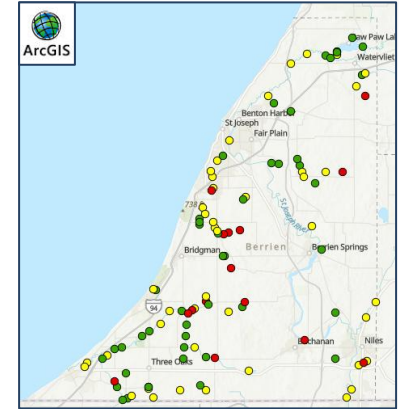


Bridge Management – Planning For Success

**Presented To: Bridge Preservation Partnerships –
Local Agency Outreach Working Group**

October 27, 2026

David Juntunen P.E. – Mott MacDonald



What is Bridge Asset Management?

MAP 21 defines asset management as a strategic and systematic process of operating, maintaining, and improving physical assets, with a focus on engineering and economic analysis based upon quality information, to identify a structured sequence of maintenance, preservation, repair, rehabilitation, and replacement actions that will achieve and sustain a desired state of good repair over the lifecycle of the assets at minimum practicable cost. (23 U.S.C. 101(a)(2), MAP-21 § 1103).

Why Bridge Asset Management?

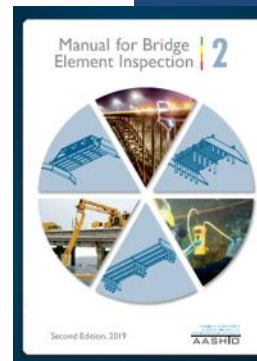
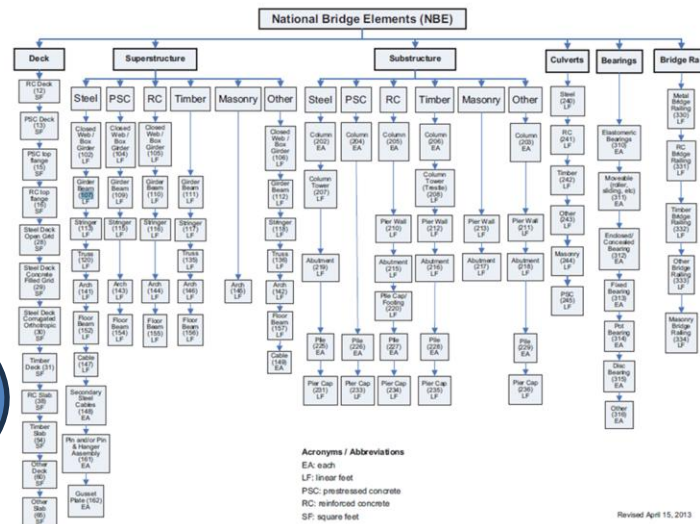
- Federal or state requirement such as Transportation Asset Management Plan (TAMP)
- Credibility with County Board, City Council, Legislature, Executive Leadership
- Integration with other infrastructure asset management
- Necessity. Our nations bridges are showing real need. We can't just build our way out of this problem.
- Be a good steward of taxpayer money. "It's the right thing to do!"

Bridge Management Starts with Data

- Inventory Data
- Condition Data
 - NBI General Condition Rating Data
- Element Data

You can get bridge data from your state DOT or the FHWA National Bridge Inventory (NBI)

Rating Number	NBI Description	Performance Measure Descriptor
9	EXCELLENT CONDITION	GOOD
8	VERY GOOD CONDITION	
7	GOOD CONDITION	
6	SATISFACTORY CONDITION	FAIR
5	FAIR CONDITION	
4	POOR CONDITION	POOR
3	SERIOUS CONDITION	
2	CRITICAL CONDITION	
1	"IMMINENT" FAILURE CONDITION	
0	FAILED CONDITION	

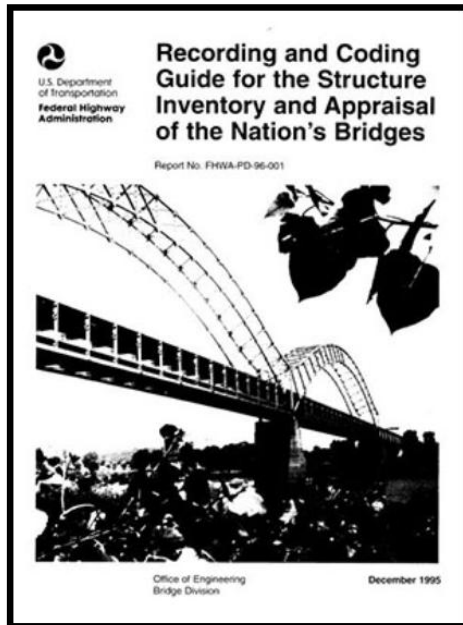


Specifications for National Bridge Inventory

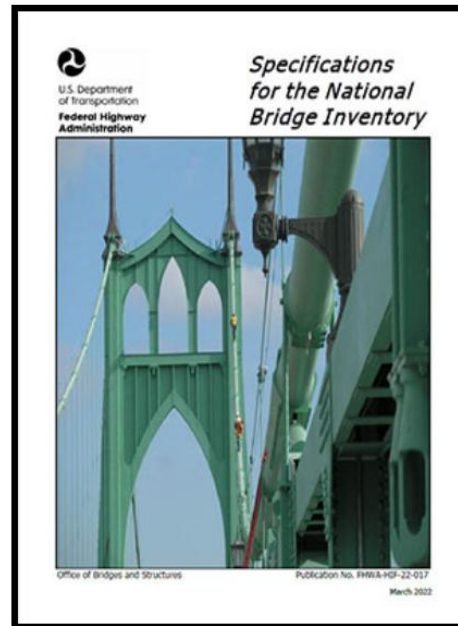
National Bridge Inventory (NBI)

NBI data and reporting is transitioning to a new data standard, guidance, procedures, and web application. Data will continue to be reported to FHWA using the Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges, guidance, procedures, and web application until the annual submittal date specified in FHWA's Implementation Memo. Subsequent submittals will be reported using the Specifications for the National Bridge Inventory (SNBI), guidance, procedures, and web application. Agencies will need to act now to satisfy the requirements of FHWA's Implementation Memo.

National Bridge Inventory – Based on the Coding Guide



National Bridge Inventory – Based on the SNBI



<https://www.fhwa.dot.gov/bridge/nbi.cfm>

Old NBI Data

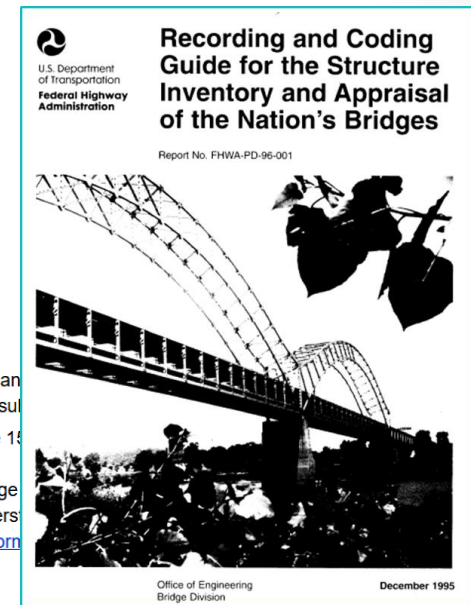
Download NBI ASCII files

The following datasets represent bridge data submitted annually to FHWA by the States, Federal agencies, and Tribal governments in accordance with [Inspection Standards](#) and the [Recording and Coding Guide for the Structure Inventory and Appraisal of the Nations Bridges](#). Each dataset is subject to be corrected or updated throughout the year. The data for public highway bridges is considered final and is published on this website by June 15.

Changes to STRUCTURALLY DEFICIENT (SD): Effective with the 2018 data archive, this term was eliminated from use in the National Bridge Inventory. The term, **Poor** condition, was adopted to characterize the summary condition of a bridge that has any component [Item 58 (Deck), Item 59 (Superstructure), or Item 62 (Culvert)] in Poor or worse condition [coded 4 or less] in accordance with the [Pavement and Bridge Condition Performance Measures final rule](#), published in January of 2017.

Changes to FUNCTIONALLY OBSOLETE (FO): This term was previously defined in <https://www.fhwa.dot.gov/bridge/0650dsup.cfm> as having an appraisal rating of 3 or less for Item 68 (Deck Geometry), Item 69 (Underclearances), or Item 72 (Approach Roadway Alignment), OR having an appraisal rating of 3 for Item 67 (Structural Condition) or Item 71 (Waterway Adequacy). Functionally obsolete is a legacy classification that was used to implement the Highway Bridge Program, which was discontinued with the enactment of MAP-21. As a result, fiscal year 2015 was the last year outstanding Highway Bridge Program funds could be obligated on eligible projects, including ones with bridges that were once classified as functionally obsolete. Therefore, FHWA is no longer tracking this measure, and will not be publishing it on our website for the 2016 data forward. Our focus has shifted to a performance-based program as established in MAP-21 and continued in the Fast Act. As such, we encourage the use of the Good-Fair-Poor bridge condition measures outlined in the [Pavement and Bridge Condition Performance Measures final rule](#), published in January of 2017.

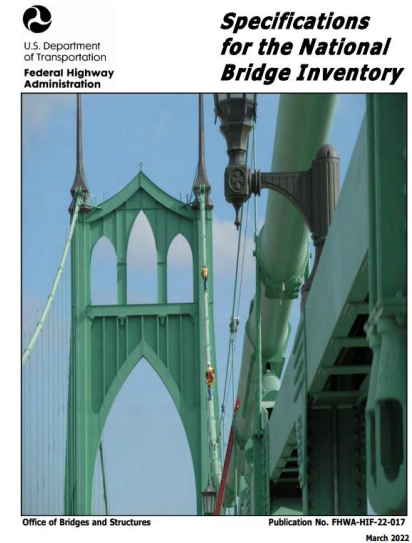
- [Recording and Coding Guide for the Structure Inventory and Appraisal of the Nations Bridges](#) (.pdf, 1 mb)
- [Errata Sheets for Coding Guide](#)
- [Record Format](#)
- [2025 Data](#)
- [2024 Data](#)
- [2023 Data](#)
- [2022 Data](#)
- [2021 Data](#)
- [2020 Data](#)
- [2019 Data](#)
- [2018 Data](#) updated 4/22/19



<https://www.fhwa.dot.gov/bridge/nbi/ascii.cfm>

New SNBI Data

Download NBI Data Files 2026



State	No. Highway Bridges	Download File Format		
Alabama	16,181	Excel	JSON	GeoJSON
Alaska	1,664	Excel	JSON	GeoJSON
Arizona	8,590	Excel	JSON	GeoJSON
Arkansas	12,999	Excel	JSON	GeoJSON
California	26,014	Excel	JSON	GeoJSON
Colorado	9,018	Excel	JSON	GeoJSON
Connecticut	4,355	Excel	JSON	GeoJSON
Delaware	888	Excel	JSON	GeoJSON
District of Columbia	261	Excel	JSON	GeoJSON

https://www.fhwa.dot.gov/bridge/nbi/nbi_data_2026.cfm

Basics of Bridge Management



Figure 15. Steps for establishing a bridge preservation program.

BMS Resources

- FHWA BMS Workshop
- TSP2 National BMS Working Group
- TSP2 Local Agency Outreach Working Group

Bridge Management Systems Workshop

Participant Workbook



Bridge Preservation BMS Working Group

TSP-2 National Working Group	"Bridge Preservation BMS Working Group"
Leader(s)	Co-Chairs: Todd Springer, VDOT; Dave Juntunen, Kercher Group Vice-Chair: Jeff Milton, VDOT Secretary: John Hooks, NCPP
Work Scope	1. Promote the development and / or adoption of best practices for Bridge Management Systems (BMS) to extend the service life of bridges and demonstrate the value of preservation. 2. Develop general guidance and examples to help practitioners nationwide identify best practices for Bridge Management Systems that meets the needs of the agency and establish a process that makes implementation less intimidating. This can be organized into basic, intermediate, and advanced BMS activities as detailed in the Attachment A. 3. Monitor and share the national development of management systems as they evolve.

<https://www.fhwa.dot.gov/bridge/management/>

<https://tsp2bridge.pavementpreservation.org/national-working-groups/>

Bridge Management 101

Three Levels of Bridge Management Systems

➤ Basic

- Collecting data (Inventory and Condition)

➤ Intermediate

- Managing for Current Needs
- Trend Analysis
- Prioritization

➤ Advanced

- Managing for the Future
 - Benefit Cost Analysis
 - Optimization



Bridge
Management isn't
Rocket Science

Bridge Management 101

Three Levels of Bridge Management Systems

➤ Basic

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 - Optimization



Bridge
Management isn't
Rocket Science

FHWA Bridge Preservation Guide

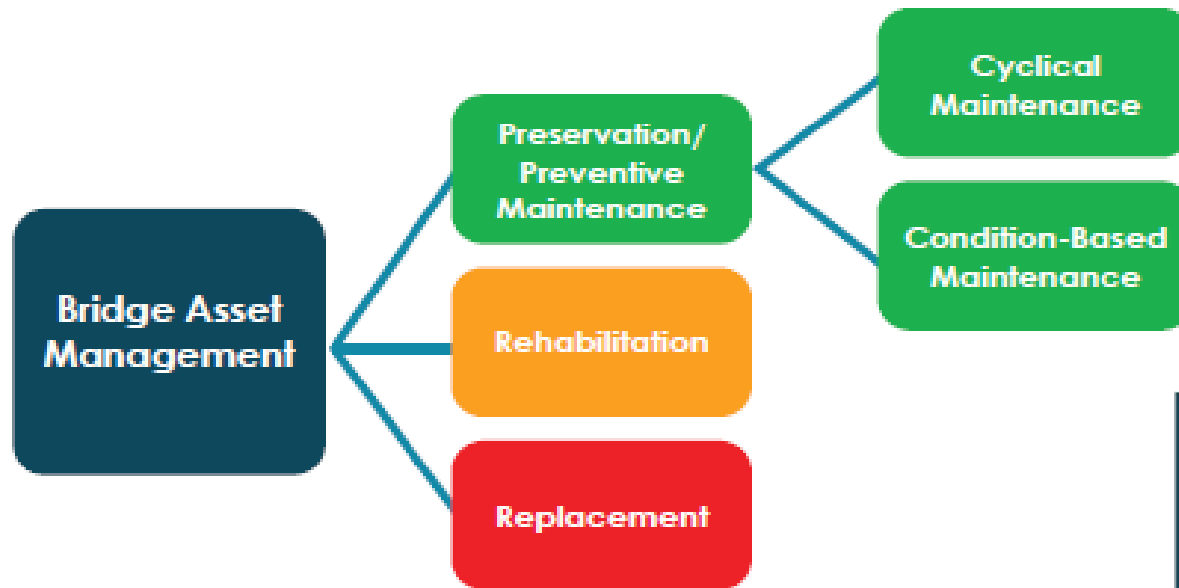
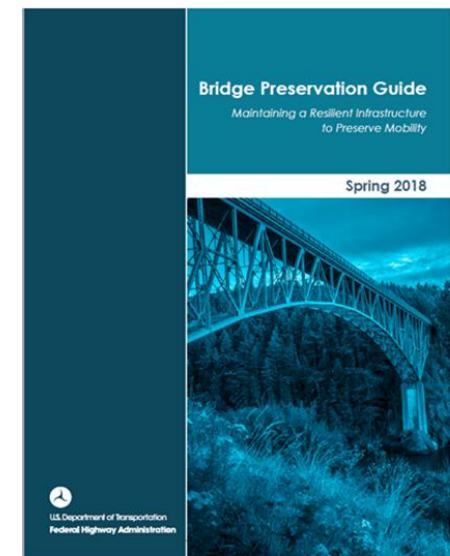
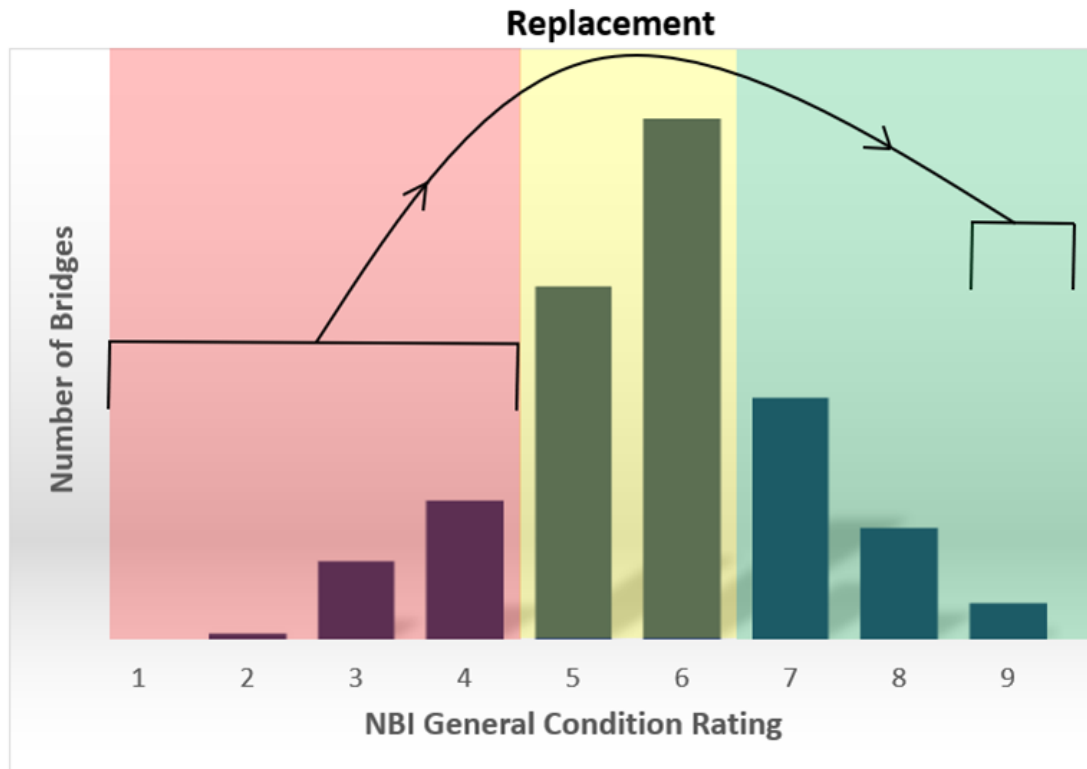


Figure 2. Bridge action categories.

<https://www.fhwa.dot.gov/bridge/preservation/guide/guide.pdf>



Replacement/Reconstruction



Rating Number	NBI Description	Performance Measure Descriptor
9	EXCELLENT CONDITION	GOOD
8	VERY GOOD CONDITION	
7	GOOD CONDITION	
6	SATISFACTORY CONDITION	FAIR
5	FAIR CONDITION	
4	POOR CONDITION	POOR
3	SERIOUS CONDITION	
2	CRITICAL CONDITION	
1	"IMMINENT" FAILURE CONDITION	
0	FAILED CONDITION	

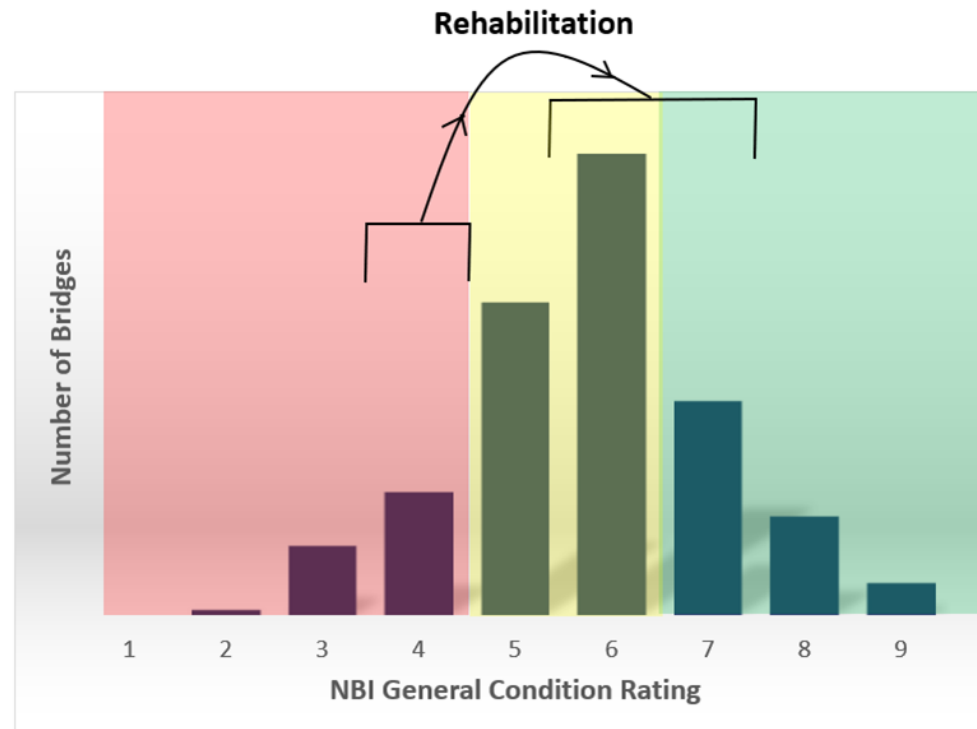


Rehabilitation



- Deck Replacement
- Superstructure Replacement
- Deck Partial Replacement
- i.e. Deep Rigid Overlays
- Superstructure Repairs
- Substructure Repairs

Rating Number	NBI Description	Performance Measure Descriptor
9	EXCELLENT CONDITION	GOOD
8	VERY GOOD CONDITION	
7	GOOD CONDITION	
6	SATISFACTORY CONDITION	FAIR
5	FAIR CONDITION	
4	POOR CONDITION	POOR
3	SERIOUS CONDITION	
2	CRITICAL CONDITION	
1	"IMMINENT" FAILURE CONDITION	
0	FAILED CONDITION	



Without Bridge Management Replacement and Repair Needs Can Become Reactive



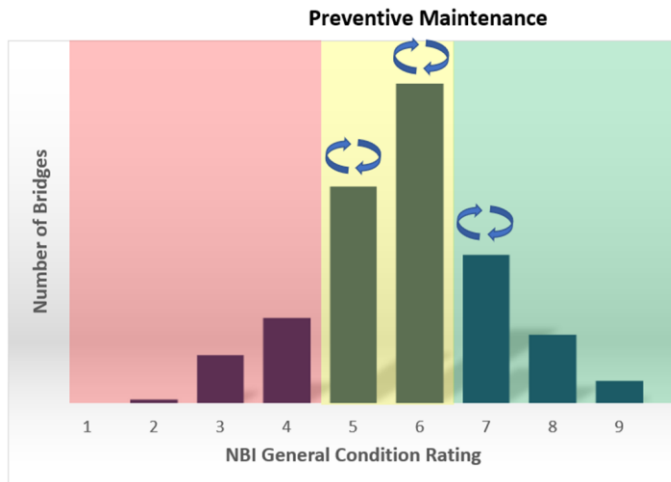
Bridge had to be closed

**Reactive!
Crisis Mode**

90 percent of deck
has bad concrete,
with full depth hole.



Preservation/Preventive Maintenance



- Joint Replacements
- Pin & Hanger Replacements
- Complete Painting
- Zone Painting
- Deck Overlays
- Deck Patching
- (many more)...



Figure 8. Joint replacement.



Figure 9. Joint seal replacement.



Figure 4. Broadcasting aggregate on sealer.

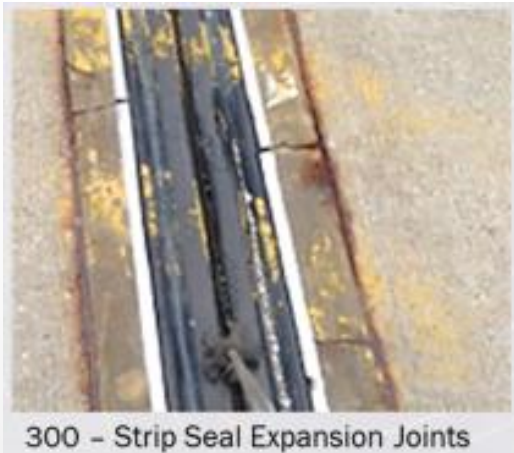
Commonly Used Elements For Preservation

- Bridge Management Elements (BME)
 - Deck Joints - Elements 300- 306
 - Deck Wearing Surface – Element 510
 - Steel Protective Coating – Element 515

- Element 107 – Steel Girder / Beam



Year 40



Cyclic Maintenance Activities

You do based on Time



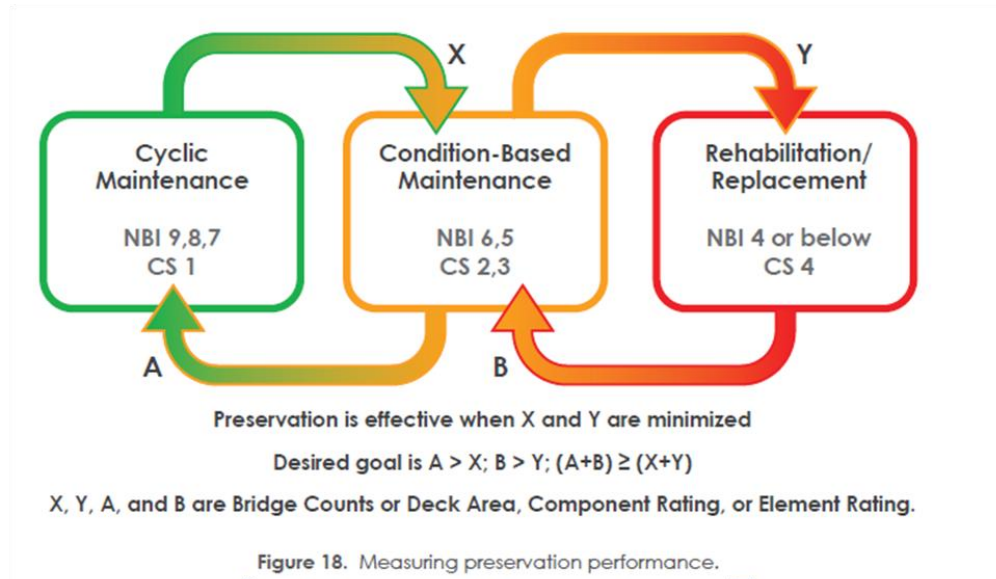
Figure 3. Bridge washing.



Figure 4. Broadcasting aggregate on sealer.

BRIDGE CYCLE OF LIFE

Deterioration



Improvement

Bridge asset management identifies a structured sequence of maintenance, preservation, repair, rehabilitation, and replacement actions.

Example Agency

Berrien County Michigan



About Berrien County in Michigan

- **BERRIEN COUNTY**

- 585 square miles in the southwestern corner of Michigan
- Population of 154,316
- 42 miles of Lake Michigan shoreline, 86 inland lakes, and the St. Joseph, Galien and Paw Paw Rivers
- Unique shape make for easy recognition
- Rich with Native American history and known as the Land of Four Flags
- Substantial and wide variety of agriculture
- 22 Townships



- **BERRIEN COUNTY ROAD DEPARTMENT (BCRD)**

- Mission Statement: “To maintain a county road system that is safe and convenient for public travel. This mission is carried out by a skilled, hardworking staff.”
- The BCRD road network consists of approximately 1,477 miles of roads, **104 bridges**, 50 miles of guardrail, 13 traffic signals, and thousands of culverts.

- **TRANSPORTATION Hub**

- Due to Berrien County’s strategic location along Lake Michigan between Detroit and Chicago, it encompasses the junction of major federal highway systems.

Objectives for Berrien County Bridge, Management

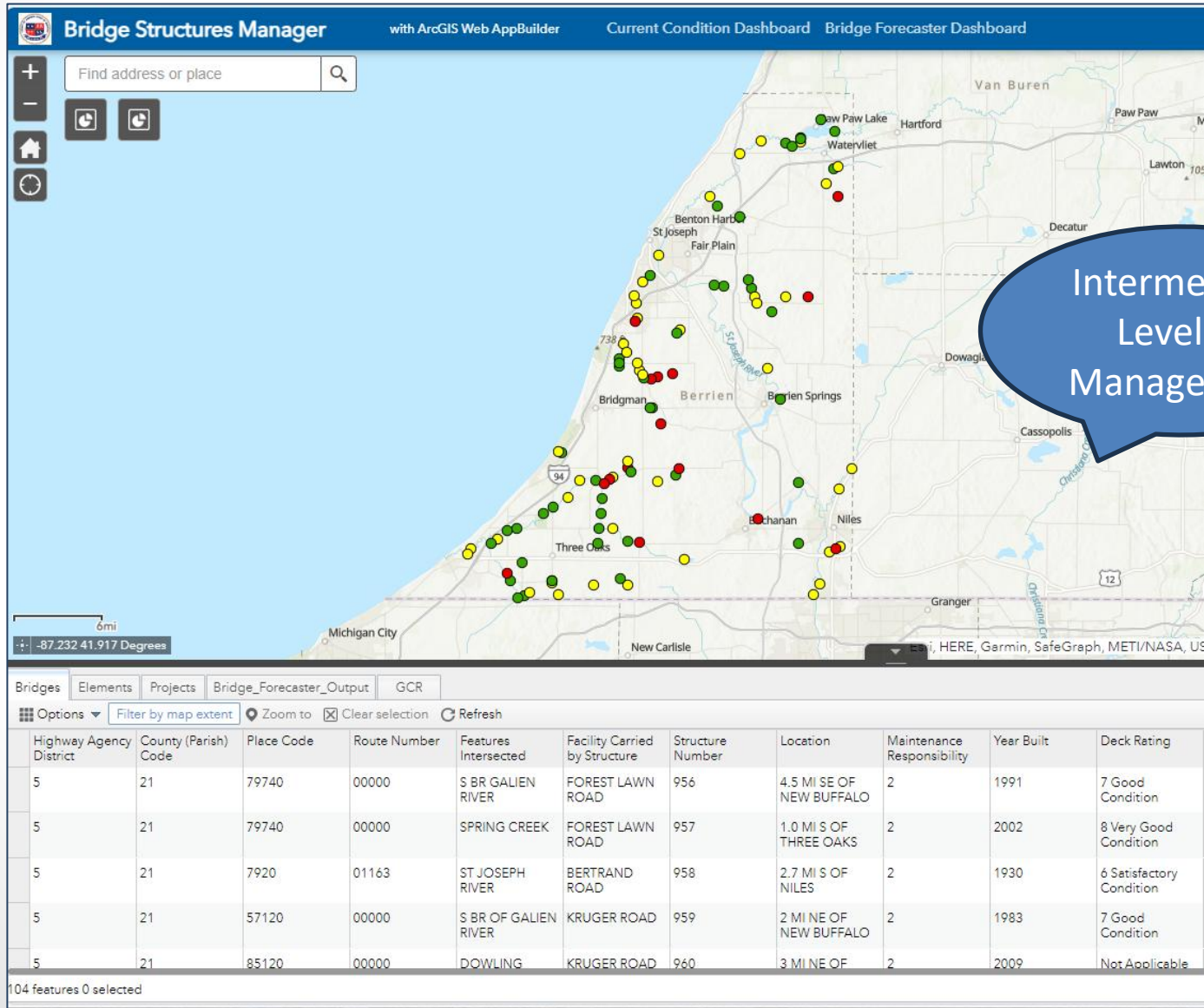
Bridge Management

- Manage bridge rehabilitation and replacement needs
- Manage bridge preservation and maintenance needs
- Manage risk
- Manage projects
- Forecast condition based upon projects and budget constraints

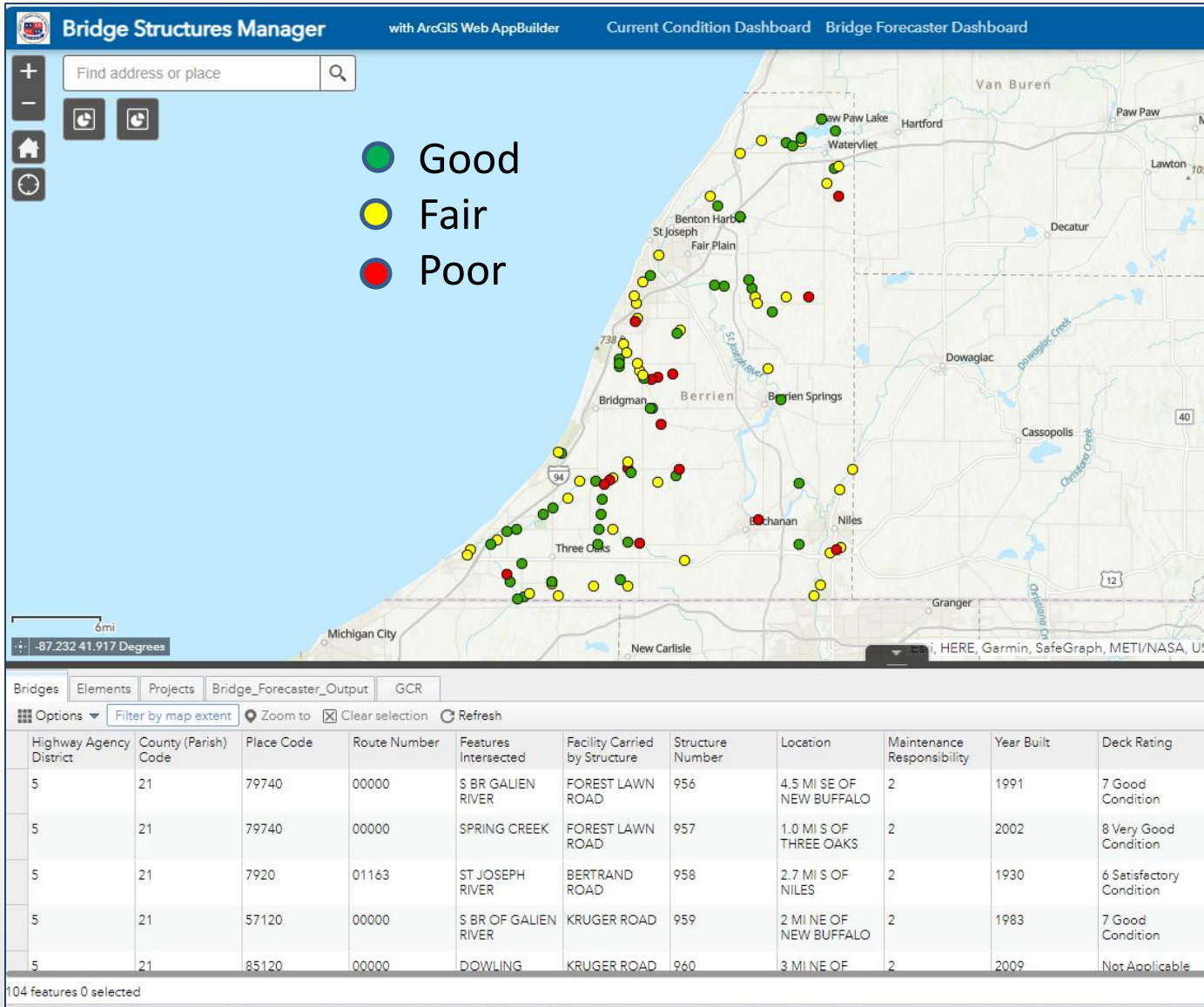
Managing Berrien County's Bridges



Bridge Structures Manager



Bridge Structures Manager



Bridge Structures Manager

Bridge Structures Manager with ArcGIS Web AppBuilder Current Condition Dashboard Bridge Forecaster Dashboard

Find address or place

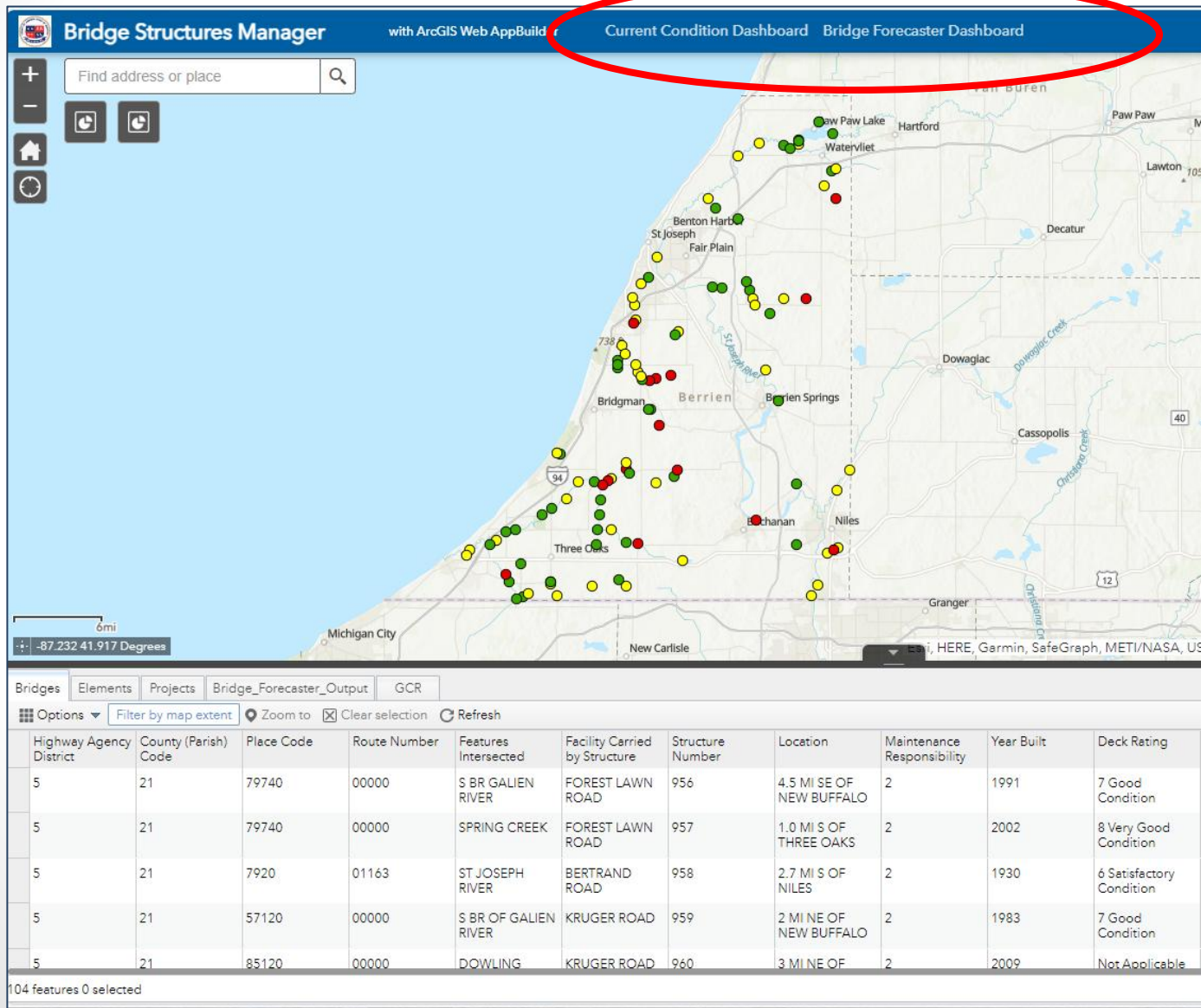
Tables

- Bridge Inventory
- NBI General Condition Rating (GCR) History
- Elements
- Projects
- Bridge Forecaster Output

104 features 0 selected

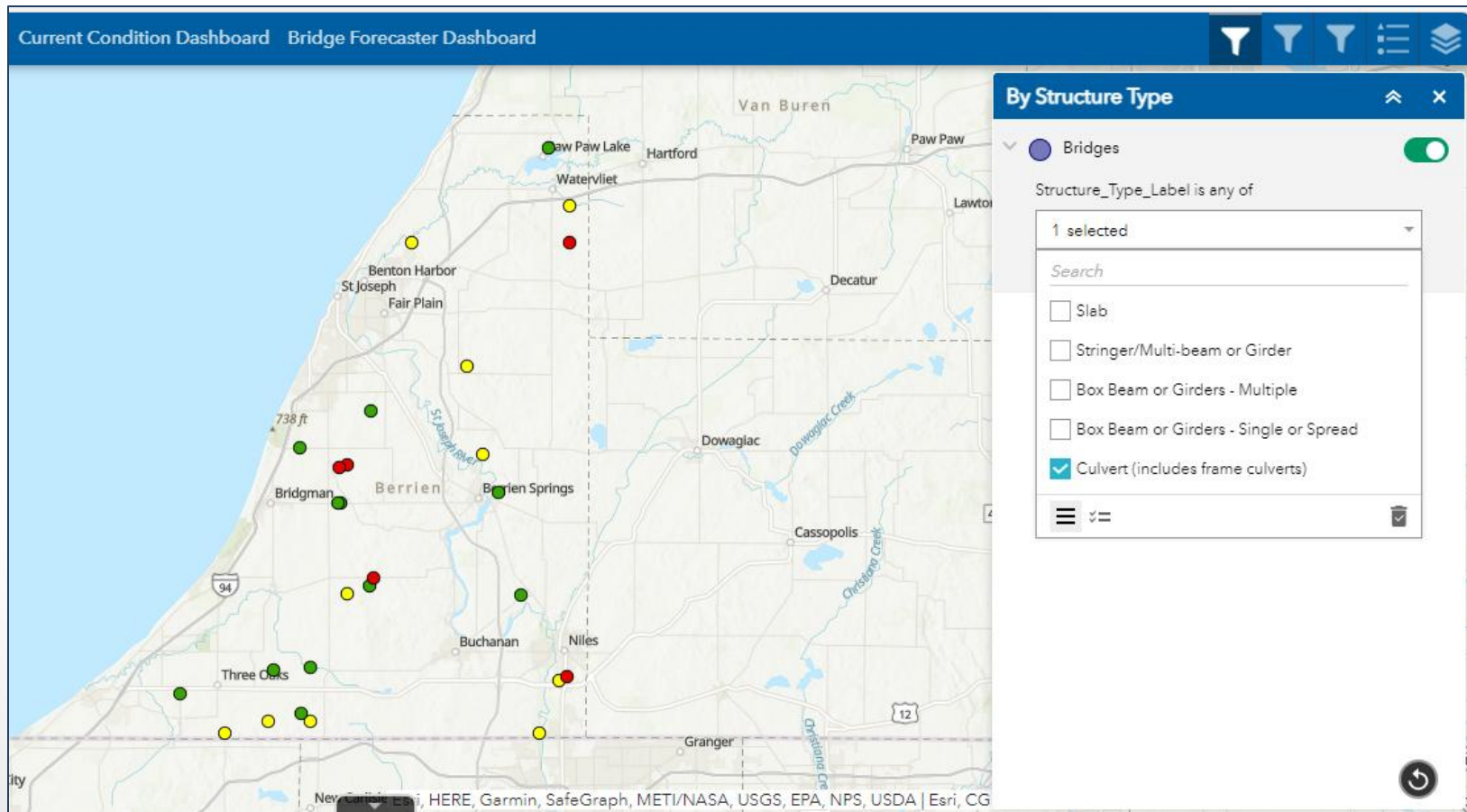
Highway Agency District	County (Parish) Code	Place Code	Route Number	Features Intersected	Facility Carried by Structure	Structure Number	Location	Maintenance Responsibility	Year Built	Deck Rating
5	21	79740	00000	S BR GALIEN RIVER	FOREST LAWN ROAD	956	4.5 MI SE OF NEW BUFFALO	2	1991	7 Good Condition
5	21	79740	00000	SPRING CREEK	FOREST LAWN ROAD	957	1.0 MI S OF THREE OAKS	2	2002	8 Very Good Condition
5	21	7920	01163	ST JOSEPH RIVER	BERTRAND ROAD	958	2.7 MI S OF NILES	2	1930	6 Satisfactory Condition
5	21	57120	00000	S BR OF GALIEN RIVER	KRUGER ROAD	959	2 MI NE OF NEW BUFFALO	2	1983	7 Good Condition
5	21	85120	00000	DOWLING	KRUGER ROAD	960	3 MI NE OF	2	2009	Not Applicable

Bridge Structures Manager



Bridge Structures Manager

Filter by Structure Type



Current Condition Dashboard

Current Condition Dashboard

Berrien County, MI.

Select Bridge Type

No category selected

Select Structure Condition Ca...

No category selected

Select Structure ID

No category selected

Total Number of Structures

104

Total Deck Area

318.2k

Square Feet

Good

144.1k

Square Feet

Fair

141k

Square Feet

Poor

33.1k

Square Feet

3 Serious Condition 9%

4 Poor Condition 6%

5 Fair Condition 10%

6 Satisfactory 33% Condition

7 Good Condition 34%

8 Very Good 9% Condition

9 Excellent 1% Condition

Esri, NASA, NGA, USGS, FEMA | Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA | The K... Powered by Esri

Last update: 17 seconds ago

Overall GCR

Structure Type

GCR Deck

GCR Super

GCR Substructure

GCR Culvert

Structure No.	Inspection Date	Element Number/Name	Parent Element	Total Quantity	Quantity in CS1 (Good)	Quantity in CS2 (Fair)	Quantity in CS3 (Poor)	Quantity in CS4 (Severe)	Percent in CS1 (Good)	Percent in CS2 (Fair)	Percent in CS3 (Poor)	Percent in CS4 (Severe)
958	15/07/2022	800		17,248.00	14,561	2,587	100	0	84.42	15.00	0.58	0.00
958	15/07/2022	331-Reinforced Concrete Bridge Railing (LFT)		784.00	734	50	0	0	93.62	6.38	0.00	0.00
958	15/07/2022	811		17,248.00	14,561	2,587	100	0	84.42	15.00	0.58	0.00
958	15/07/2022	812		784.00	724	50	10	0	92.35	6.38	1.28	0.00
958	15/07/2022	300-Strip Seal Expansion Joint (LFT)		220.00	0	217	3	0	0.00	98.64	1.36	0.00

Mott MacDonald Restricted

Current Condition Dashboard

Current Condition Dashboard
Berrien County, MI.

Select Bridge Type
No category selected

Select Structure Condition Ca...
No category selected

Select Structure ID
No category selected



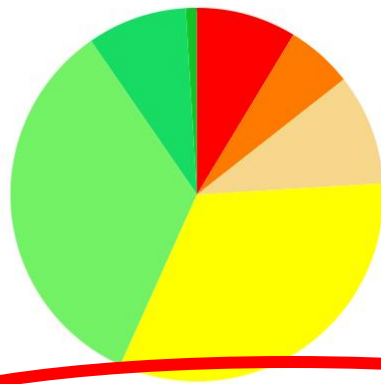
Total Number of Structures
104

Total Deck Area
318.2k
Square Feet

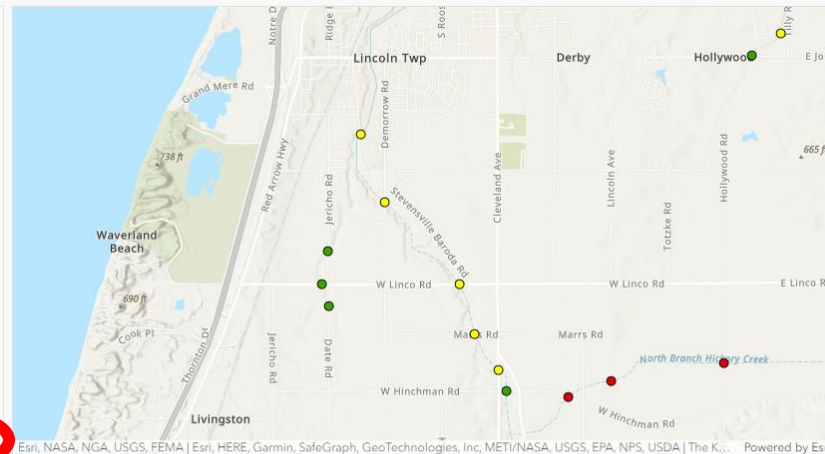
Good
144.1k
Square Feet

Fair
141k
Square Feet

Poor
33.1k
Square Feet



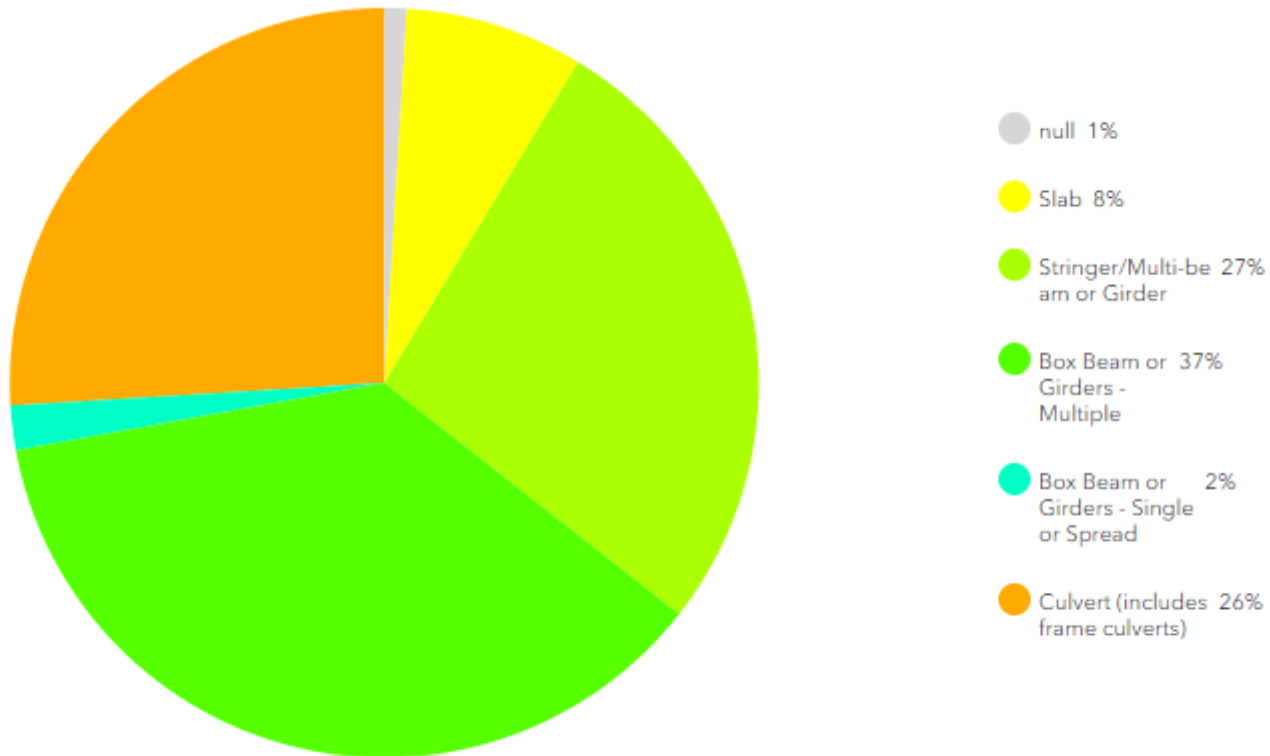
- 3 Serious Condition 9%
- 4 Poor Condition 6%
- 5 Fair Condition 10%
- 6 Satisfactory 33% Condition
- 7 Good Condition 34%
- 8 Very Good 9% Condition
- 9 Excellent 1% Condition



Overall GCR | Structure Type | GCR Deck | GCR Super | GCR Substructure | GCR Culvert

Structure No.	Inspection Date	Element Number/Name	Parent Element	Inspection Quantity	Quantity in CS1 (Good)	Quantity in CS2 (Fair)	Quantity in CS3 (Poor)	Quantity in CS4 (Severe)	Percent in CS1 (Good)	Percent in CS2 (Fair)	Percent in CS3 (Poor)	Percent in CS4 (Severe)
958	15/07/2022	800		17,248.00	14,561	2,587	100	0	84.42	15.00	0.58	0.00
958	15/07/2022	331-Reinforced Concrete Bridge Railing (LFT)		784.00	734	50	0	0	93.62	6.38	0.00	0.00
958	15/07/2022	811		17,248.00	14,561	2,587	100	0	84.42	15.00	0.58	0.00
958	15/07/2022	812		784.00	724	50	10	0	92.35	6.38	1.28	0.00
958	15/07/2022	300-Strip Seal Expansion Joint (LFT)		220.00	0	217	3	0	0.00	98.64	1.36	0.00

Current Condition Dashboard



Last update: 2 minutes ago

Overall GCR

Structure Type

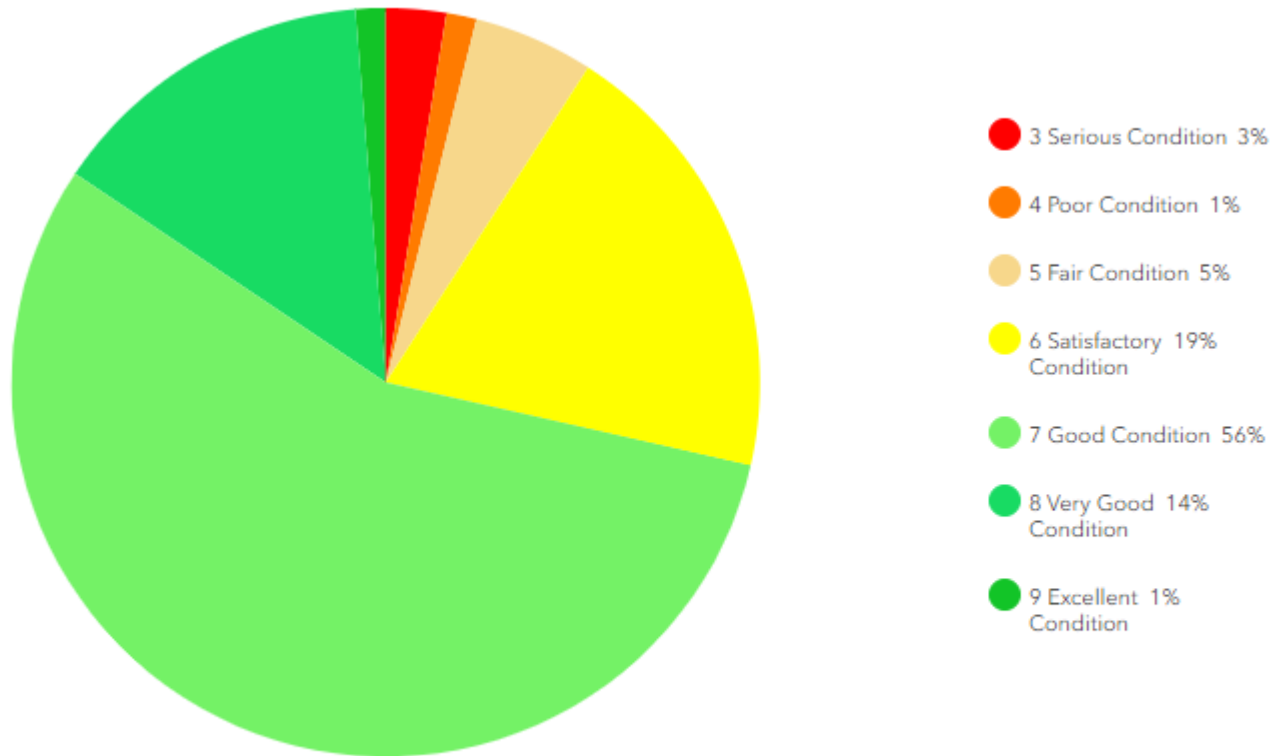
GCR Deck

GCR Super

GCR Substructure

GCR Culvert

Current Condition Dashboard



Last update: 4 minutes ago

Overall GCR

Structure Type

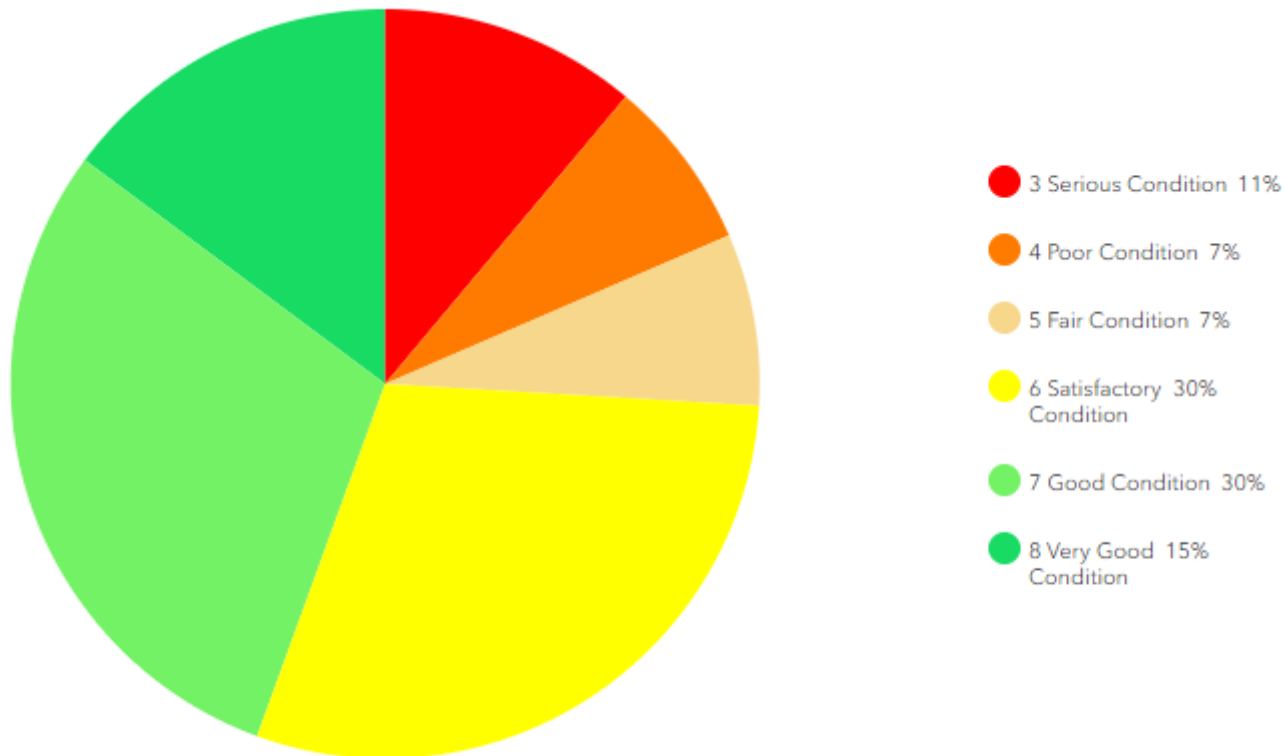
GCR Deck

GCR Super

GCR Substructure

GCR Culvert

Current Condition Dashboard



Last update: 5 minutes ago

Overall GCR

Structure Type

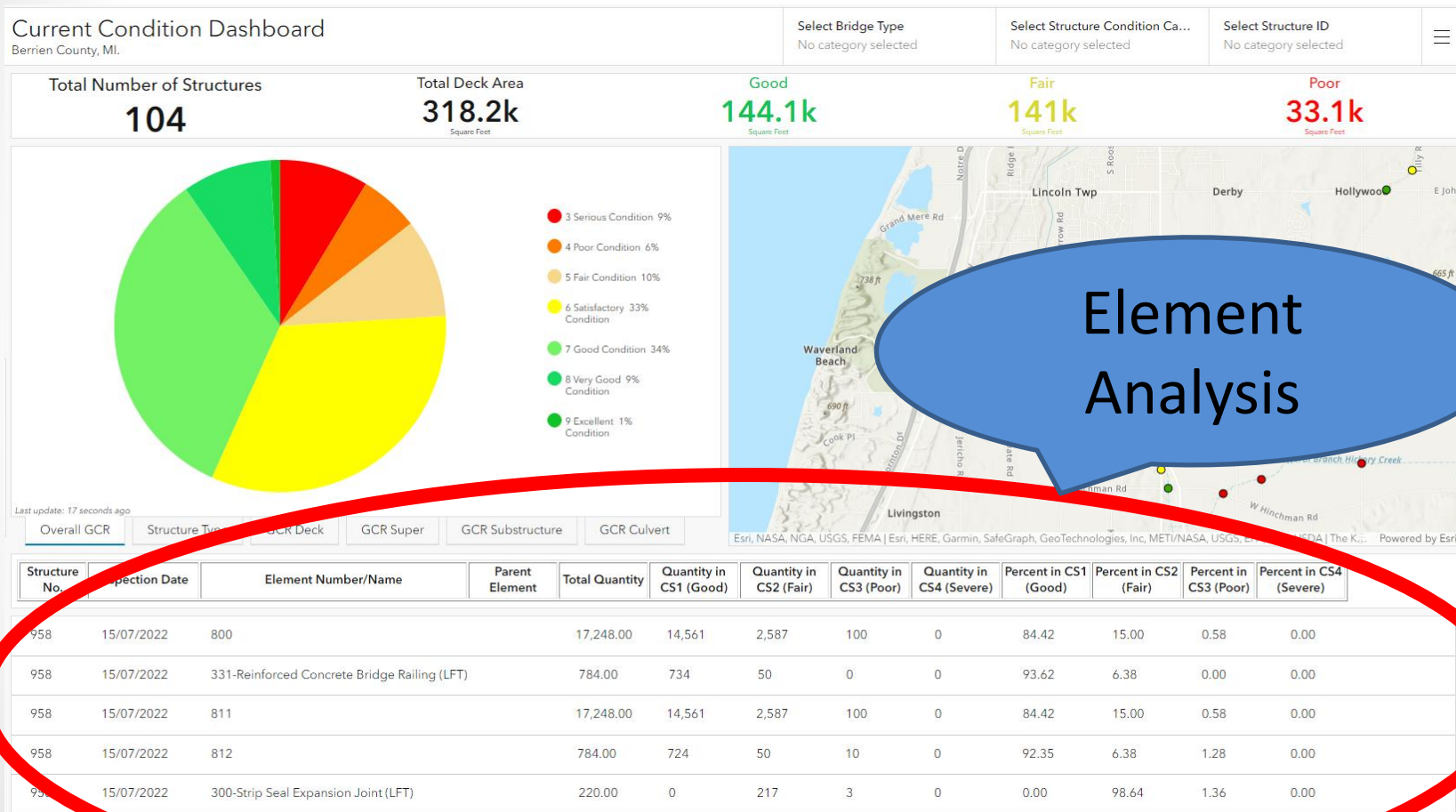
GCR Deck

GCR Super

GCR Substructure

GCR Culvert

Current Condition Dashboard



Bridge Maintenance

Annual Operations and Maintenance Plan for Bridges and Structures

- Bridge Deck Cleaning
- Concrete Bridge Deck Sealing
- Bituminous Wearing Surface Sealing
- Brush Cutting



Bridge Maintenance Basics Training Day

Projects

ArcGIS Survey 123



Structure Number

Record the same exact number as recorded for NBI item 8 - Structure Number.

957

Projects (1)



Project Year*

Record the inspection date.

2025

Project Type*

Record the type of project work to be done.

Rehabilitation

Project Description*

Record a description of work to be done.

Rehabilitation

Project Cost*

Record the Cost of the Project.

75000

Updated Deck Rating

Record the projected condition after Project completion.

7 Good Condition



Bridges Elements Projects Bridge_Forecaster_Output GCR

Options Filter by map extent Zoom to Clear selection Refresh

Structure Number	Project Year	Project Type	Project Description	Cost	Updated Deck Rating	Updated Super Rating	Updated Sub Rating	Updated Culvert Rating	PM Added Time in Deck GCR
956	2025	Preventive Maintenance (PM)	Preventive Maintenance (PM)	25,000.00					10
957	2025	Rehabilitation	Rehabilitation	75,000.00	7	7	7		
958	2025	Replacement	Replace bridge with GRS structure	1,200,000.00	9	9	9		
959	2025	Replacement	Replacement	150,000.00	9				
960	2025	Preventive Maintenance (PM)	Preventive Maintenance (PM)	25,000.00					

Bridge Forecaster Dashboard

Bridge Forecaster Dashboard

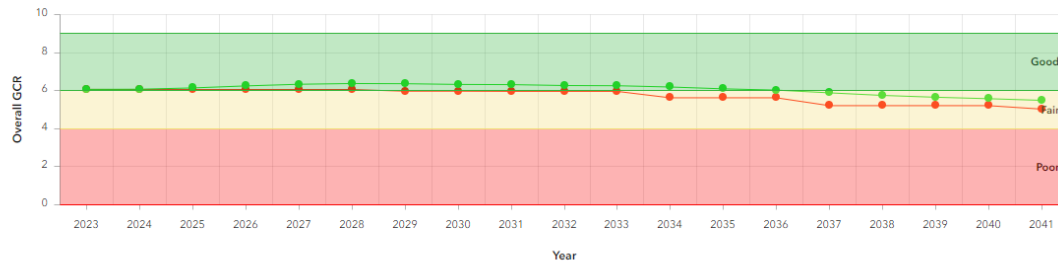
Select Structure ID

Select Structures to Display, R...

Structure Type Selector

Use in conjunction with Struct...

Network Average Bridge Overall GCR



Last update: 1 minute ago

Percent Fair & Good

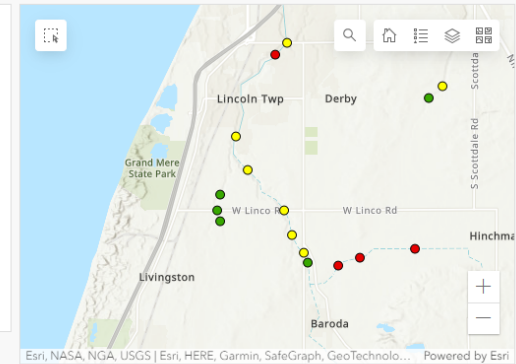
Overall GCR

Deck Structure GCR

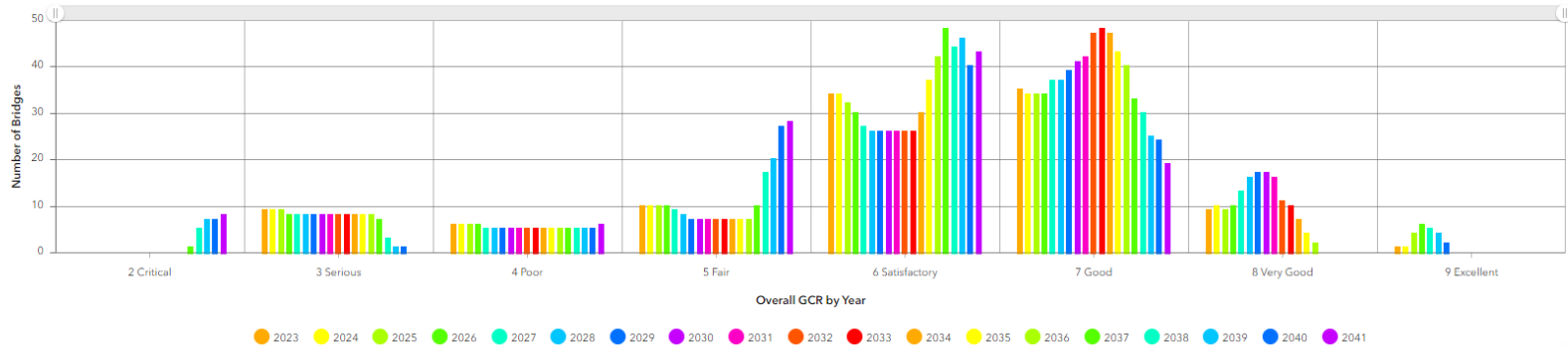
Super-Structure GCR

Sub-Structure GCR

Culvert Ranting by Year



Structure Count by Structure Count



Berrien County Asset Management Plan for Bridges

Key Highlights

- Review inventory and conditions
- Track recent projects
- Large deck and complex bridge needs
- Preservation strategy
- Prioritization criteria and selection
- Review replacement needs
- Review rehab needs
- Anticipated budget and identify funding sources
- Operations and maintenance plan



**2025 Asset
Management Plan for
County-Maintained
Bridges**

Berrien County Asset Management Plan for Bridges

APPENDIX A – SUMMARY OF PRESERVATION CRITERIA

Operations and Maintenance Plan

- Concrete deck sealing
- Deck patching
- Deck joints
- HMA surface sealing
- Brush cutting
- Steel member zone painting
- Substructure repair candidates
- Bridge slope repair candidates

Summary of Preservation Criteria from MDOT Project Scoping Manual		
Preservation Action	Bridge Selection Criteria	Expected Service Life
Replacement		
Total Replacement	- NBI Rating of 3 or less - OR when cost of rehabilitation exceeds cost of replacement - OR when bridge is <u>scour</u> critical with no counter-measures available	70 years
Superstructure Replacement	- NBI Rating for superstructure of 4 or less - OR when cost of rehabilitating superstructure and deck exceeds replacement cost	40 years
Deck Replacement • Epoxy Coated Steel • Black Steel	Use guidelines in MDOT's <i>Bridge Deck Preservation Matrix</i> - NBI Rating of 4 or for deck surface and deck bottom - OR when deck replacement cost is competitive with rehabilitation	70 years 40 years
Substructure Replacement (Full or Partial)	- NBI Rating of 4 or less for abutments, piers, or pier cap - OR existence of open vertical cracks, signs of differential settlement, or presence of active movement - OR bridge is scour critical with no counter-measures available	40 years
Rehabilitation		
Concrete Deck Overlays • Deep • Shallow • HMA/Membrane • HMA Cap	Guidelines in MDOT's <i>Bridge Deck Preservation Matrix</i> - NBI Deck Rating <5 for surface and >5 for bottom - NBI Deck Rating <5 for surface and >4 for bottom - NBI Deck Rating <5 for surface and >4 for bottom - NBI Deck Rating <5 for surface and <4 for bottom	25 years 15 years 8 years 3 years
Railing Retrofit/Replacement	- NBI Deck Rating greater than 5 - OR Railing/Barrier rated less than 5 - OR Safety Improvement is needed	
Steel Beam Repairs	- More than 25% section loss is present in an area of the beam that affects load carrying capacity - OR in order to correct impact damage that impairs beam strength	25 years
Prestressed Concrete Beam Repairs	- Repair ends of prestressed I-beams when more than 5% <u>spalling</u> is present - OR repair areas to correct impact damage that impairs beam	25 years

Summary of Bridge Management

Bridge Management

- Produce annual bridge management needs report
 - Submit projects to the Michigan Local Agency Bridge Program
- Manage bridge maintenance crews
- Manage bridge preservation and maintenance needs
- Manage risk
- Forecast condition based upon projects and budget constraints
- Track and manage bridge maintenance and contract projects

Thank You!

Questions?

David Juntunen P.E. – Mott MacDonald

- Email: David.Juntunen@mottmac.com
- Phone: 517-208-0709

