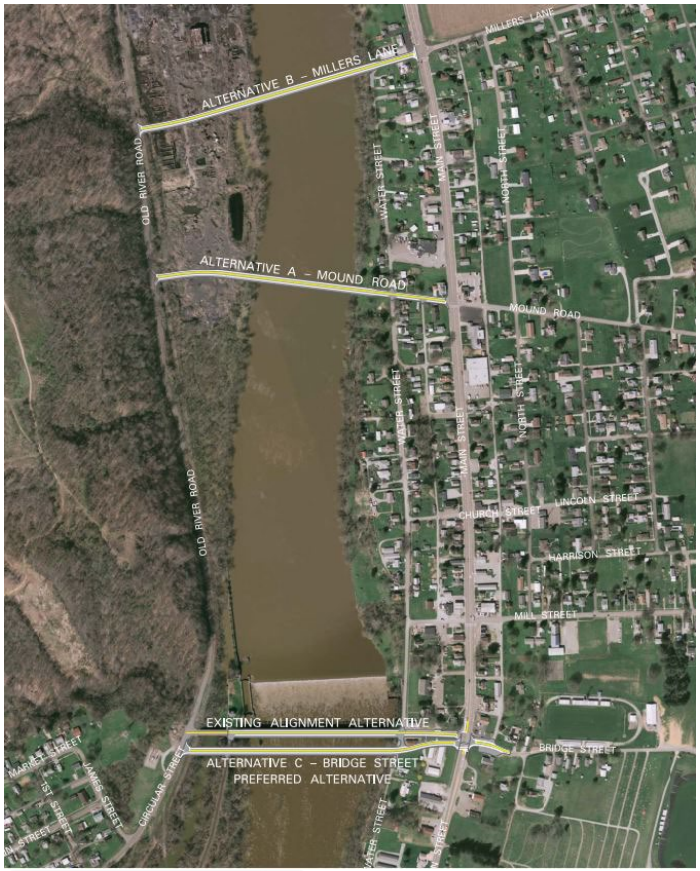
Funding/Project Timeline



February 2016 – Added 4th alternative for consideration.

May 2016 – added design, environmental, ROW services to consultant contract.

June 2016 - Public meeting to present alternatives. Strong community support for location just downstream of existing bridge.

Summer 2016 – Feasibility Study complete, Alternative C selected as preferred alternative.

September 2016 - Survey field work completed, and Stage 1 plans submitted.

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Funding/Project Timeline

Fall 2016 - Received approval for $13,985,594 federal funds from Local Major Bridge

	Federal Match %	Federal Funds	Credit Bridge	Local Match %	Local Funds	Total
Preliminary Engineering	80%	$205,904		20%	$51,476	$257,380
Environmental & Design Engineering, R/W Services	80%	$1,106,410		20%	$276,602	$1,383,012
R/W Review Services	100%	$53,491		0%		$53,491
R/W Acquisition & Utility Relocation	80%	$1,600,000	$300,000	5%	$100,000	$2,000,000
Local Major Bridge - Construction	95%	$13,070,649		5%	$653,532	$13,724,181
CEAO – LBR* Construction	80%	$1,730,869		20%	$432,717	$2,163,586
Local Major Bridge - Construction Inspection & Engineering	95%	$914,945		5%	$48,155	$963,100
CEAO – LBR* Construction Inspection & Engineering	80%	$56,817		20%	$14,204	$71,021
Local Funded - Construction Engineering & Inspection				100%	$78,022	$78,022
Grand Total		**$18,739,085**	**$300,000**		**$1,654,709**	**$20,693,794**

**CEAO – LBR = County Engineer's Association of Ohio – Local Bridge Program*

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Funding/Project Timeline

January 2017 – Structure Type Study approved

February 2017 – R/W acquisition process started and accelerated

March 2017 – Received Environmental Clearance

Spring 2017 – Offers made to property owners

Winter 2017 – Final plans complete and submitted

Spring 2018 – Advertise for bids and bid award administered by ODOT

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DESIGN

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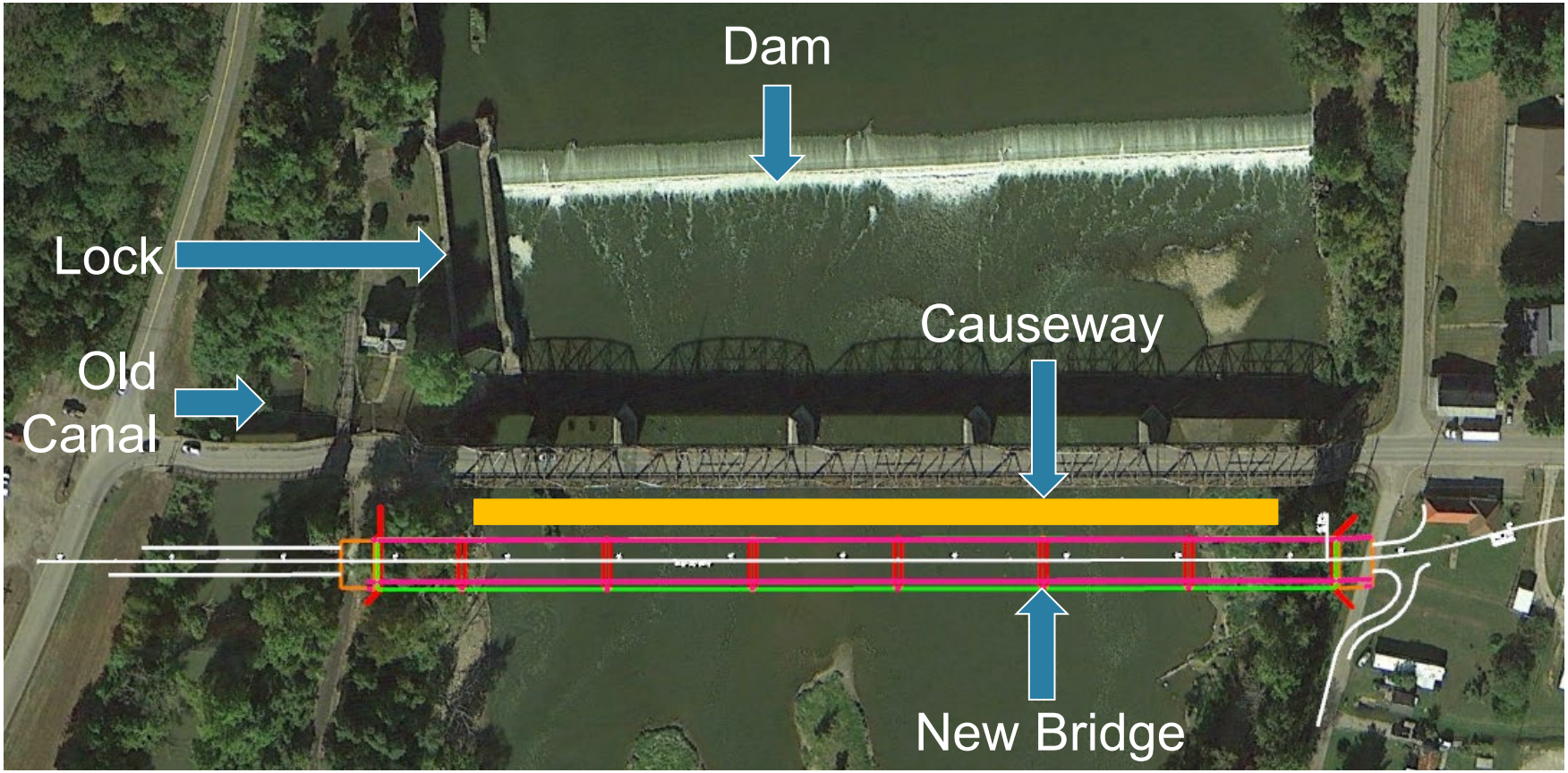
Design - Site Layout



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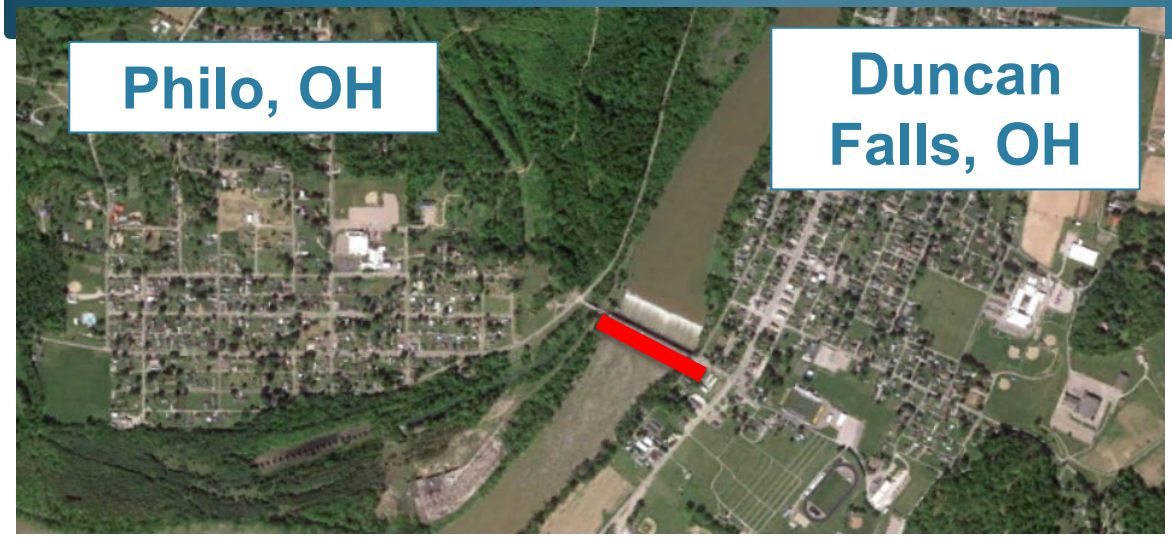
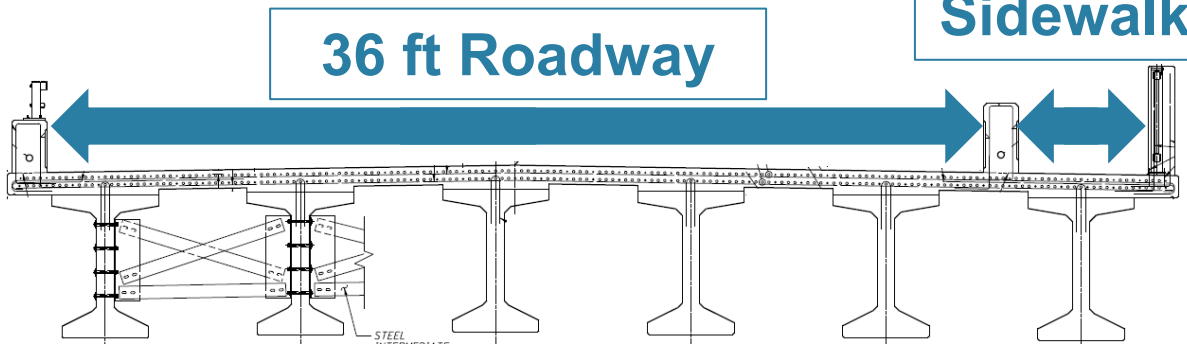
Design – Typical Section





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Design - Atmospheric Concerns

- Corrosion Problem
- Beam Selection
  - Steel Beams
    - Weathering Steel
    - Painted
    - Hot-Dip Galvanizing
    - Metallizing
  - Concrete Beams

Design - Beam Transportation

West Side - Narrow Roads

East Side - Wide Open Roads

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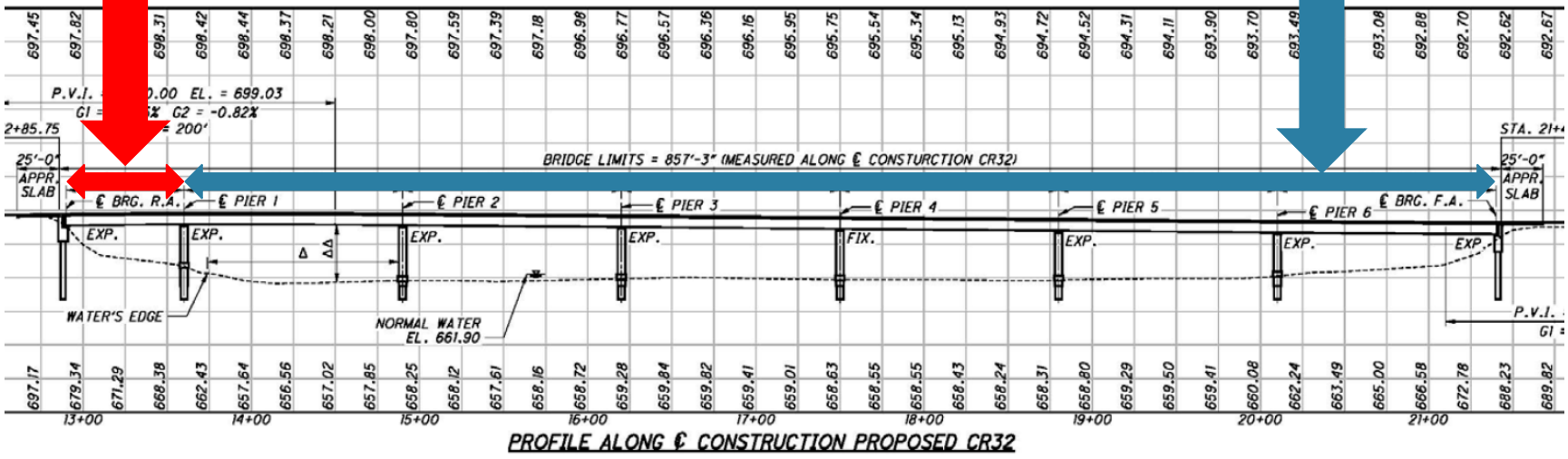
Design - Beam Transportation

Delivery on West Side
73 ft Beams
85,000 lbs

Delivery on East Side
130 ft Beams
150,000 lbs



PROFILE ALONG ℄ CONSTRUCTION PROPOSED CR32

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Design - Spanning the Lock Entrance

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Design - Hydraulic Analysis

- Muskingum River is a regulated stream
  - USGS Streamstats is not applicable
  - Using Streamstats:
    - Q_{25} = 115,000 cfs
    - Q_{100} = 143,000 cfs
  - Gage Station at McConnelsville
    - 16 miles downstream from the bridge

Design - Hydraulic Analysis

- Use gage data at McConnelsville:
  - Proportionally adjust results based on relative size of drainage area

Exceedance Probability	McConnelsville Log-Normal Discharge (cfs)	McConnelsville Log-Pearson Discharge (cfs)	Philo Log-Pearson Discharge (cfs)
0.5	39922	39533	38300
0.2	51140	50972	49300
0.1	58209	58543	56700
0.04	66825	68152	66000
0.02	73059	75363	73000
0.01	79161	82632	80000

  - FEMA 100-Year is 74000 < 10% difference
  - Confirmation of methodology

Design – Geotechnical Borings

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Design – Geotechnical Borings

What about drilling in water?

Won't do that again. Too much risk for personnel safety and of rig damage

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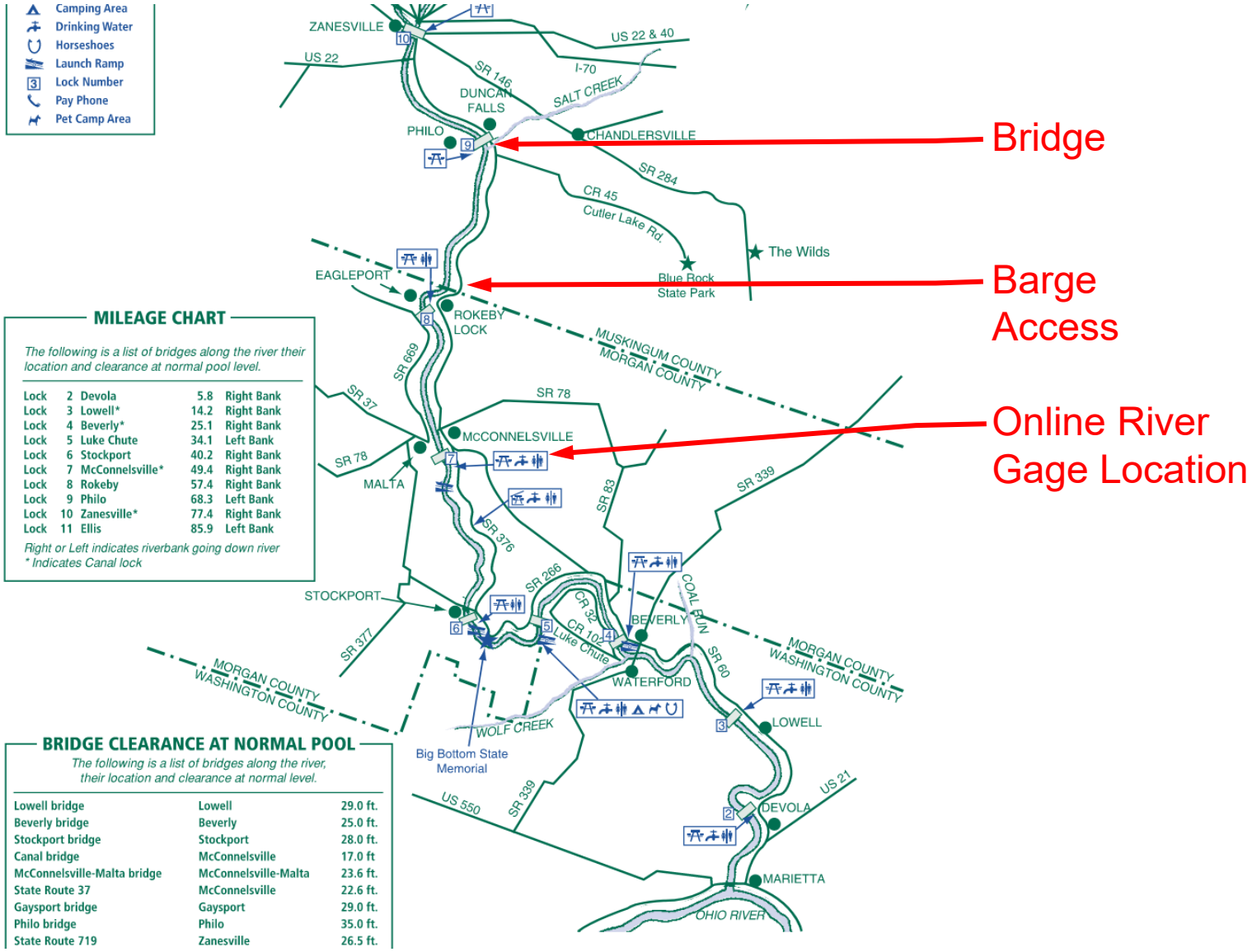
Timeline

Aug. 2016	Drilled 5 borings on land. Water depth across alignment is 0 to 5 ft. Load barge 8 miles downstream of dam.
Nov. 2016	Watched river levels. At end of month, barge operator moved downstream for winter. Water level low and locks often freeze during winter.
Jan. 2017	Reconsider borings drilled from existing bridge.



MILEAGE CHART

The following is a list of bridges along the river their location and clearance at normal pool level.

Lock	2	Devola	5.8	Right Bank
Lock	3	Lowell*	14.2	Right Bank
Lock	4	Beverly*	25.1	Right Bank
Lock	5	Luke Chute	34.1	Left Bank
Lock	6	Stockport	40.2	Right Bank
Lock	7	McConnelsville*	49.4	Right Bank
Lock	8	Rokeby	57.4	Right Bank
Lock	9	Philo	68.3	Left Bank
Lock	10	Zanesville*	77.4	Right Bank
Lock	11	Ellis	85.9	Left Bank

Right or Left indicates riverbank going down river
** Indicates Canal lock*

BRIDGE CLEARANCE AT NORMAL POOL

The following is a list of bridges along the river, their location and clearance at normal level.

Lowell bridge	Lowell	29.0 ft.
Beverly bridge	Beverly	25.0 ft.
Stockport bridge	Stockport	28.0 ft.
Canal bridge	McConnelsville	17.0 ft
McConnelsville-Malta bridge	McConnelsville-Malta	23.6 ft.
State Route 37	McConnelsville	22.6 ft.
Gaysport bridge	Gaysport	29.0 ft.
Philo bridge	Philo	35.0 ft.
State Route 719	Zanesville	26.5 ft.

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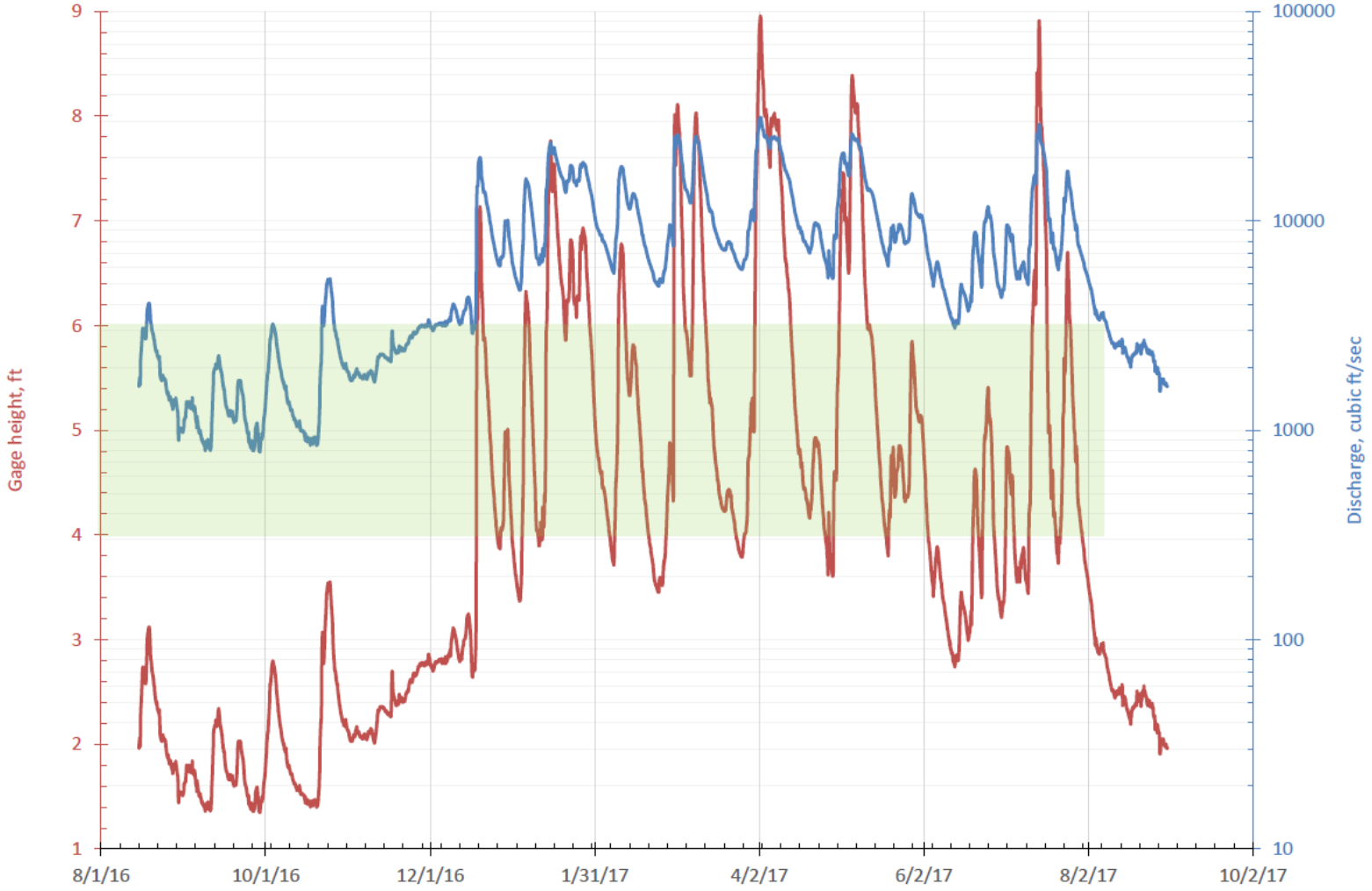
Gage Height and Discharge
USGS 03150000 Muskingum River at McConnelsville OH
August 15, 2016 to August 31, 2017



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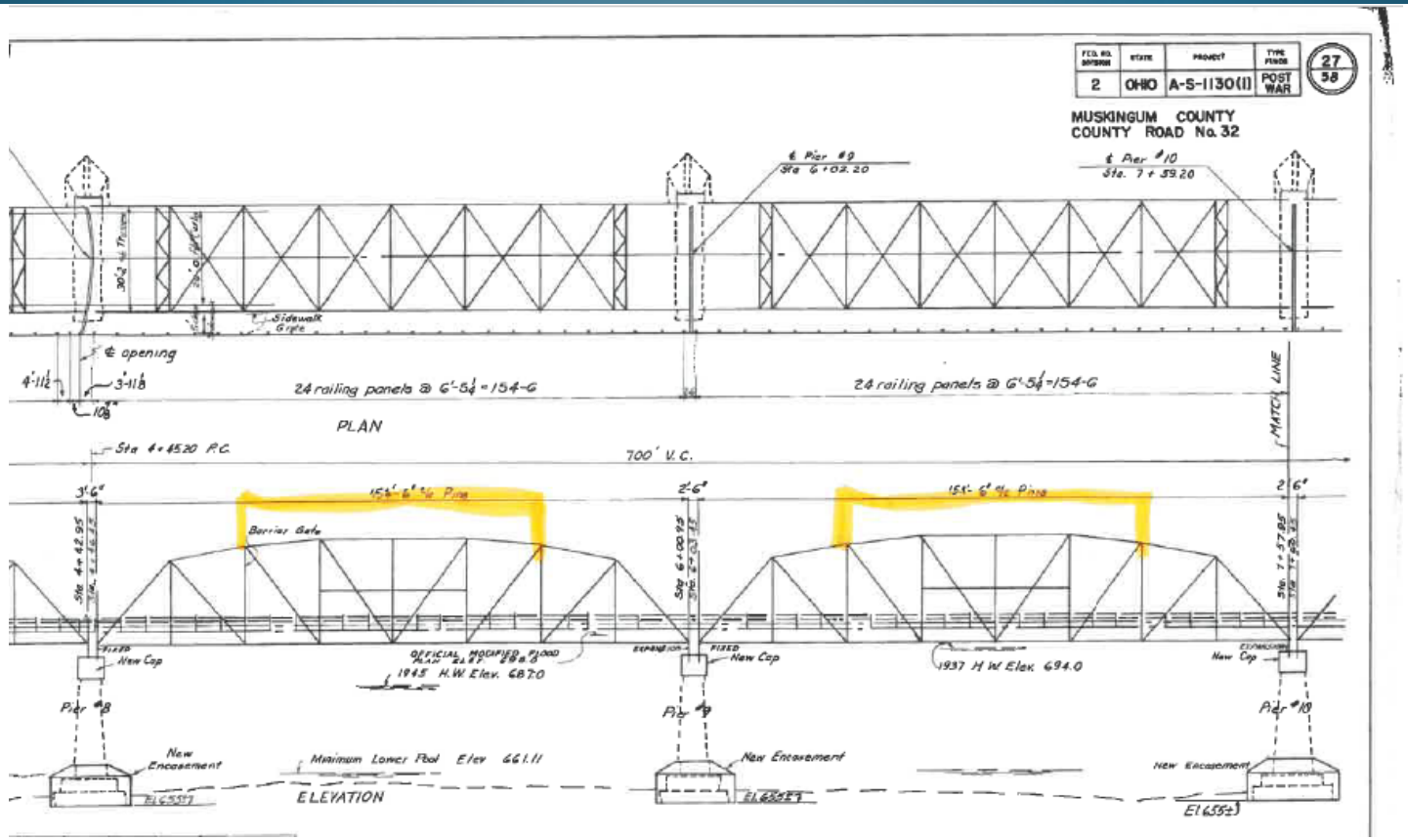
Design
Drilling from existing bridge



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Design
Drilling from existing bridge

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Design
Use different barge with less draft

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Timeline

March 2017	Unsuccessful attempt with barge. Crane not available. *Stage 2 plans submitted.*
May 2017	Continued monitoring. Water too high. "… just when there is a downward trend in the river flow then another storm enters the watershed area and recharges the river."
July 2017	Unsuccessful attempt with barge. River too high.
Sept. 2017	Reconsider borings drilled from existing bridge. *Stage 3 plans submitted.*
Nov. 2017	Unable to get river borings before project sells in March 2018.

CONSTRUCTION

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Construction

- Contractor

- Bid Contract Amount $9,984,026.19

Construction

- Muskingum River Captures 1/5th of the State of Ohio's Watershed

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Construction Began July 2018

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Construction

- Major Change Orders
- Drilled Shafts for Piers
- Causeway & Cofferdam Work
- Project Delay

Construction
Drilled Shaft Depth - 25' Deeper Than Bid

- Bid Price Drilled Shaft for Piers: $262,250.00
- Actual Drilled Shaft for Piers: $1,343,841.60

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Construction
Drilled Shaft Depth

- Two pier borings drilled 9/20-21/2018
- Shale and coal over siltstone
- Extend drilled shafts using lapped #11 bars and hoops
- Reduce rock socket in siltstone from 12’ to 8’
- Left steel casing in place

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Construction Halted Nov. 1 2018

- Cofferdam Work Bid: $600,000
- Actual Cofferdam Work: 1,241,024.86
- 50,000 Ton Rock
- 27-40' Pipes

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Construction

- Causeway & Cofferdam Repairs: $275,000

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Construction

- Project Delay – 15 Months
- Equipment Downtime approx. $425,000

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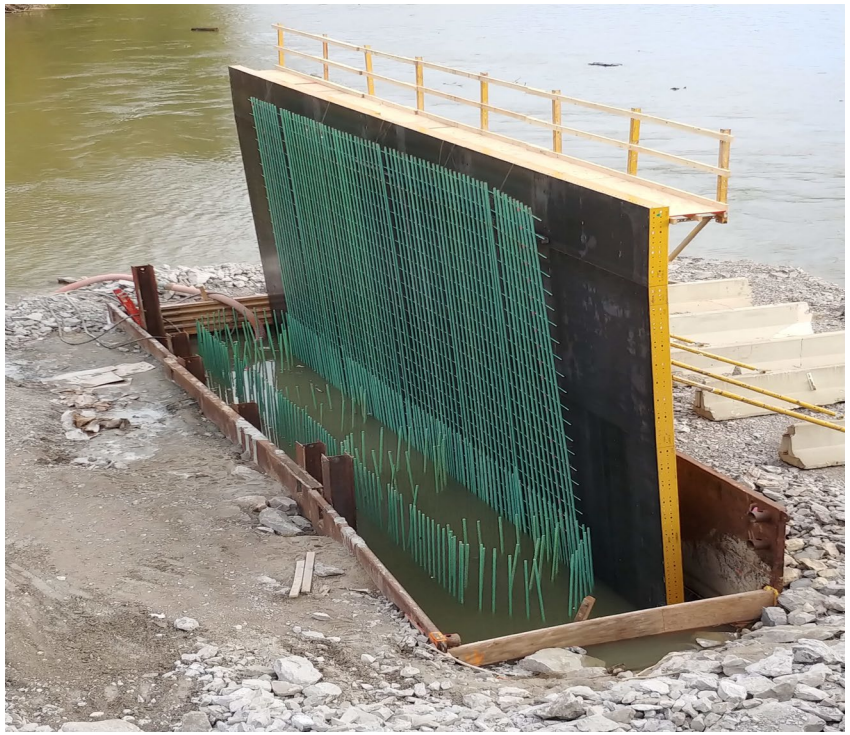
Construction Resumed July 29, 2019



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Construction

- Due to the delay another Fracture Critical Inspection was required.
- More Repairs were required.
- Limited Traffic to 1 Lane.

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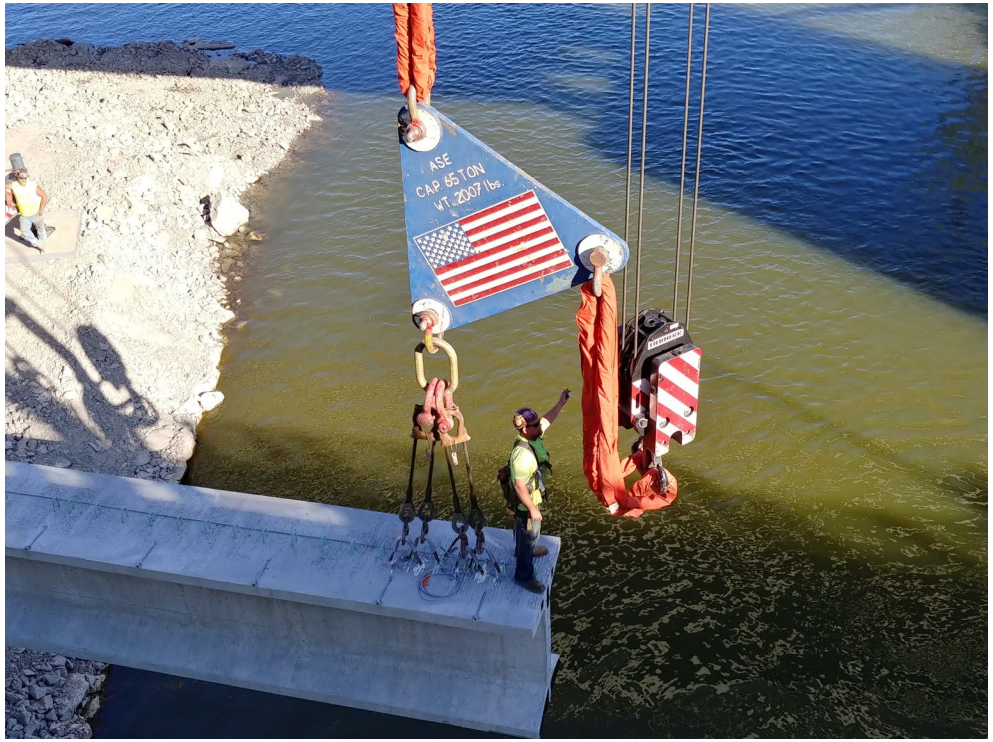

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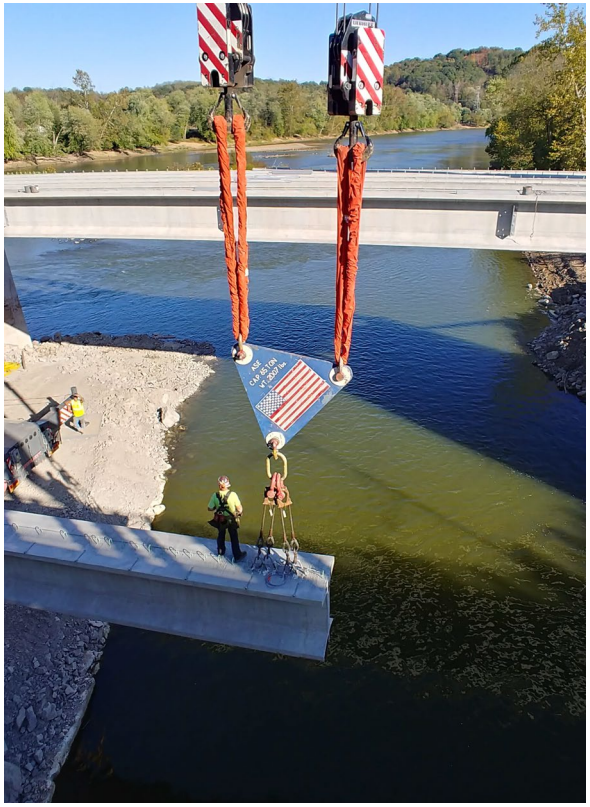
Construction



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Construction

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Construction
Dec. 11 2019, River Breached Causeway

- 117 Days Worked
- Completed Piers 1-6
- 30 Concrete Girders
- 6 Girders Installed Feb. 2020

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Construction

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- July 24, 2020 1300 CY - Concrete Deck

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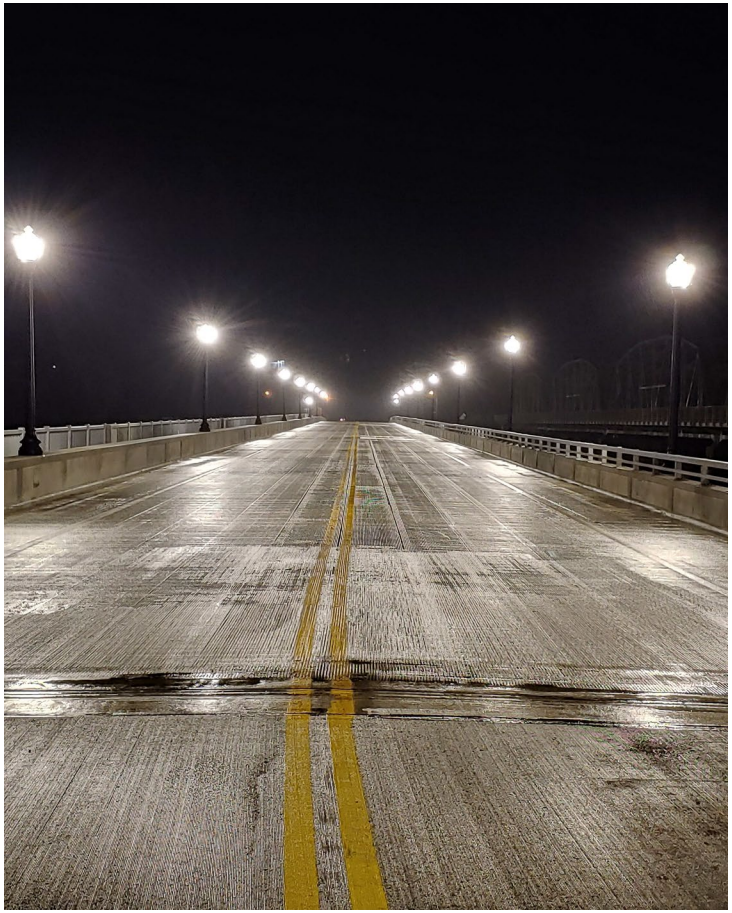
Construction



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Construction

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Total Construction Cost $12,700,000

- 5000 CY Concrete & 700,000 lbs Steel

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Construction

- Time Lapse Video Warning

Construction

After years of blood, sweat, and tears...Holy Moly!!!

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Demolition

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Questions?

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