National Bridge Preservation Conference

September 2024

The Bridges of Monon South Trail

Clark Dietz

Engineering Quality of Life®

NATIONAL BRIDGE PRESERVATION CONFERENCE 2024

Innovation for Infrastructure Resiliency

01 BACKGROUND

02 STRUCTURE INSPECTIONS AND SCOPING

03 FINAL DESIGN

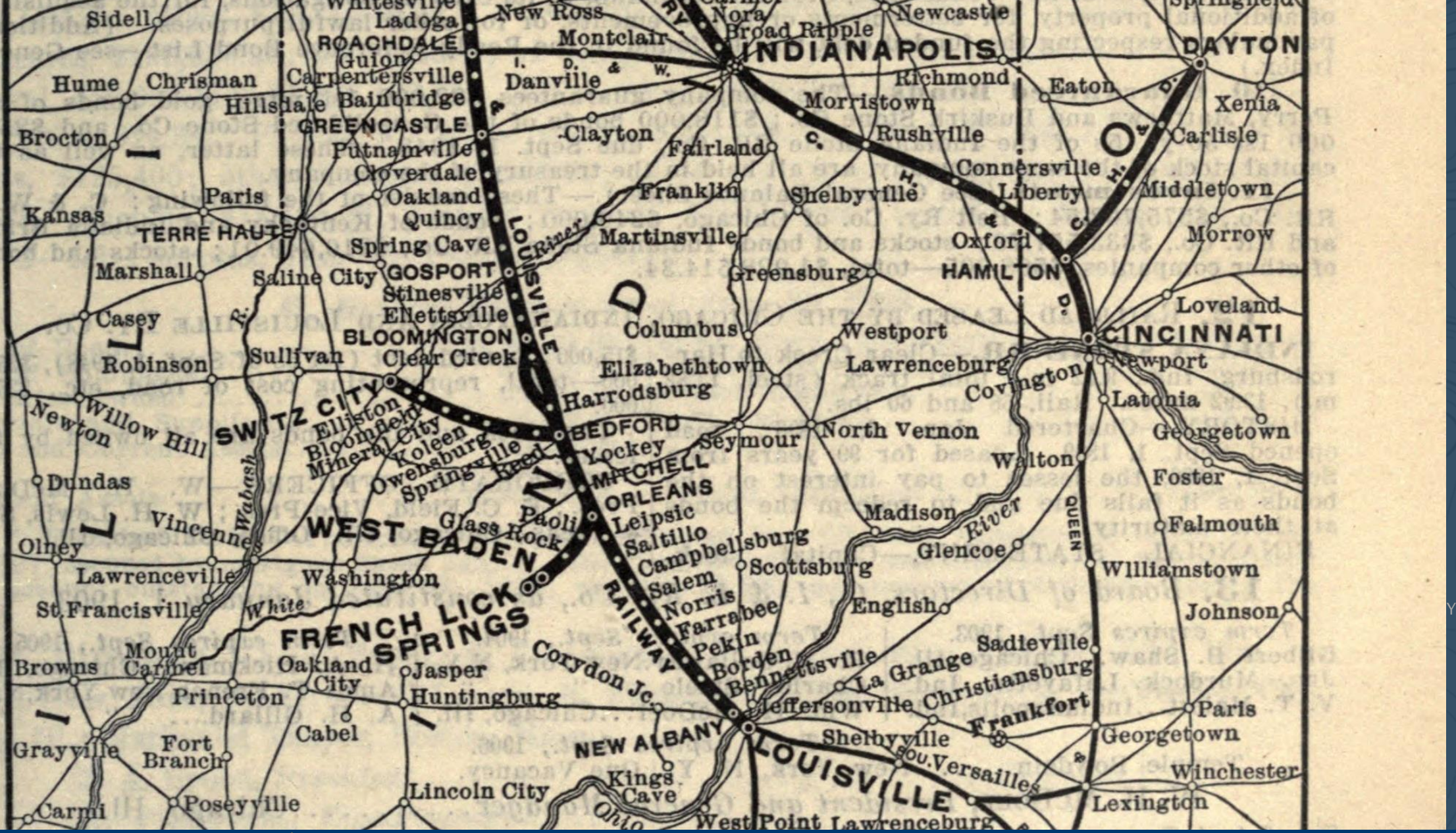
04 BIDDING AND CONSTRUCTION

Background

How the Monon South Trail came to be.


Chicago
Aurora
Michigan City
South Bend
Tinley Park
Gary
Goshen
Joliet
INDIANA
Kankakee
Fort Wayne
Marion
Kokomo
Lafayette
Muncie
Champaign
Danville
Richmond
Indianapolis
INDIANA
Oxford
Terre Haute
Bloomington
Cincinnati
Seymour
Project Location
Vincennes
Louisville
Frankfort
Lexington
Evansville

Photo: J. David Ingles 1967,
Classic Trains, trains.com


Sidell
Ladoga
ROACHDALE
Guion
Hume
Chrisman
Carpentersville
Hillsdale
Bainbridge
GREENCASTLE
Brocton
Putnamville
Cloverdale
Oakland
Quincy
Paris
Kansas
TERRE HAUTE
Spring Cave
Marshall
Saline City
GOSPORT
Stinesville
Ellettsville
Casey
BLOOMINGTON
Clear Creek
Robinson
Sullivan
Newton
Willow Hill
SWITZ CITY
Ellistion
Bloomfield
Mineral City
Koleen
Owensburg
Springville
Reed
Dundas
Vincennes
Wabash
WEST BADEN
Glass Rock
Paoli
Olney
Lawrenceville
Washington
St. Francisville
White
FRENCH LICK SPRINGS
Browns
Mount Carmel
Oakland City
Jasper
Princeton
Huntingburg
Corydon Jc.
Cabel
Grayville
Fort Branch
Carmi
Poseyville
Lincoln City
Kings Cave
Ohio
West Point
Lawrenceburg
New Ross
Montclair
Danville
Clayton
Whitesville
Nora
Broad Ripple
INDIANAPOLIS
Newcastle
Richmond
Morristown
Rushville
Fairland
Franklin
Martinsville
Shelbyville
Greensburg
Columbus
Elizabethtown
Harrodsburg
BEDFORD
Yockey
MITCHELL
ORLEANS
Leipsic
Saltillo
Campbellsburg
Salem
Norris
Farrabee
Pekin
Borden
Bennettsville
Scottsburg
Seymour
North Vernon
Madison
Glencoe
English
Jeffersonville
NEW ALBANY
Shelbyville
Sou. Versailles
LOUISVILLE
Lexington
Frankfort
La Grange
Sadieville
Christiansburg
Georgetown
Winchester
Paris
Eaton
DAYTON
Xenia
Carlisle
Middletown
Morrow
Connersville
Liberty
Oxford
HAMILTON
Loveland
CINCINNATI
Newport
Covington
Latonia
Georgetown
Walton
Foster
Falmouth
Williamstown
Johnson
Westport
Lawrenceburg
RAILWAY
LOUISVILLE
River
QUEEN
I. D. & W.
C. H. & D.
C. H. & D.
O.

ARKETPLACE
For & Place Classifieds

IndyStar.

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POLITICS

Holcomb announces $29.5M for 62-mile Monon South Trail in Southern Indiana

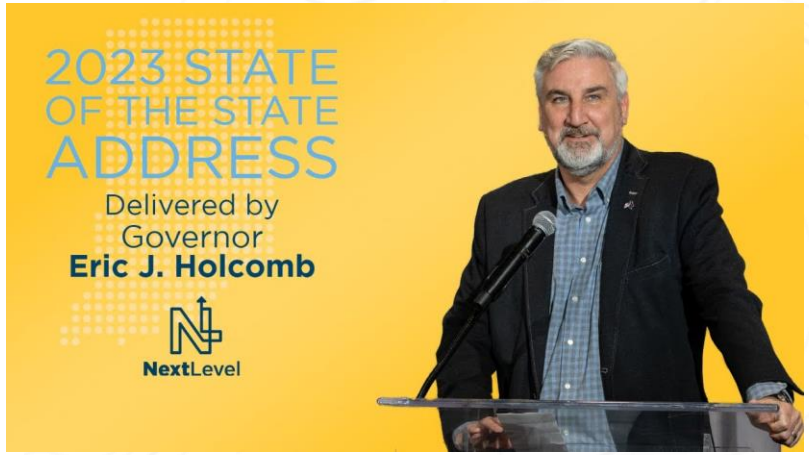
Claire Rafford and Arika Herron Indianapolis Star

Published 7:05 p.m. ET Jan. 10, 2023 | Updated 8:37 a.m. ET Jan. 11, 2023

View Comments

The Indianapolis Monon Trail celebrates 25 years

The Monon Trail, which stretches for 10 miles, debuted in 1996 to mixed reception. 25 years later, it is beloved by many in the city and has 1.3 million visitors a year.



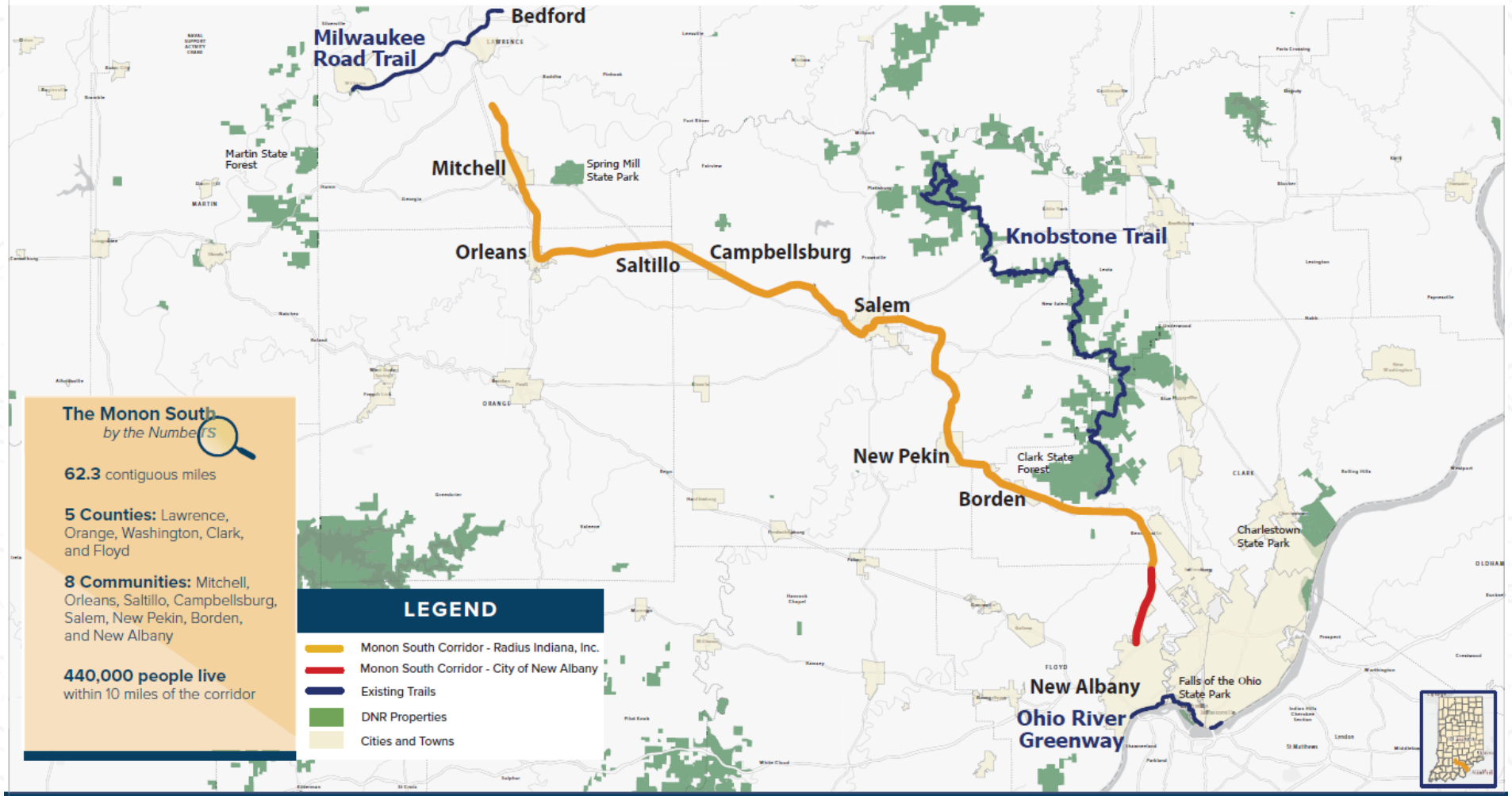
Radius INDIANA

ECONOMIC DEVELOPMENT IN SOUTHERN INDIANA

A nonprofit economic development organization serving eight counties in southern Indiana. Its mission is to drive regional economic growth and improve quality of life through collaboration, innovation, and advocacy.

Monon South

DNR Indiana Department of Natural Resources | NextLevel TRAILS



Structures Program Constraints

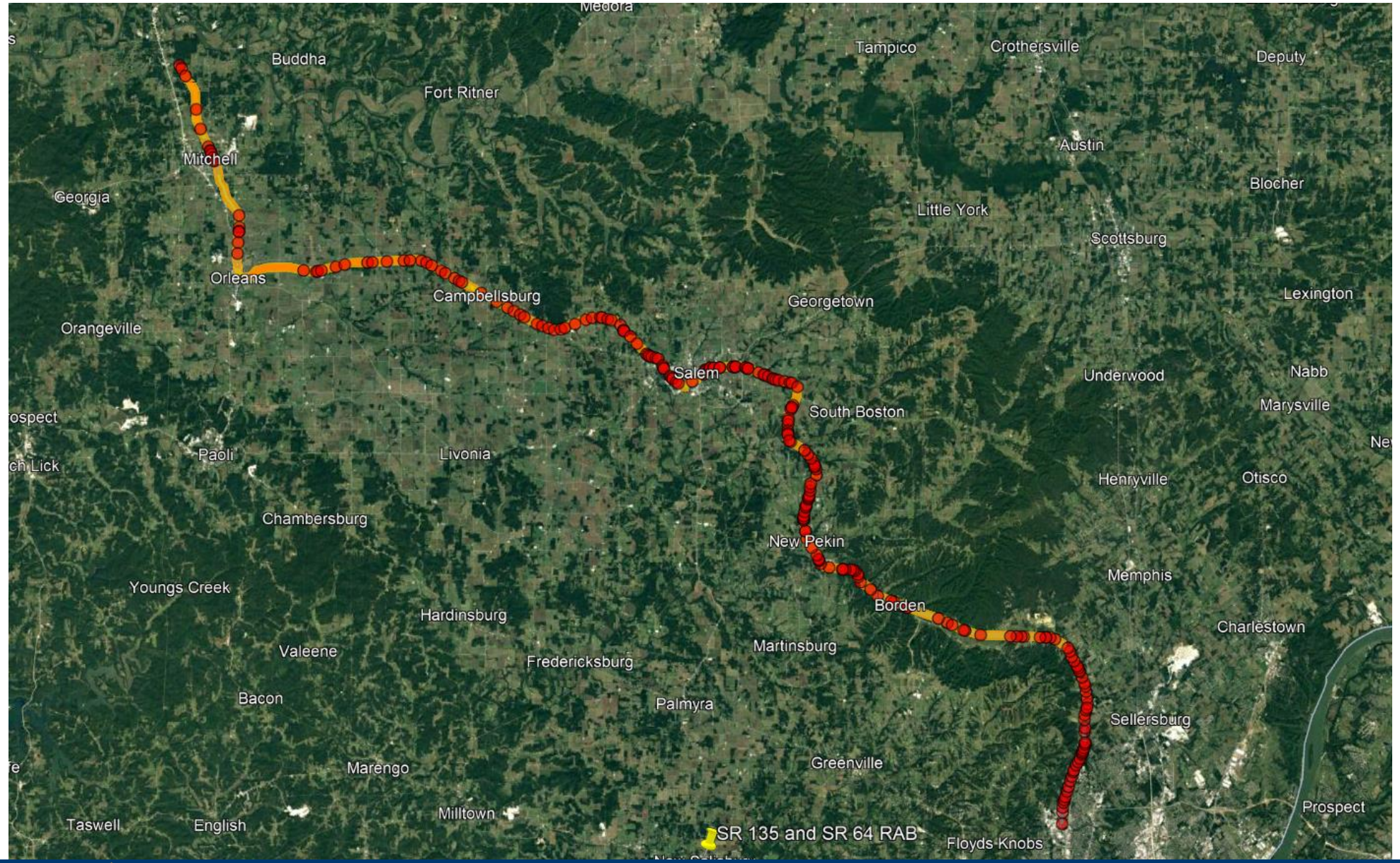
- Long term **asset management** vs. short term delivery expectations
- Partial trail opening in 2024 and completion in 2025
- Creating a *Signature* bridge

Structure Inspections and Scoping

Determining what we have and what we have to do.

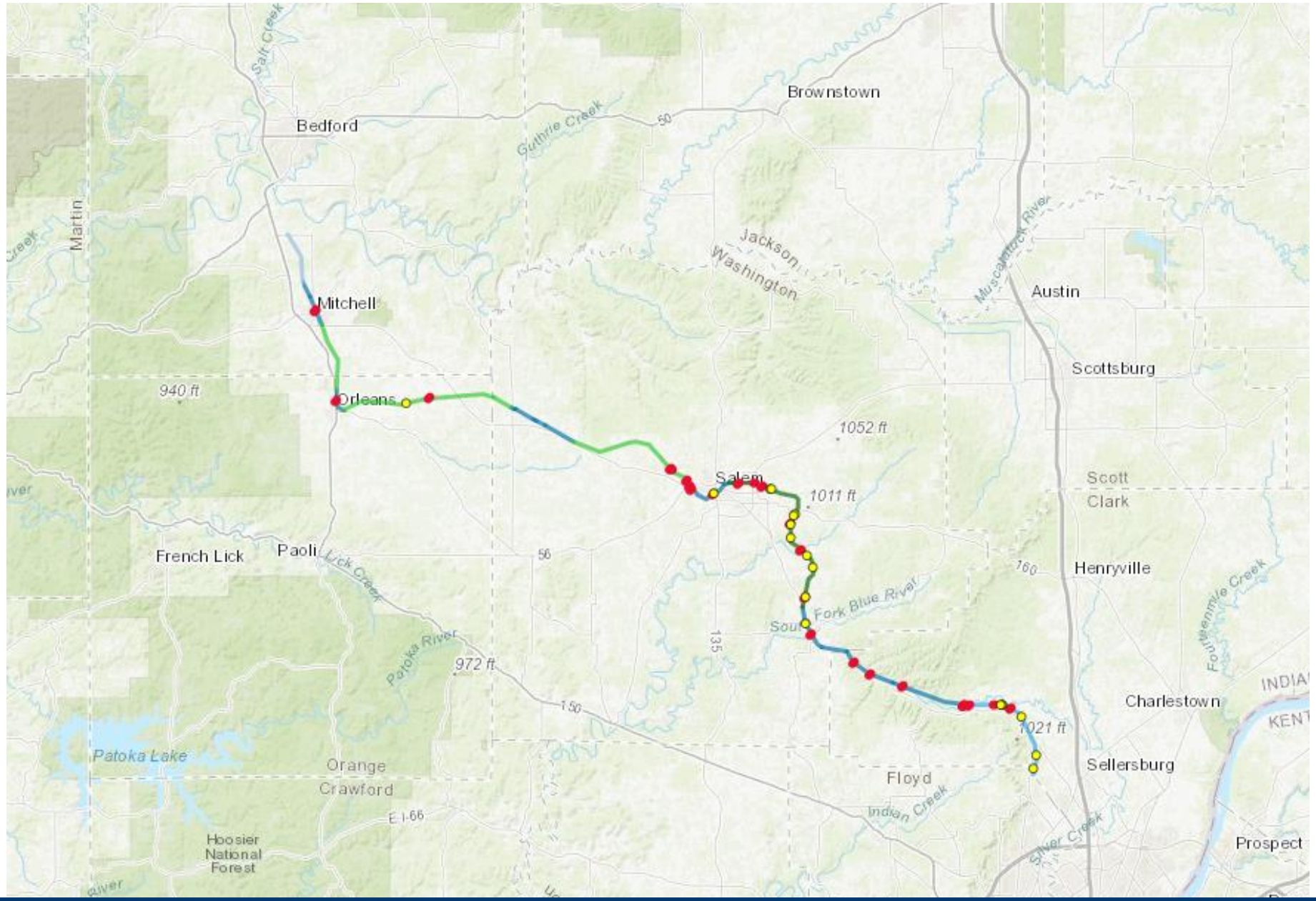
62 Miles of Data

- Original railroad mapping data
- Just “culverts” alone!
- Exported to GIS to filter, sort, and evaluate data



Phase 1 Inspections

- 22 Bridges
- 12 Culverts (Small Structures)
- Common Sizes:
  - W30s
  - W33s
  - 30”-36” riveted steel plate girders



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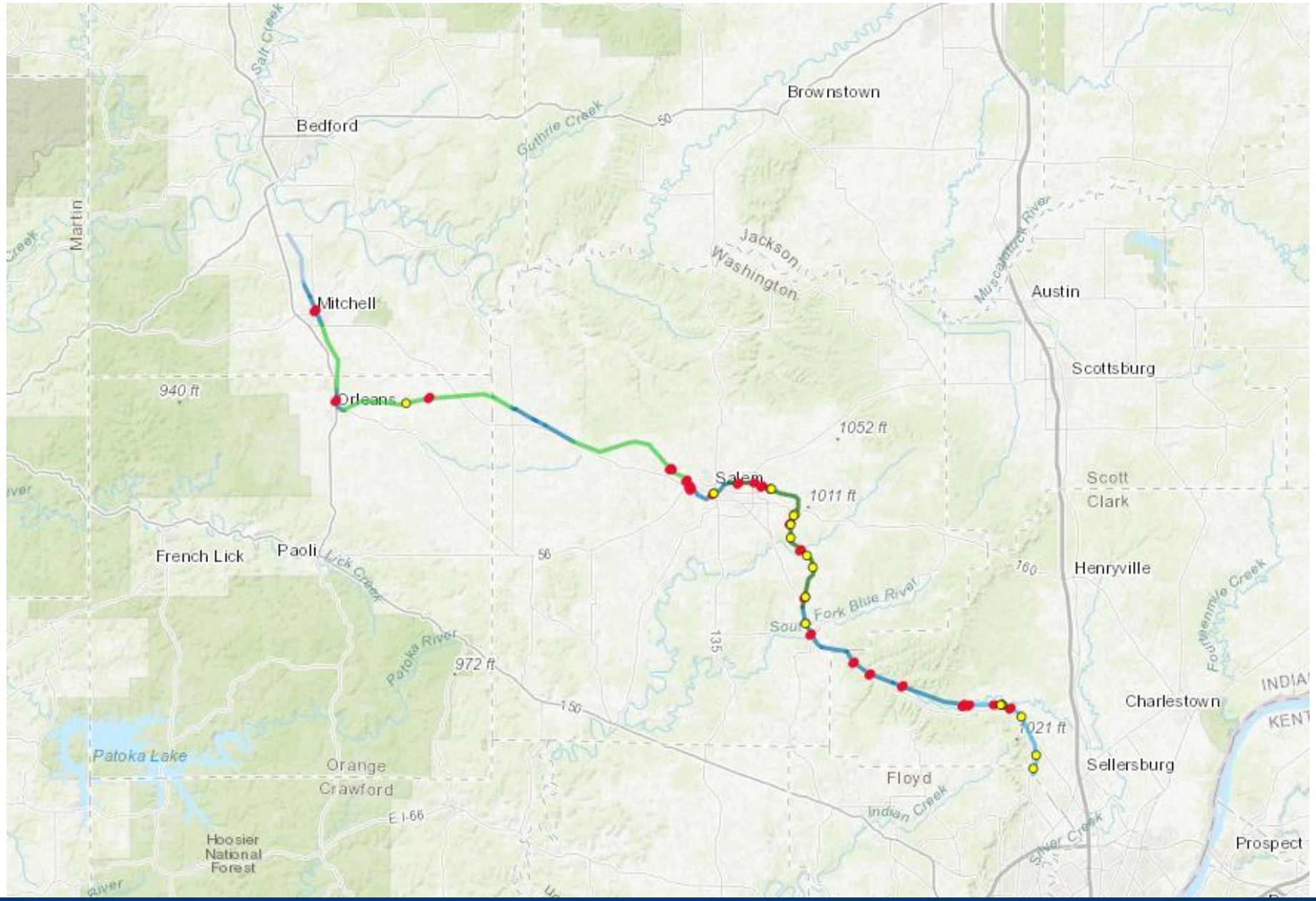

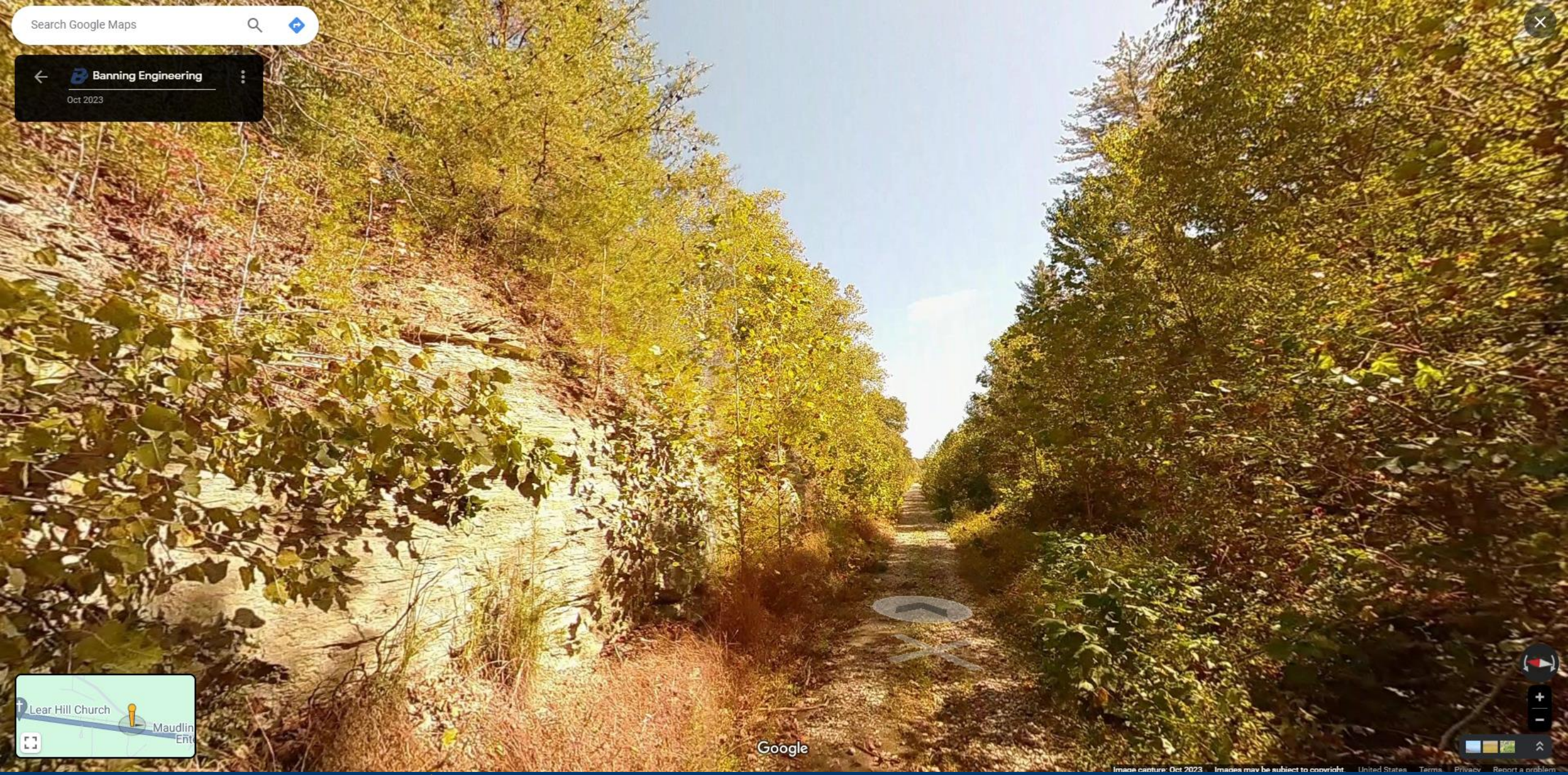
Search Google Maps
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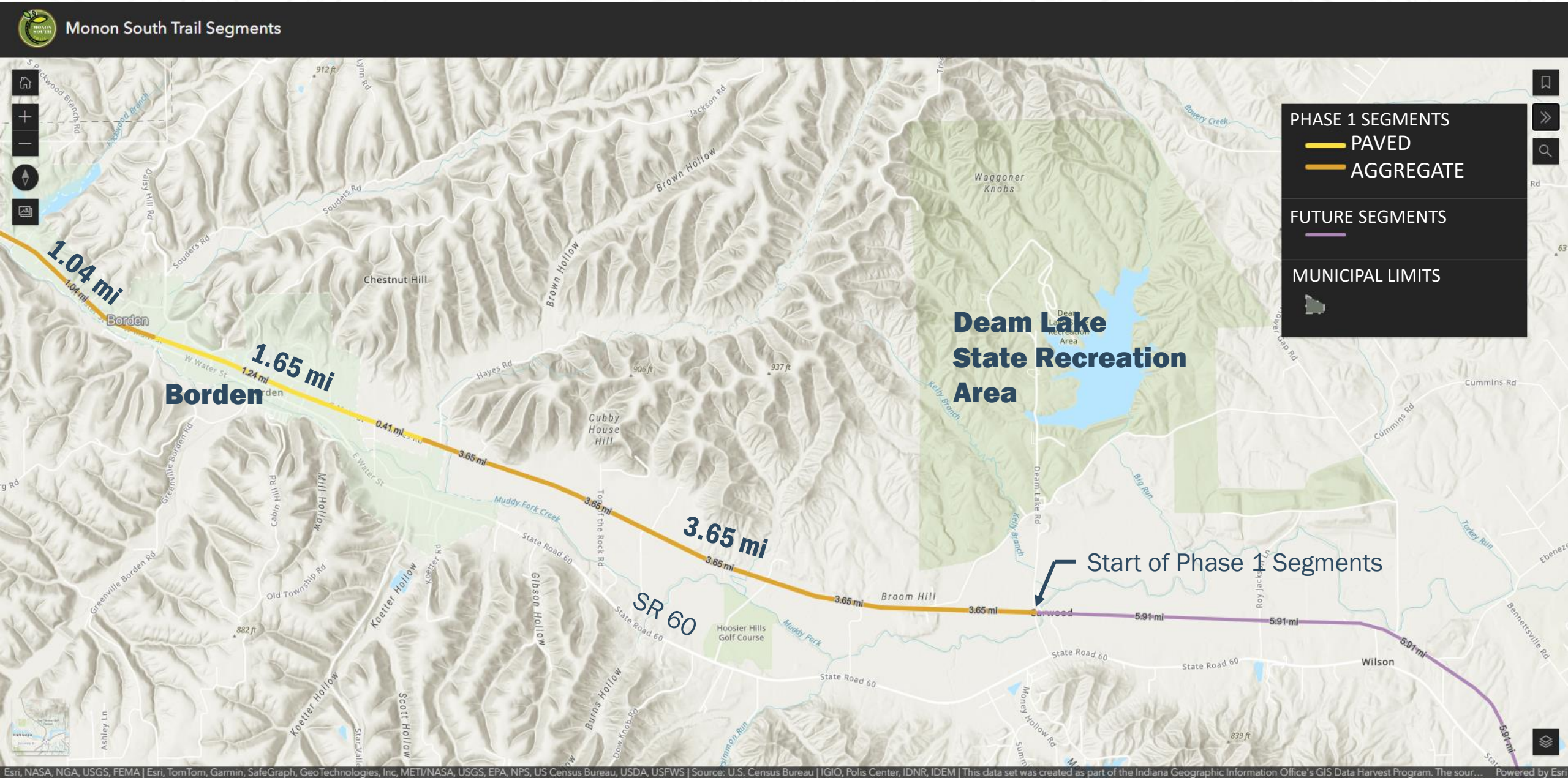
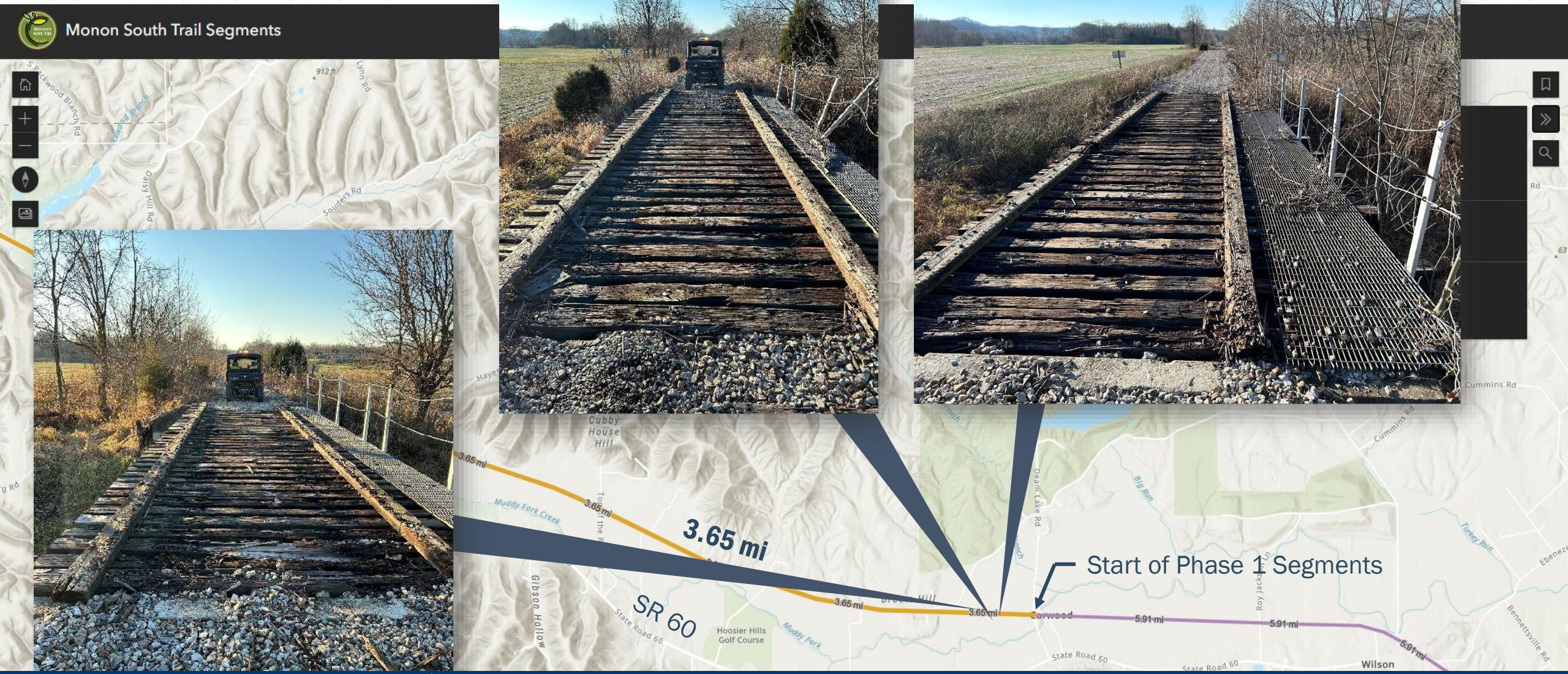
PHASE 1 LIMITS

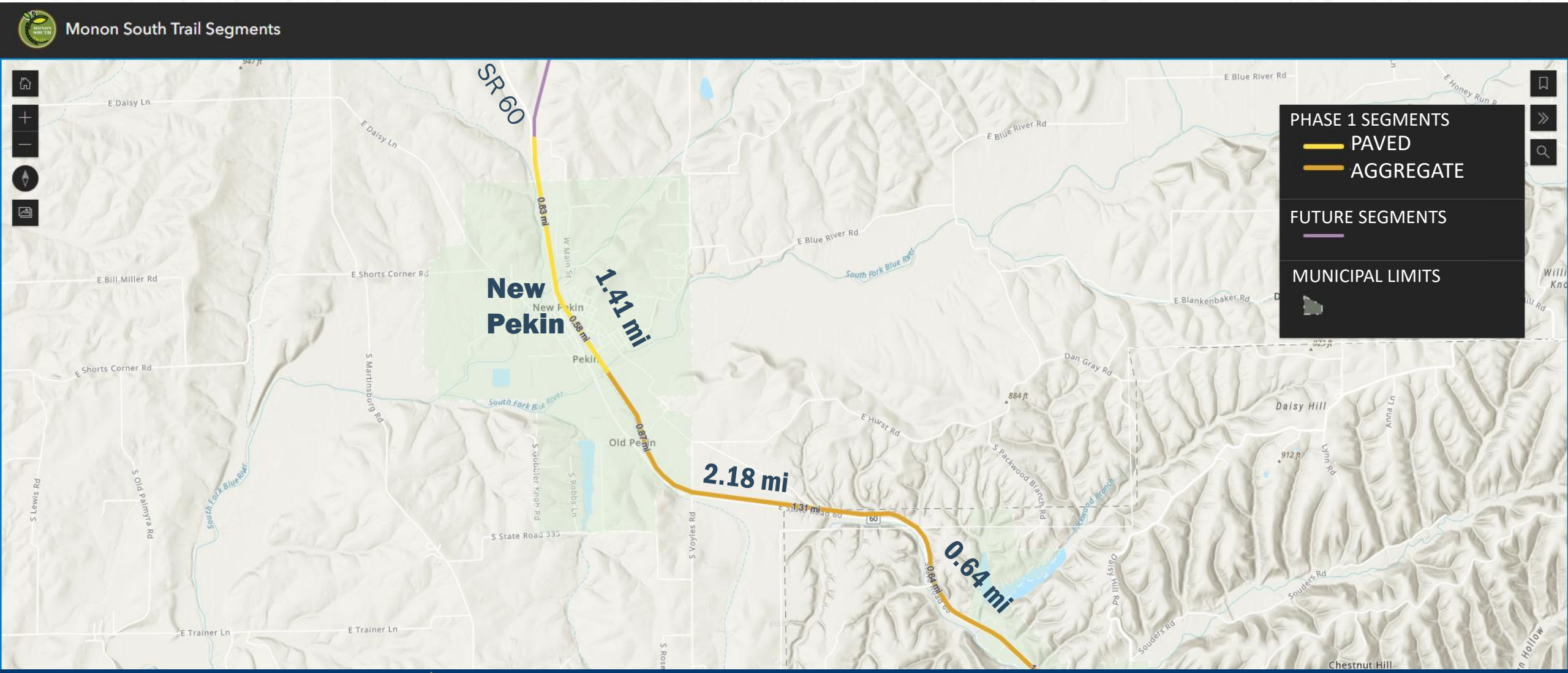


PHASE 1

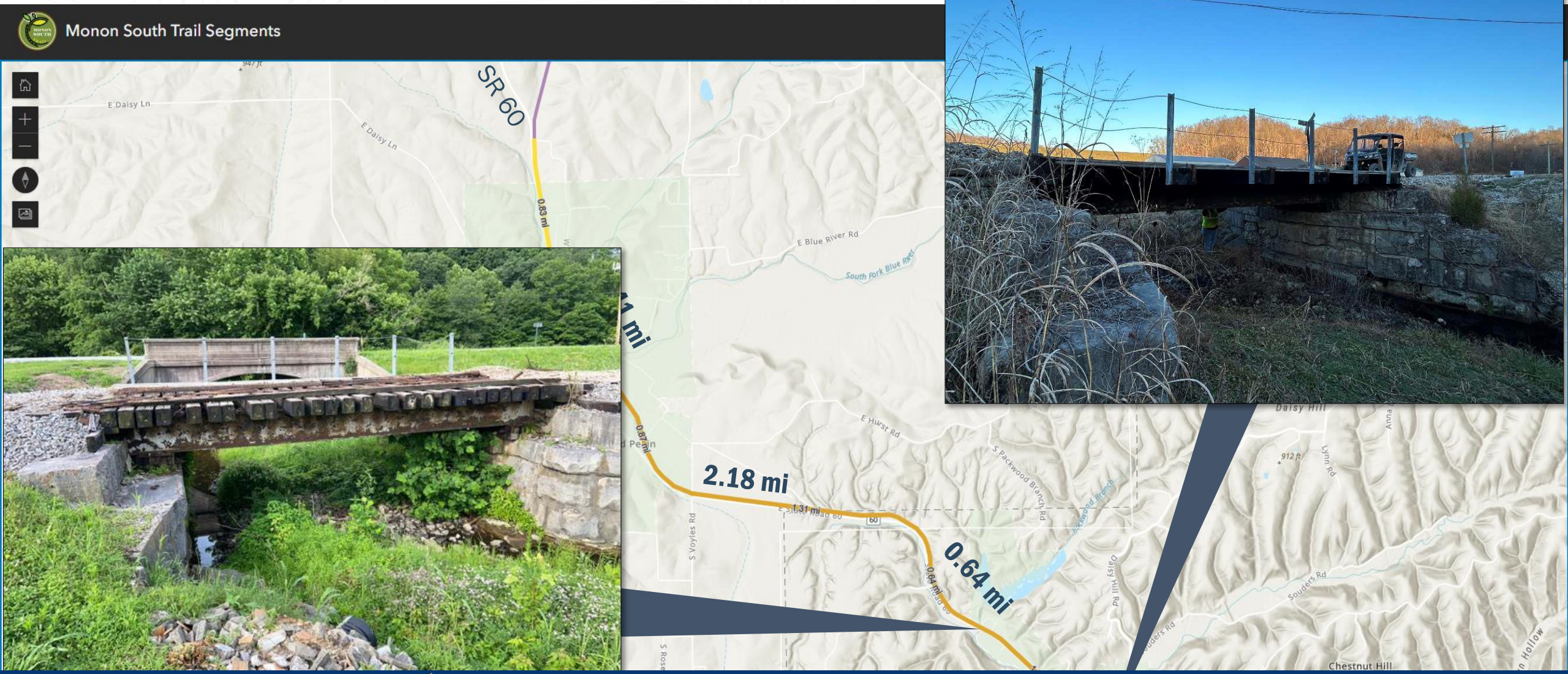

Monon South Trail Segments
3.65 mi
3.65 mi
3.65 mi
3.65 mi
3.65 mi
SR 60
Start of Phase 1 Segments
5.91 mi
5.91 mi
5.91 mi
Cubby House Hill
Muddy Fork Creek
Gibson Hollow
Hoosier Hills Golf Course
Muddy Fork
Dean Lake Rd
Big Run
Cummins Rd
State Road 60
Wilson

PHASE 1 LIMITS

PHASE 1 LIMITS



PHASE 1 LIMITS



PHASE 1 LIMITS

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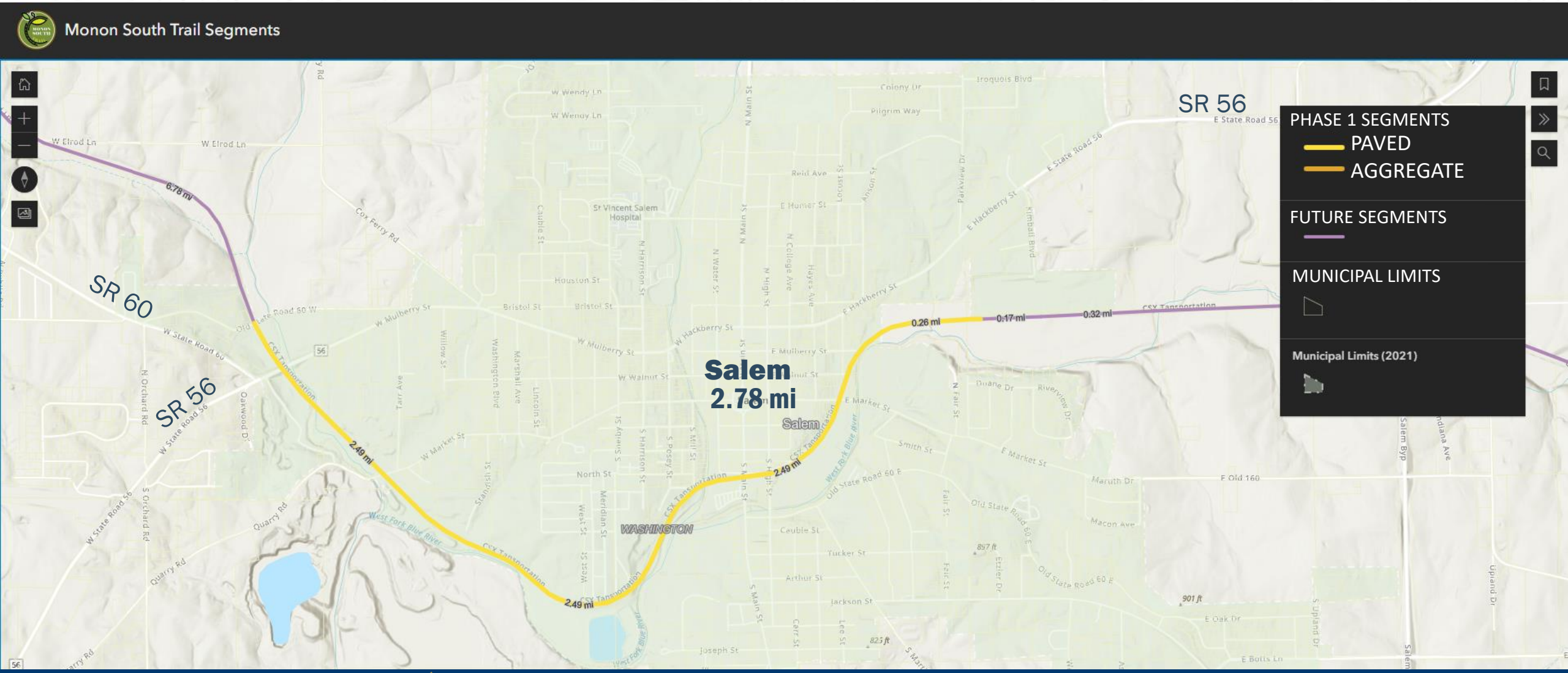


PHA

Monon South Trail Segments

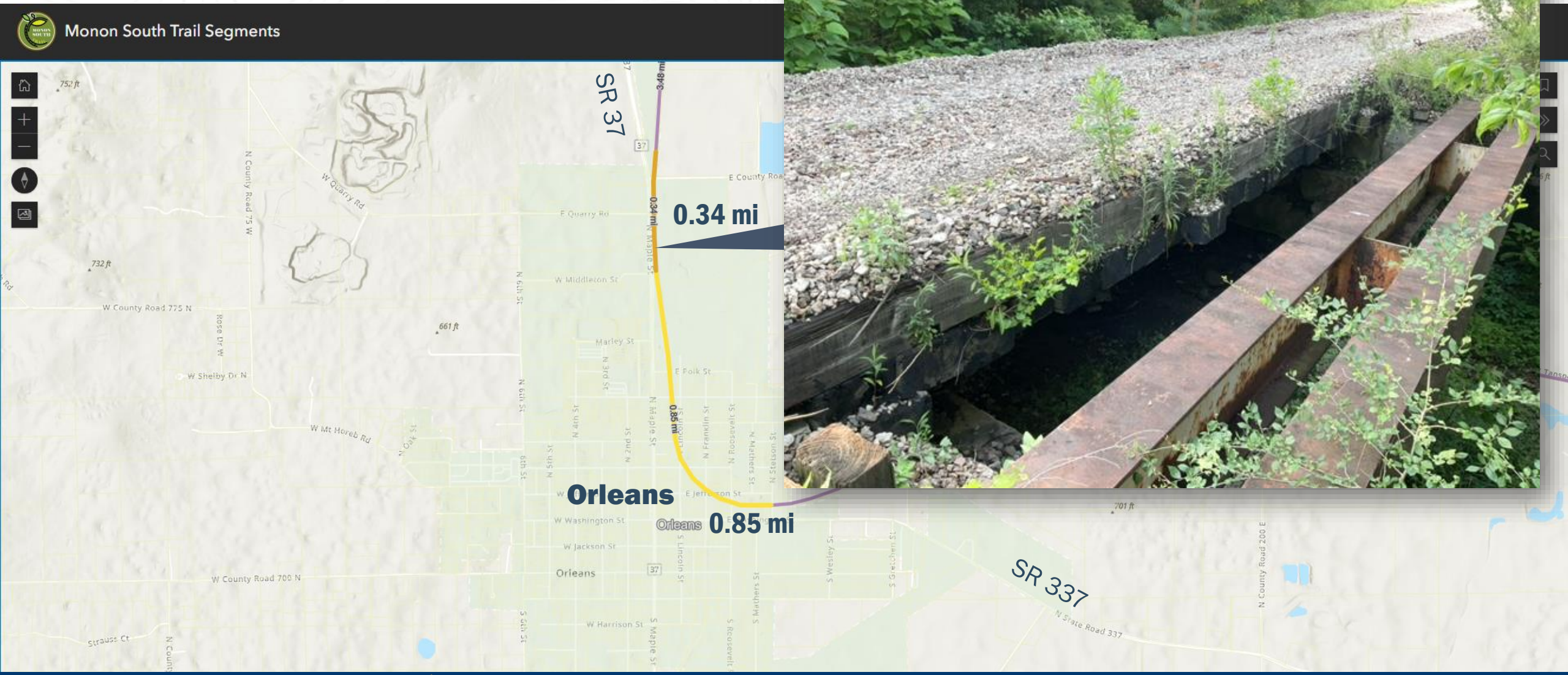
Salem
2.78 mi

SR 60

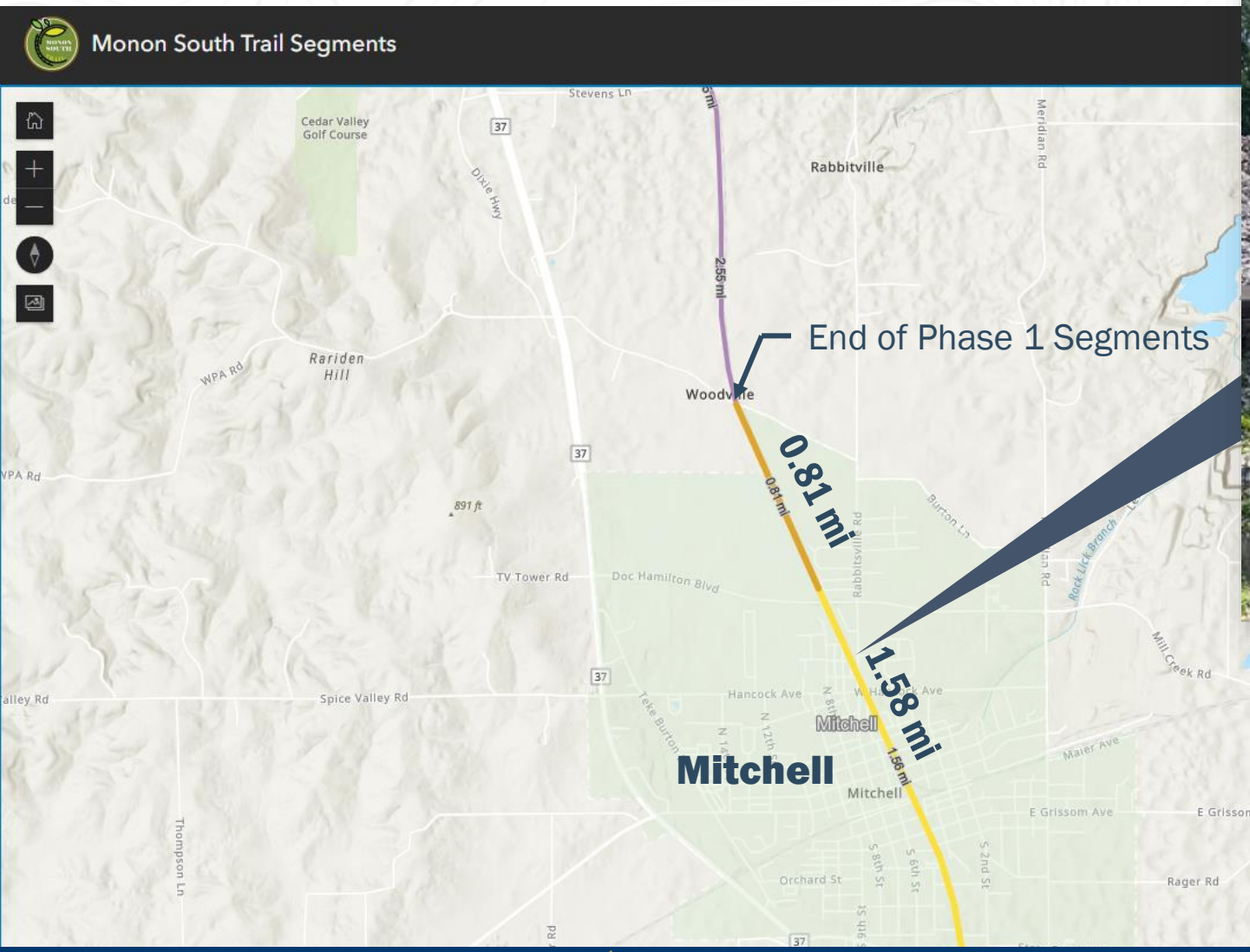
SR 56

WASHINGTON

PHASE 1 LIMITS



PHASE 1 LIMITS



- Our team of Structural Engineers' initial assessment during inspection:
  - 4 Replacements
  - 2 Superstructure replacement
  - And 22 New Decks

- Not everyone is inherently a Preservation Practitioner

- A lot of designers do not come into the project with a Preservation mindset right away.

Scoping Strategy

General Assumptions:

- Radius Indiana (Client) desires a design philosophy that ensures the rapid opening of the trail. Therefore, recommended bridge rehabilitation described is the minimum necessary to provide on-time opening of the trail, while providing the public with a responsible and safe final product. Repair recommendations should **not be viewed as long term solutions**, but merely a **first step** in beginning a long-term asset management strategy.

Scoping Strategy

General Recommendation:

- Riprap at all substructures with visible scour
- Implement scour monitoring
- Remove brush and trees near and around structures
- Determine allowable section loss for steel beam superstructures based on design load

Structures Scoping Summary Table

Bridge ID	Latitude	Longitude	Nickname	Work Type and Repair Recommendations	Deck Type	Railing Type	Existing Length (ft)	Existing Length (in)	Existing Out to Out (ft)	Existing Out to Out (in)	Design Clear Width (ft)
BR-10-004	38.448668	-85.868573	Deam Lake 1	Replace existing timber rail tie deck with timber trail surface deck and install railings. Clean tops of abutments.	Timber	Timber with steel / aluminum posts	46	6	13	3	14
BR-10-005	38.4487170	-85.8700040	Deam Lake 2	Replace existing timber rail tie deck with timber trail surface deck and install railings. Clean tops of abutments.	Timber	Timber with steel / aluminum posts	46	3	13	8	14
BR-10-006	38.4487546	-85.8708735	Deam Lake 3	Replace existing timber rail tie deck with timber trail surface deck and install railings. Clean tops of abutments.	Timber	Timber with steel / aluminum posts	46	6	13	9	14
BR-10-007	38.4618864	-85.9268056	Borden South (2-span)	Replace stone return walls on west end and re-cast west abutment backwall. Replace existing timber rail tie deck with timber trail surface deck and install railings. Place large riprap adjacent to substructure units in stream.	Timber	Timber with steel / aluminum posts	60	3	10	0	14
BR-10-008	38.4709915	-85.9574239	Borden North	Analyze existing 8" rail ties for sufficiency to cantilever 2'-0" assuming no support from fascia beams. If acceptable analysis, make no repairs and pave new trail over top of an improved subbase. Install railing.	Asphalt	Timber with steel / aluminum posts	42	8	15	6	14
BR-10-009	38.4790519	-85.9725147	Borden Water Treatment	Replace existing timber rail tie deck with timber trail surface deck and install railings. Clean tops of abutments.	Timber	Timber with steel / aluminum posts	31	0	15	0	14

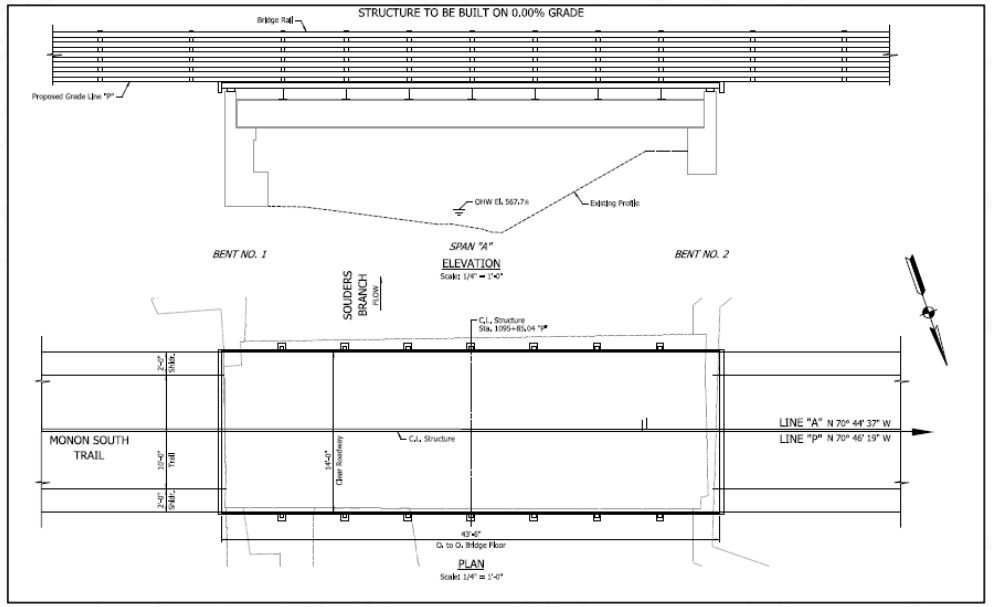
Bridge ID	Latitude	Longitude	Nickname	Work Type and Repair Recommendations	Deck Type	Railing Type	Existing Length (ft)	Existing Length (in)	Existing Out to Out (ft)	Existing Out to Out (in)	Design Clear Width (ft)
BR-88-010	38.5001922	-86.0119834	Pekin South (3-span)	Remove timber rail ties and ballast. [While Ballast and Rail tie deck is off, inspect beam ends as current Bridge and River Configuration makes beam end access difficult. This will provide updated inspection information on current beam end condition, as well as determine areas in need of repair. Install bolted steel repairs where existing web holes are noted in field pictures below, and where section loss discovered while deck is off exceeds allowable. (Create typical detail for optional bolted steel repairs) Consider painting beam ends to provide longevity at this location due to limited beam end access.] Install new concrete deck. Install railings. Remove Debris Pile and Probe Foundations for Scour. Place Riprap adjacent to piers in water.	Concrete	Timber with steel / aluminum posts	121	0	14	6	14
BR-88-017	38.6022843	-86.1027360	Salem Double Arch	Pave trail over existing bridge with improved subbase. Install railing. Existing concrete facing walls appear to be in sufficient condition for installation of railing. Driven post railing would require evaluation of fill material type and depth. Repair stone wingwalls.	Asphalt	Timber with steel / aluminum posts	66	0	29	9	14
BR-88-018	38.6055250	-86.1232444	Salem West (2-span)	Replace existing timber rail tie deck with timber trail surface deck and install railings. Repair missing stone in pier. Clean tops of abutments.	Timber	Timber with steel / aluminum posts	66	6	10	2	14
BR-59-023	38.6695709	-86.4522065	Orleans North	Re-align trail to adjacent superstructure. Install new deck on existing beams. Reconstruct Backwall. Install railing.	Timber	Timber with steel / aluminum posts	29	0	16	6	14
BR-47-024	38.7349808	-86.4720615	Mitchell Bridge	Pave trail over existing bridge with improved subbase. Install railing. Install slope restoration on west ditch between path embankment and adjacent roadway.	Asphalt	Timber with steel / aluminum posts	15	6	15	6	14
CLV-88-006	38.50713498	-86.01724252	Pekin North Box	Remove ballast and existing superstructure. Install concrete backwalls and return walls. Install precast concrete slab (at trail elevation) and install railings.	Concrete	Timber with steel / aluminum posts	19	8	8	1	14

Final Design

Structures Rehabilitations in Plan View

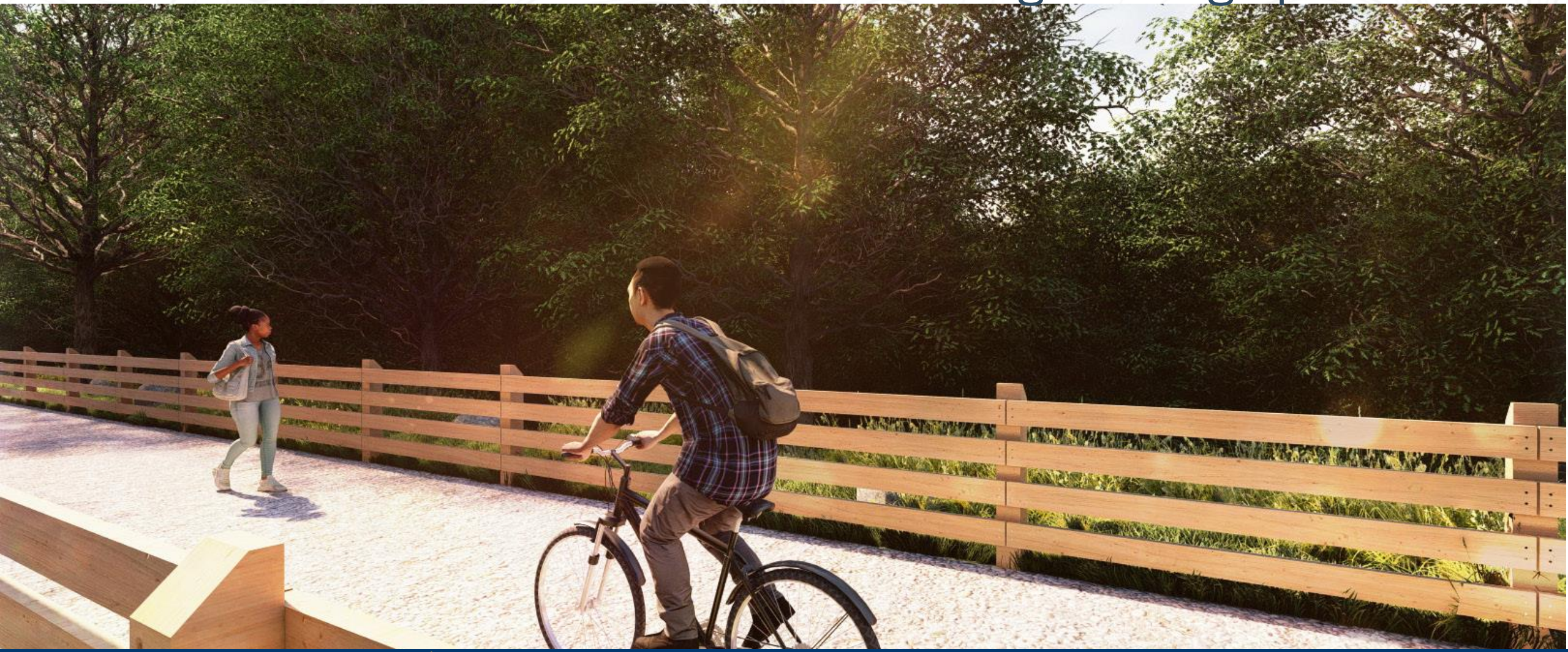
Final Design

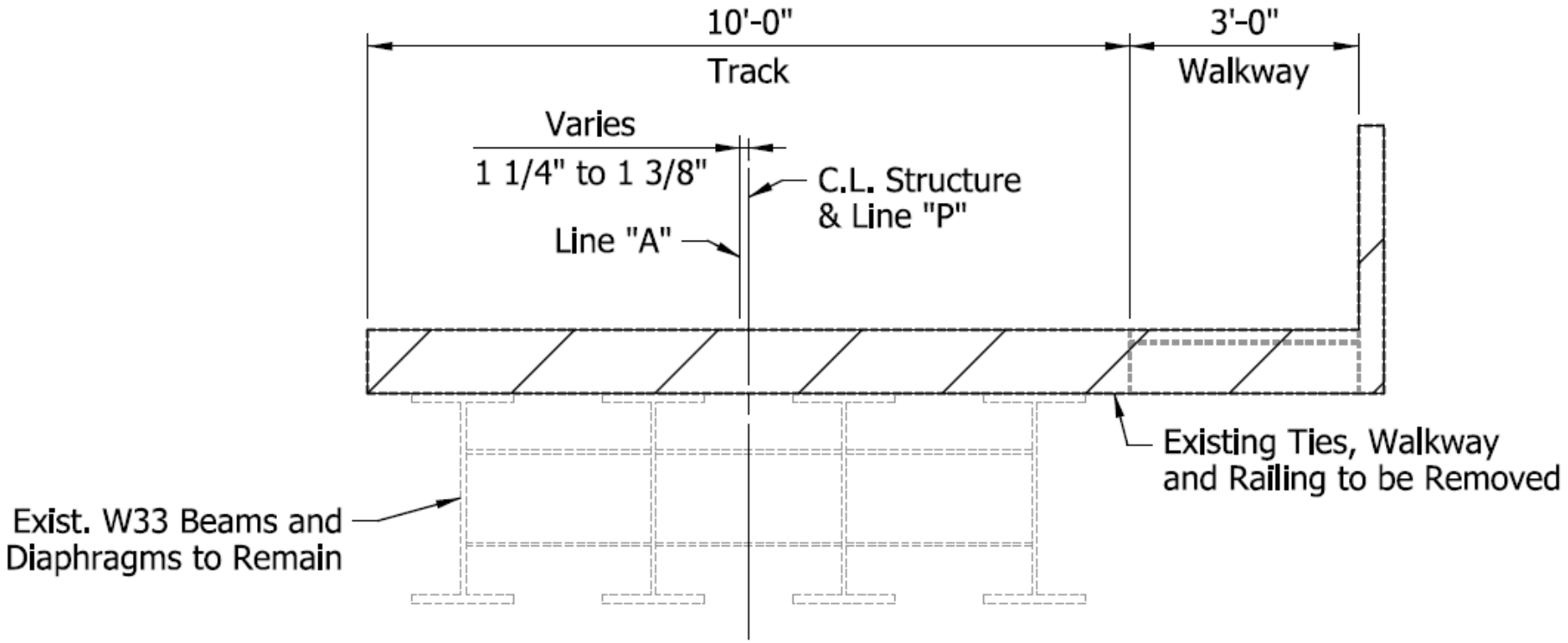
- Rehab plans for 9 bridges and 1 culvert
- Primarily timber decks on steel beams
- Common railing detail to match design aesthetic
- Minimal impacts to waterways – permits only required at 4 structures
- Pave over ballast and add railings to 2 additional bridges



STR 10-004 – Borden, IN

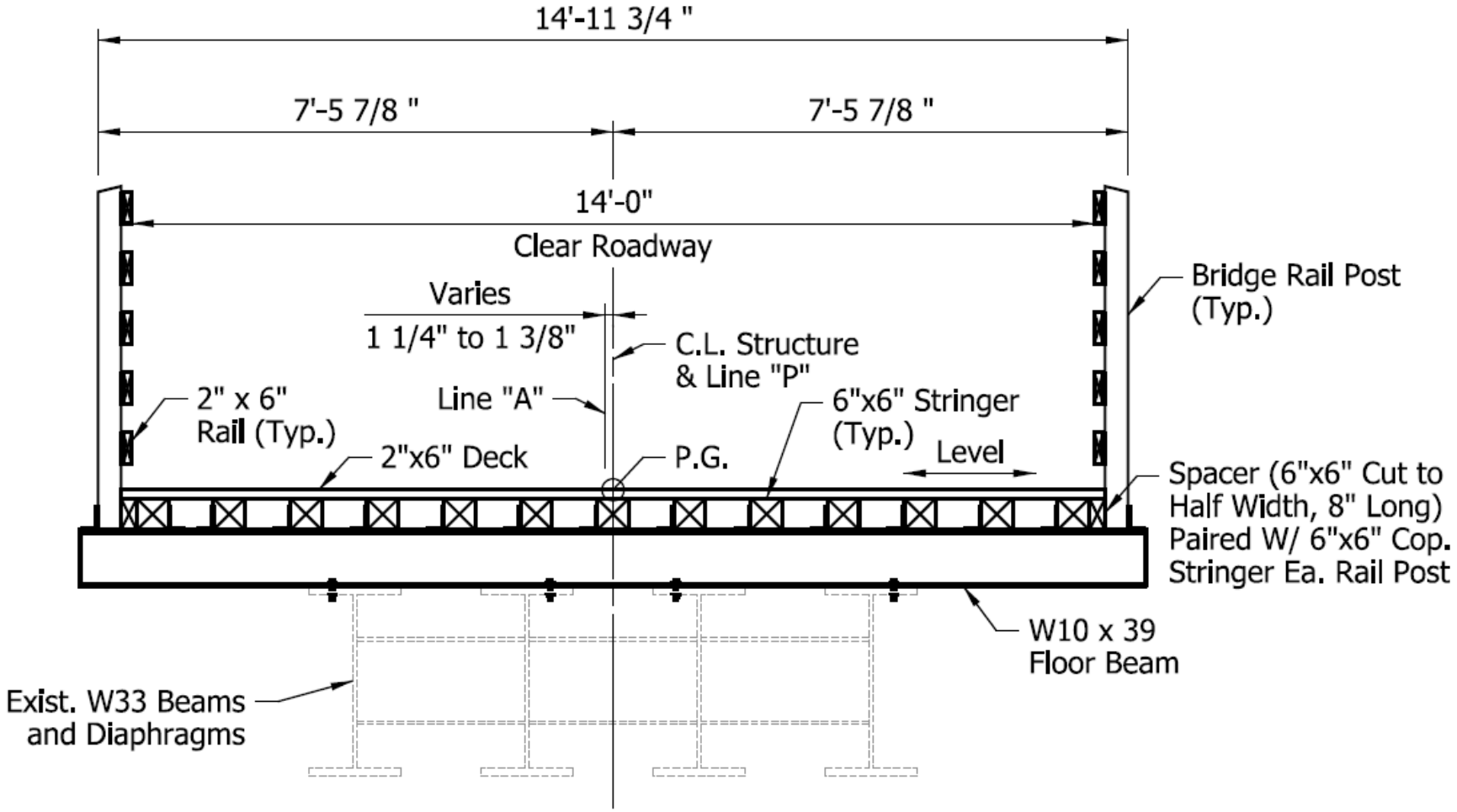
Bridge Railing Special Detail





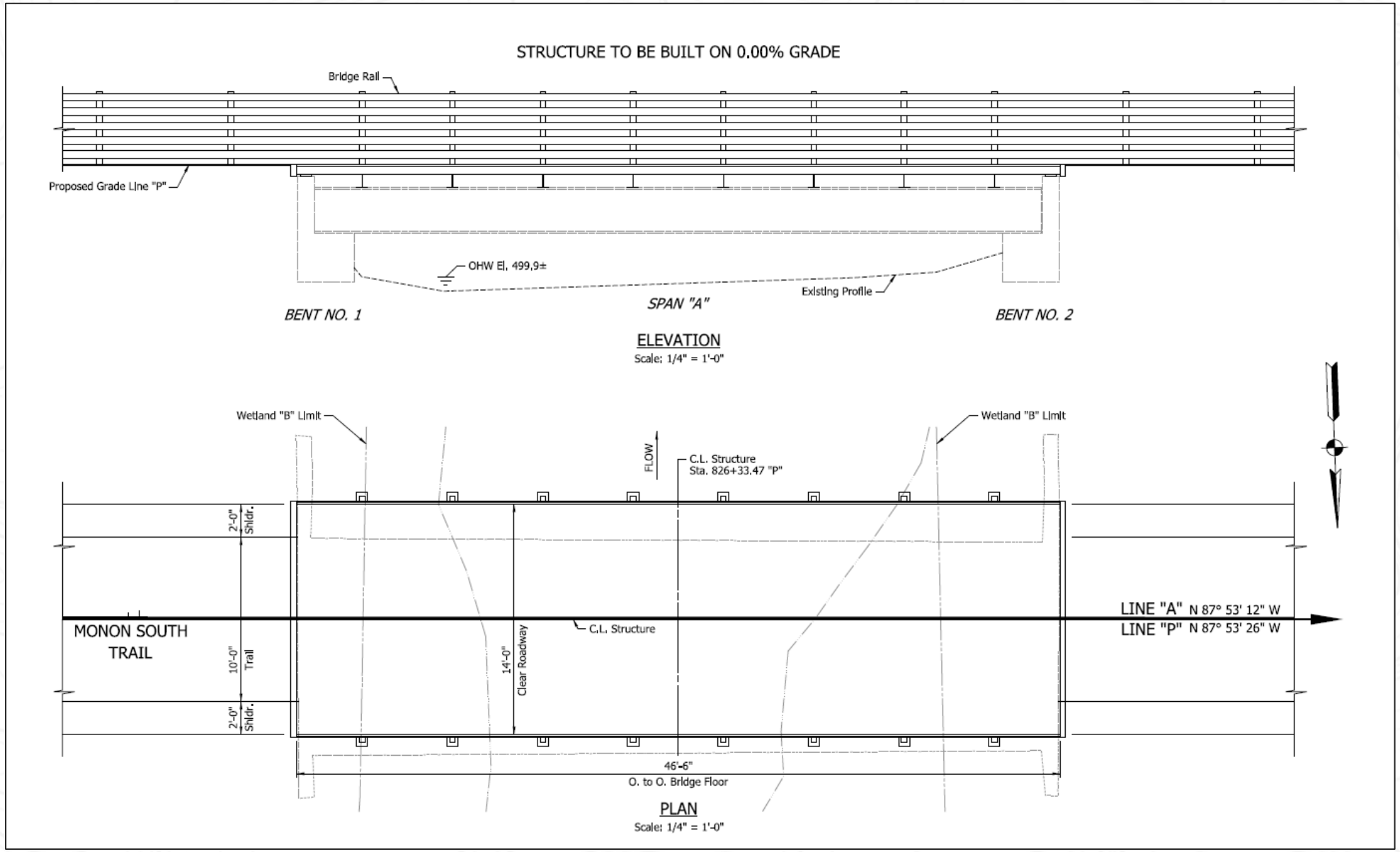
EXISTING TYPICAL SECTION

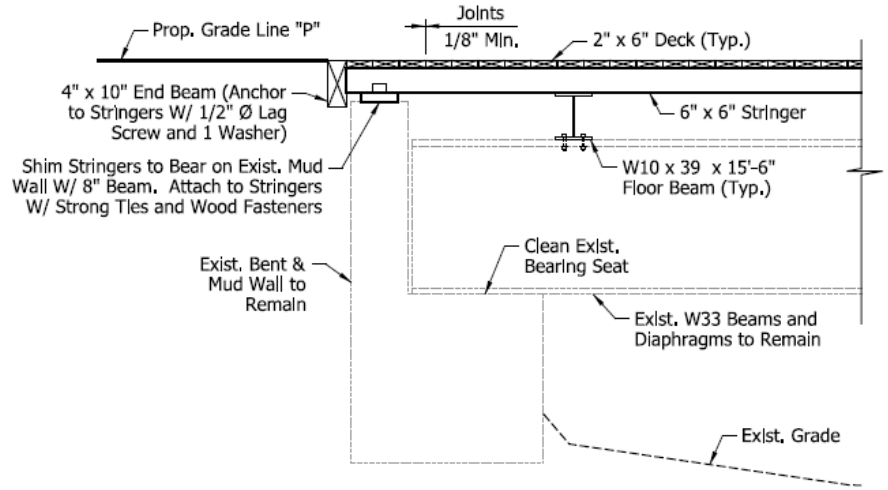
Scale: 3/8" = 1'-0"



PROPOSED TYPICAL SECTION

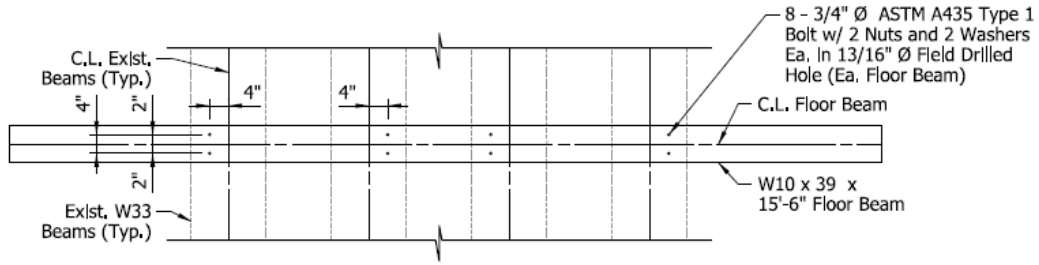
Scale: 3/8" = 1'-0"


STRUCTURE TO BE BUILT ON 0.00% GRADE
Bridge Rail
Proposed Grade Line "P"
OHW El. 499.9±
Existing Profile
SPAN "A"
BENT NO. 1
BENT NO. 2
ELEVATION
Scale: 1/4" = 1'-0"
Wetland "B" Limit
Wetland "B" Limit
FLOW
C.L. Structure
Sta. 826+33.47 "P"
2'-0" Shldr.
MONON SOUTH TRAIL
10'-0" Trail
2'-0" Shldr.
C.L. Structure
14'-0" Clear Roadway
LINE "A" N 87° 53' 12" W
LINE "P" N 87° 53' 26" W
46'-6"
O. to O. Bridge Floor
PLAN
Scale: 1/4" = 1'-0"



SECTION "A-A"

Scale: 1/2" = 1'-0"



FLOOR BEAM ANCHORING DETAIL

No Scale

Bidding and Construction

Let’s build a trail!

Contractor’s Forum

- Total Bid: $15,347,000
- Structures Work: $ 2,033,745

~$170,000 per structure


ORLEANS


VOLVO

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ClarkDietz
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