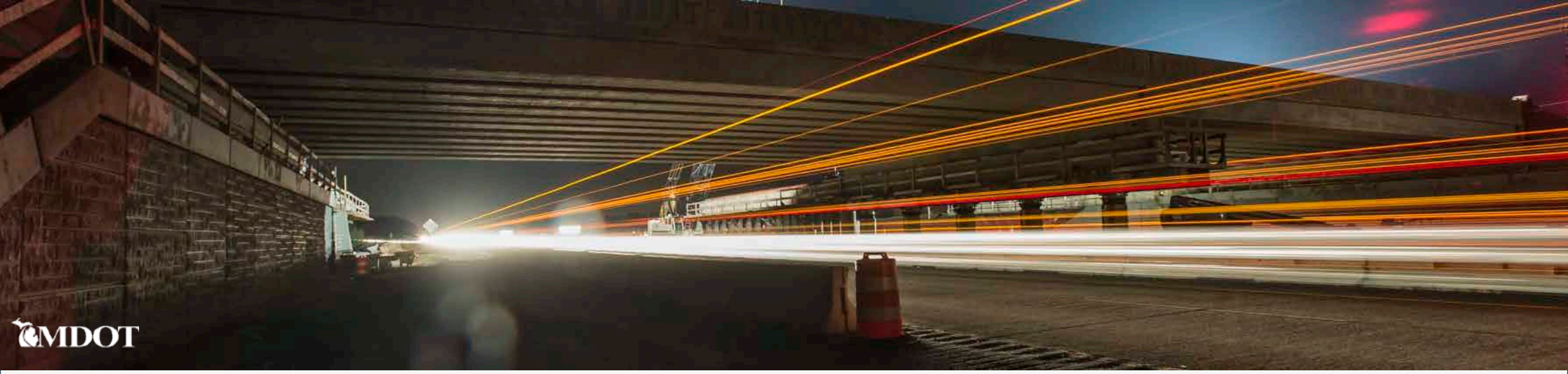


MDOT Bureau of Bridges and Structures

2024 Michigan Bridge Week

Beckie Curtis, Chief Bridge Engineer

MDOT and National

Local Bridge Bundle

Bridge Inspection

Bridge Design

Bridge Construction

Geotechnical

Ancillary Structures

Michigan Department of Transportation

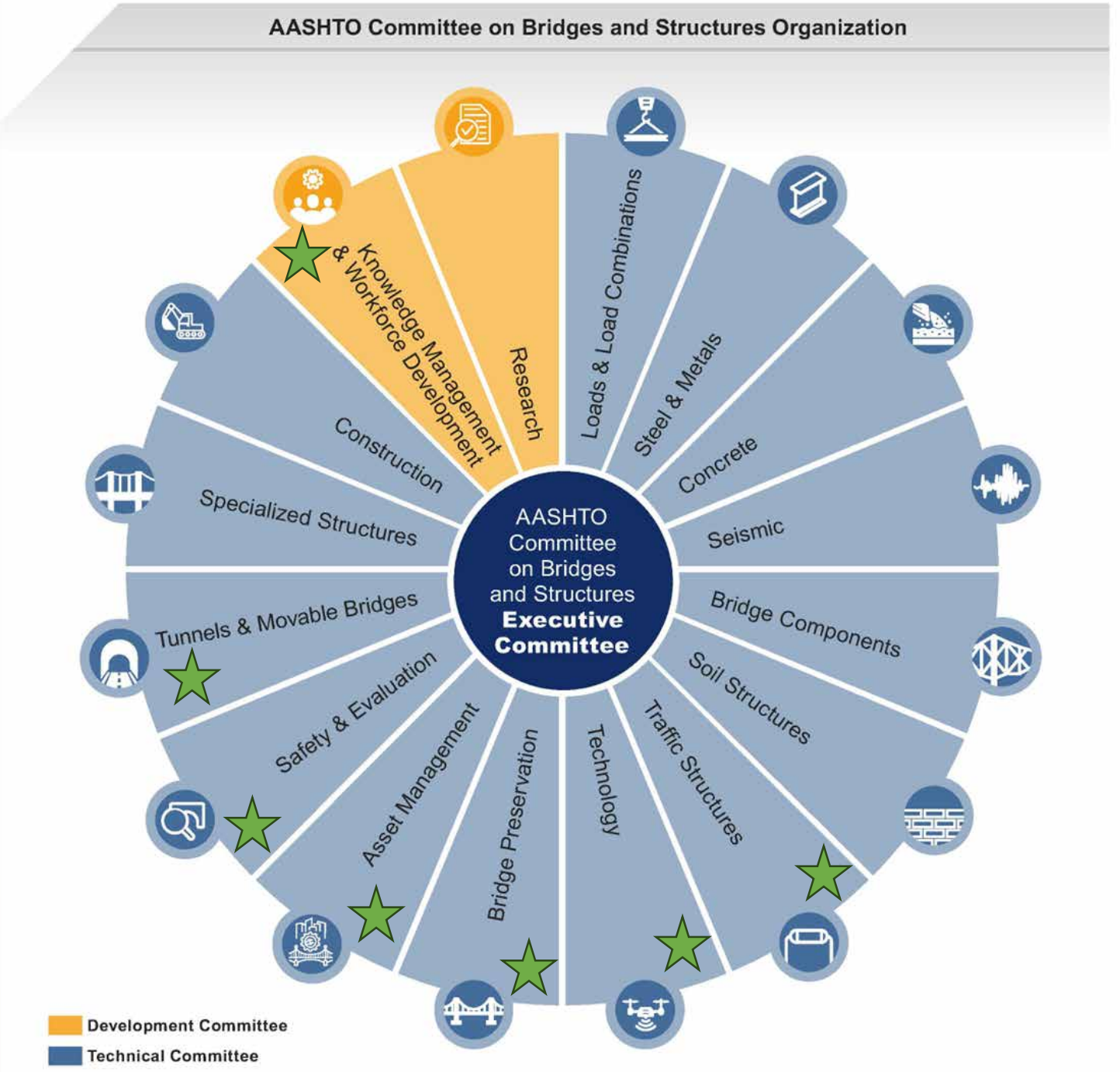
Bureau of Bridges and Structures

AASHTO Committee on Bridges and Structures Reorganization

COBS Strategic Goals

1. Maintain and Enhance the AASHTO Specifications
2. Maintain, Enhance, and Grow the Workforce
3. Assess the Condition of Bridges and Structures
4. Manage the Inventory of Bridges and Structures
5. Advance Methods for Project Delivery
6. Strategically Plan and Promote Research
7. Contribute to National Policy

★ MDOT membership on Technical Committee



WHO WE ARE, WHAT WE DO

OUR MISSION

SERVING AND CONNECTING PEOPLE, COMMUNITIES, AND THE ECONOMY THROUGH TRANSPORTATION.

WHAT WE STAND FOR

OUR VALUES

VISIONARY

Anticipate, imagine, and implement creative solutions.

ENSURING POSITIVE OUTCOMES

Collaborate, align, and deliver results.

PEOPLE FIRST

Value others, set clear expectations, and show appreciation and gratitude.

PROFESSIONAL EXCELLENCE

Know your role, act timely, and continuously learn and share.

DIVERSITY, EQUITY, AND INCLUSION

Value all people, seek to understand, and be open to all voices.

CHARACTER AND INTEGRITY

Be honest, fair, and trustworthy.

Michigan Department of Transportation

WHERE WE ARE GOING

OUR VISION

People-focused

Adaptable

Efficient

Safe

Mobile

Accessible

Reliable

Convenient

Economic, Freight and Societal Vitality

Resilient

Quality of Life

Well-maintained

Sustainably Funded

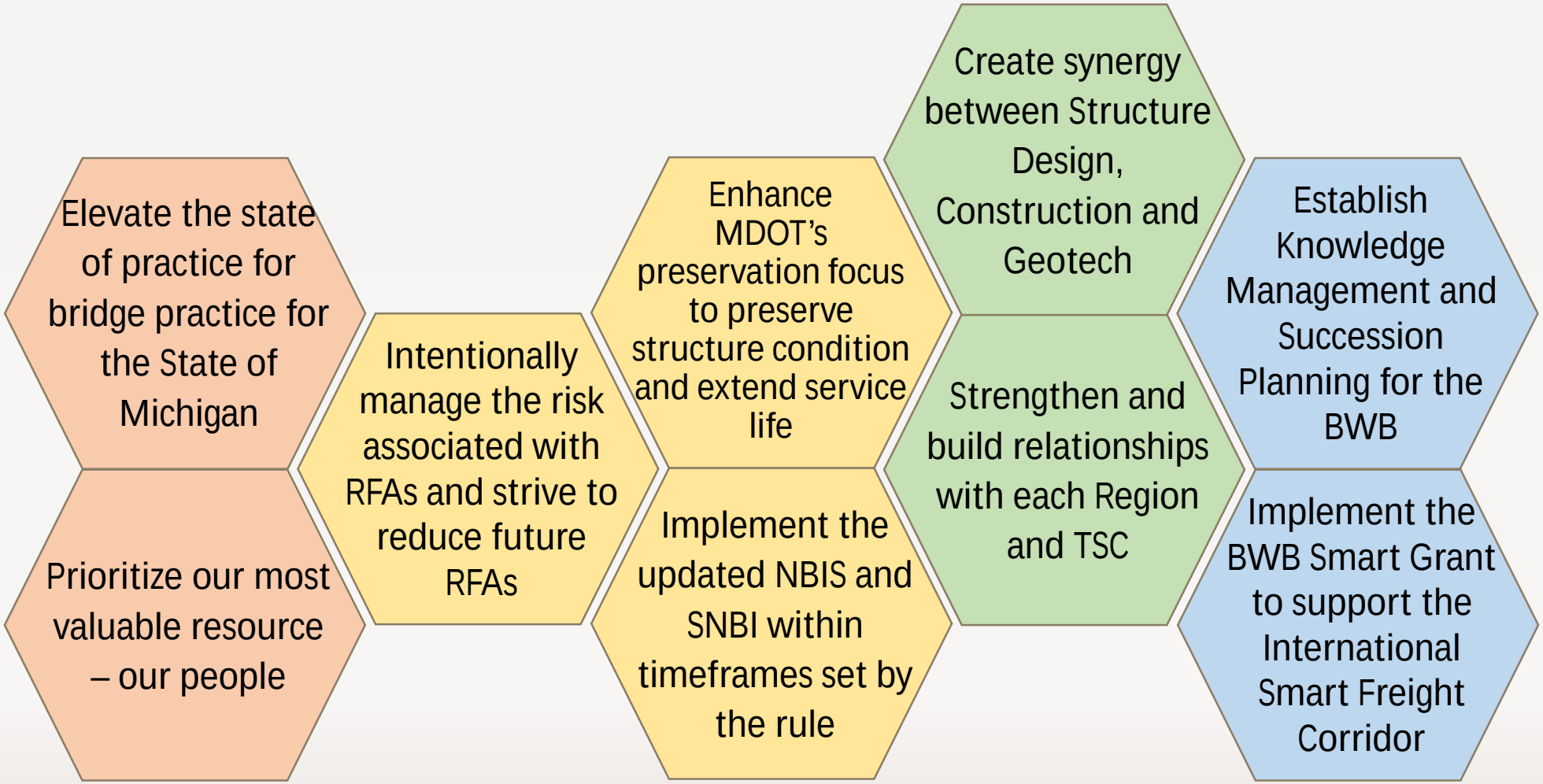
Supports Public Health

TO PROVIDE PEOPLE WITH A SAFE, FUTURE-DRIVEN, INTERCONNECTED MULTIMODAL TRANSPORTATION NETWORK THAT ENSURES EQUITABLE OPTIONS.

Michigan Department of Transportation

STRATEGIC PLAN

BOBS Strategic Initiatives



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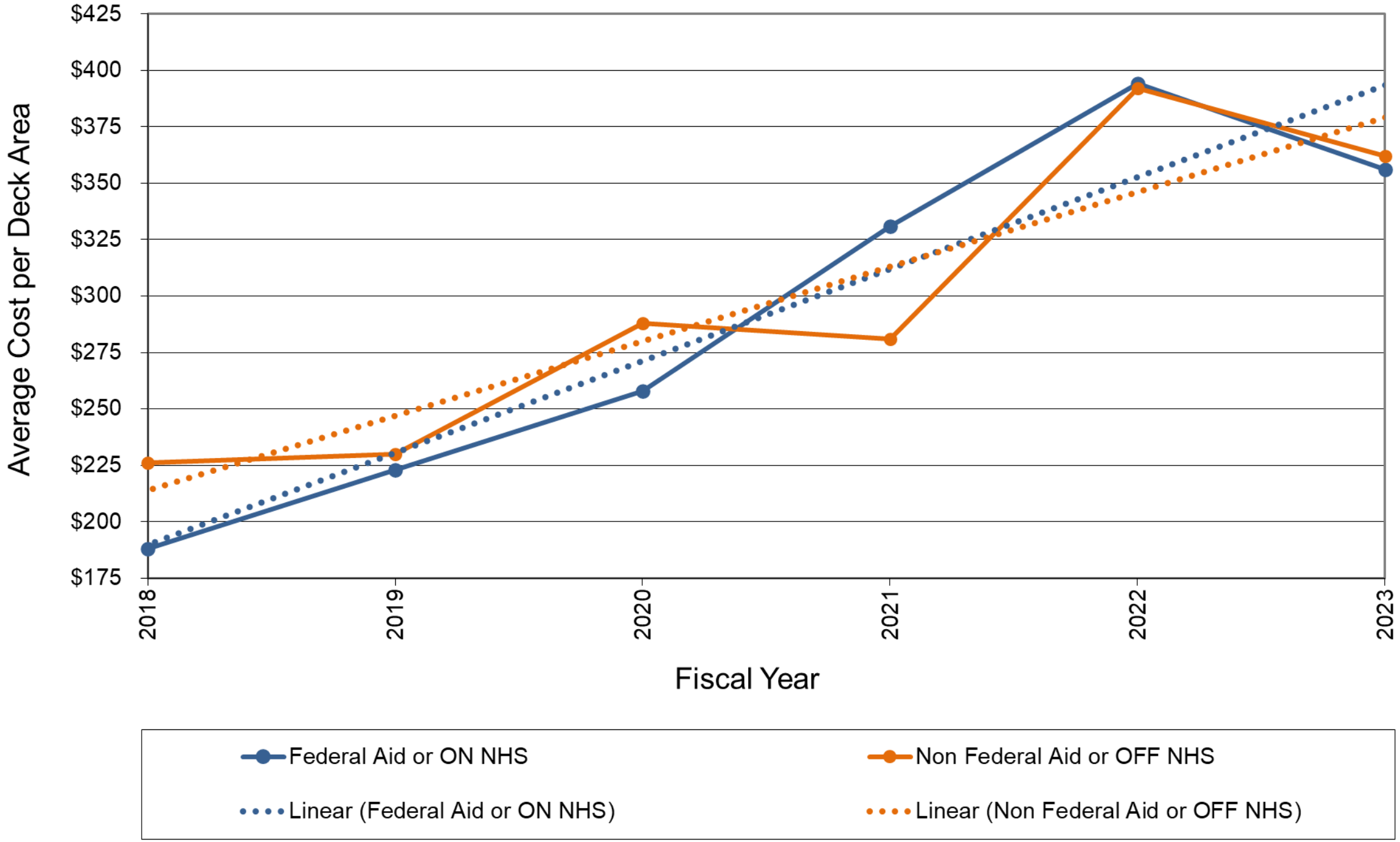
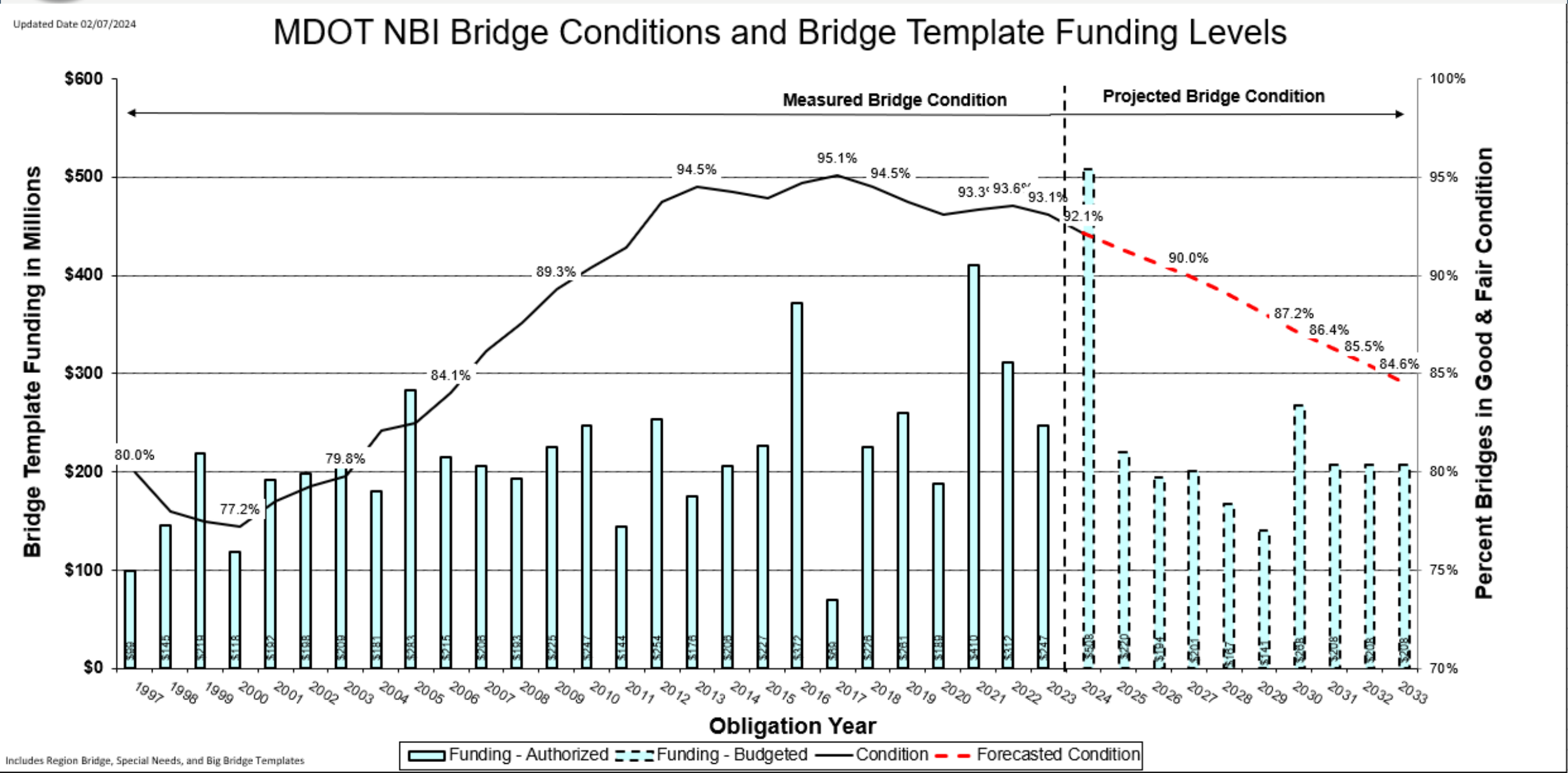
Federal Bridge Replacement Costs



MDOT Region Bridge NBI Conditions and Funding

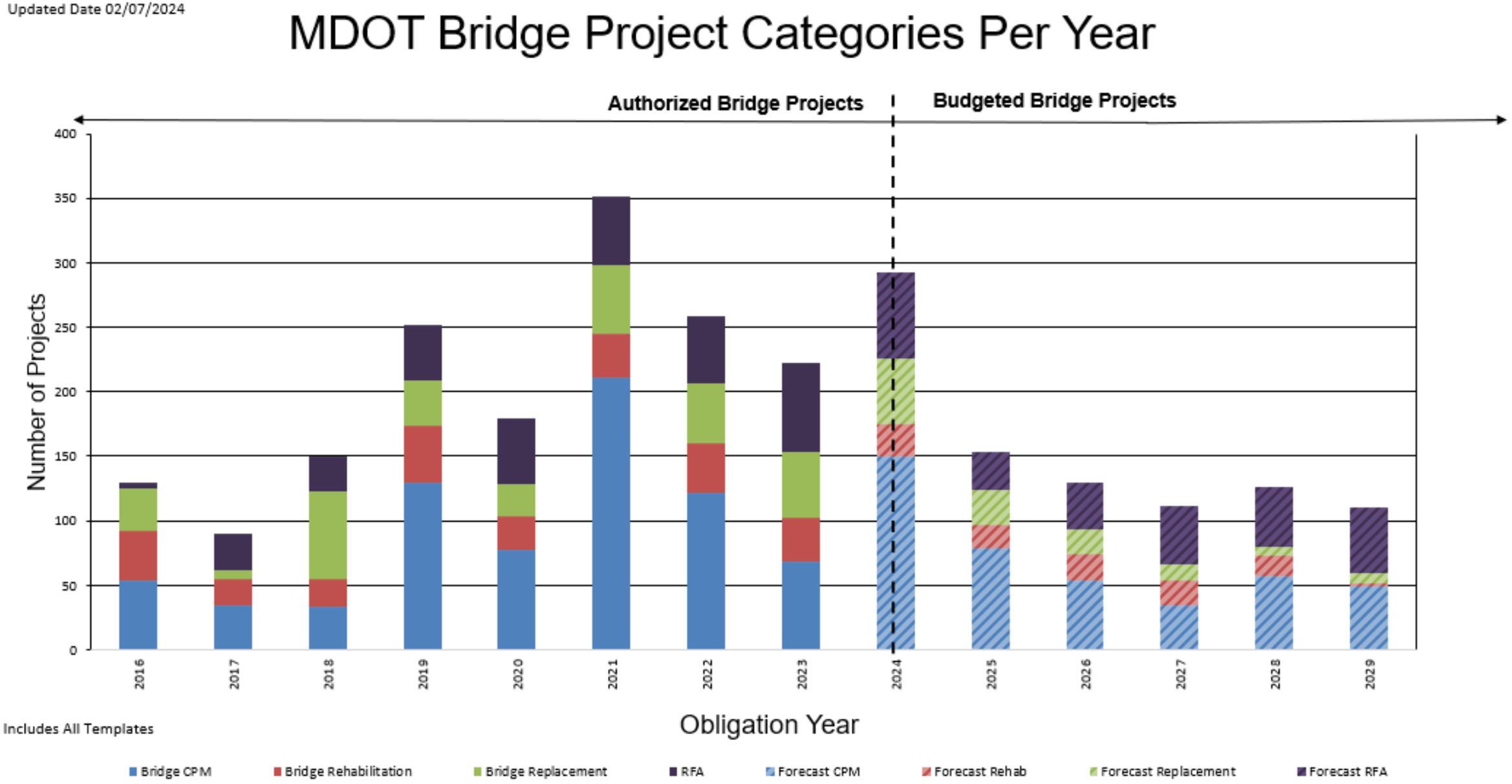
Updated Date 02/07/2024



Includes Region Bridge, Special Needs, and Big Bridge Templates

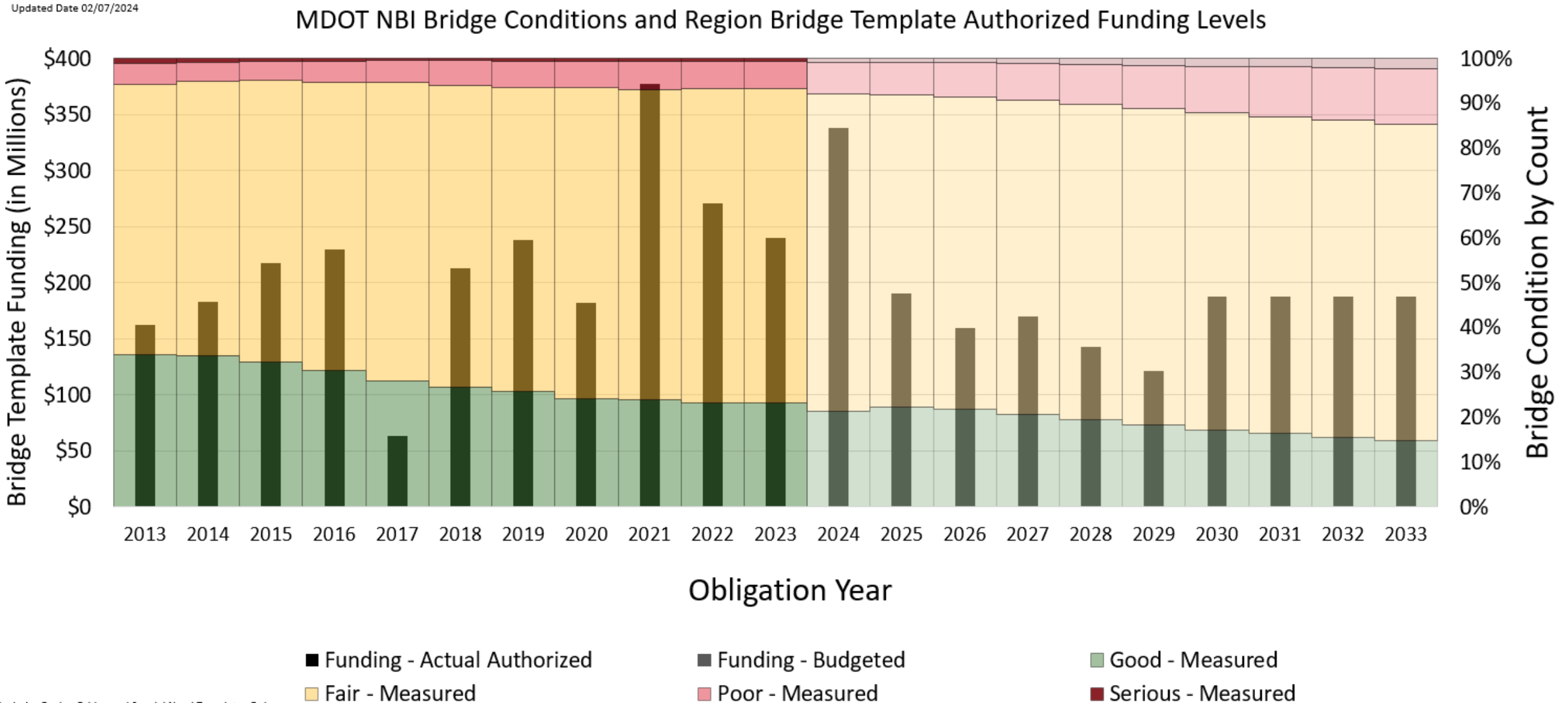
MDOT Region Bridge NBI Conditions and Funding

Updated Date 02/07/2024



MDOT Region Bridge NBI Conditions and Funding

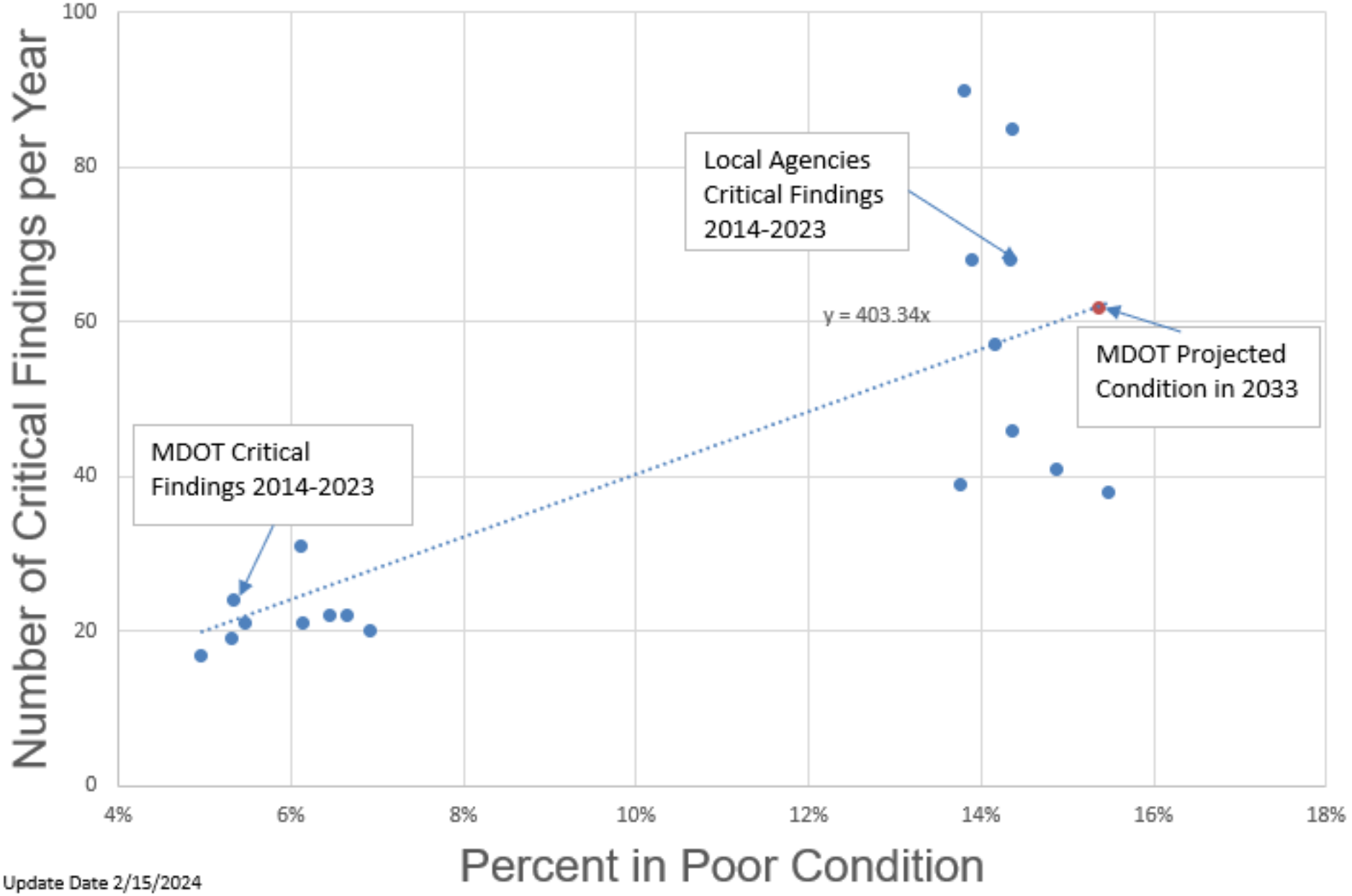
Updated Date 02/07/2024



Includes Region Bridge and Special Need Templates Only

Federal Bridge Replacement Costs

Projecting Critical Findings

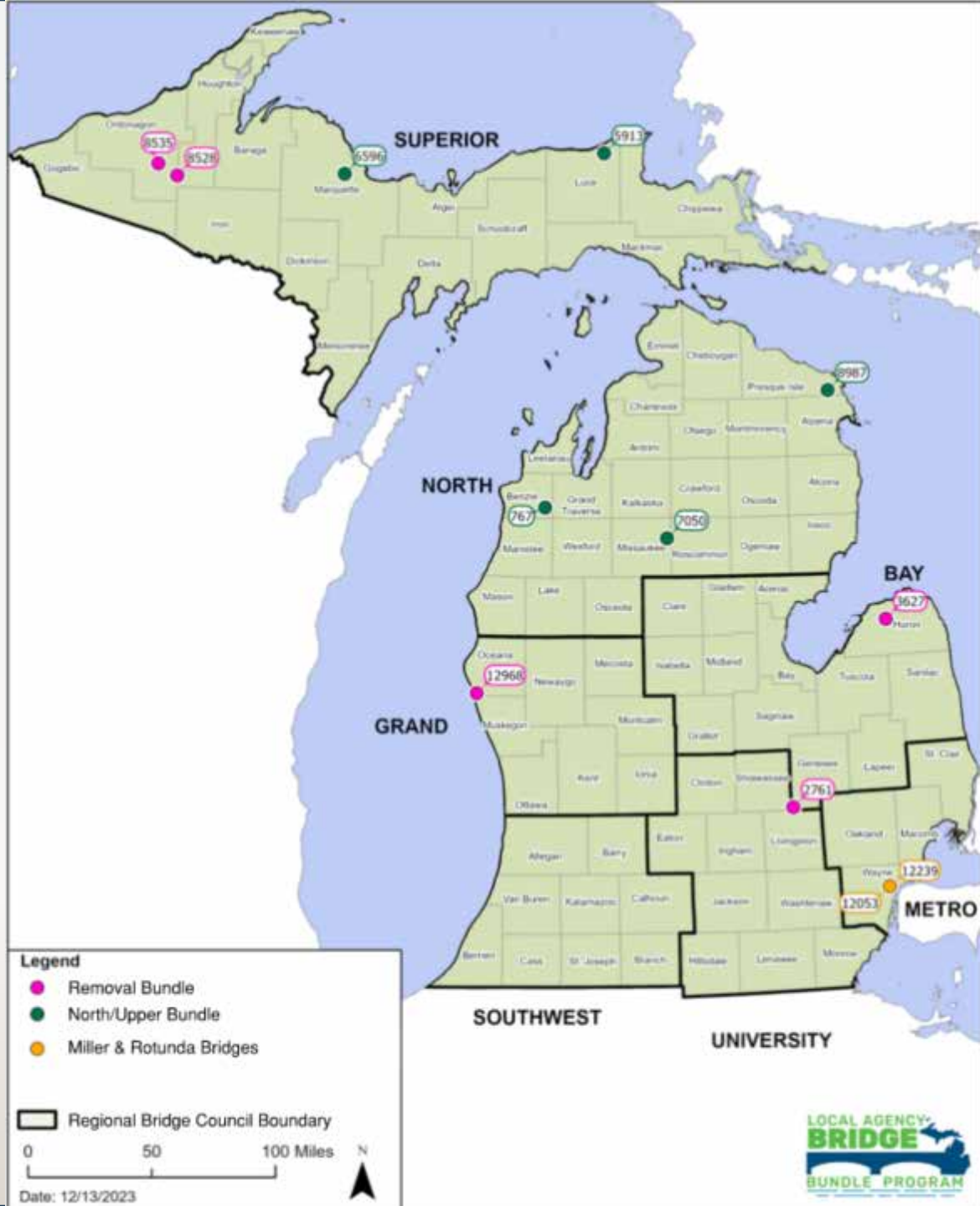


Update Date 2/15/2024

Local Bridge Bundle – Phase II

- CRRSAA funded
- 3 bundles in the phase
  - 5 permanent bridge removals
  - DB package of 5 bridge removals in North & Superior Regions
  - 2 bridge replacements in Wayne County
- Remaining CRRSAA funding in EPE phase will be used for early design of future bundles

www.Michigan.gov/bridgebundling



Local Bridge Bundle – Phase III

- Selection process for Phase III prioritized bridges deferred from Phase II
- Funded from the FY24 budget
- EPE work is funded by the Phase II CRRSAA funding
- 7 bundles total

www.Michigan.gov/bridgebundling

Local Bridge Bundle – Phase III

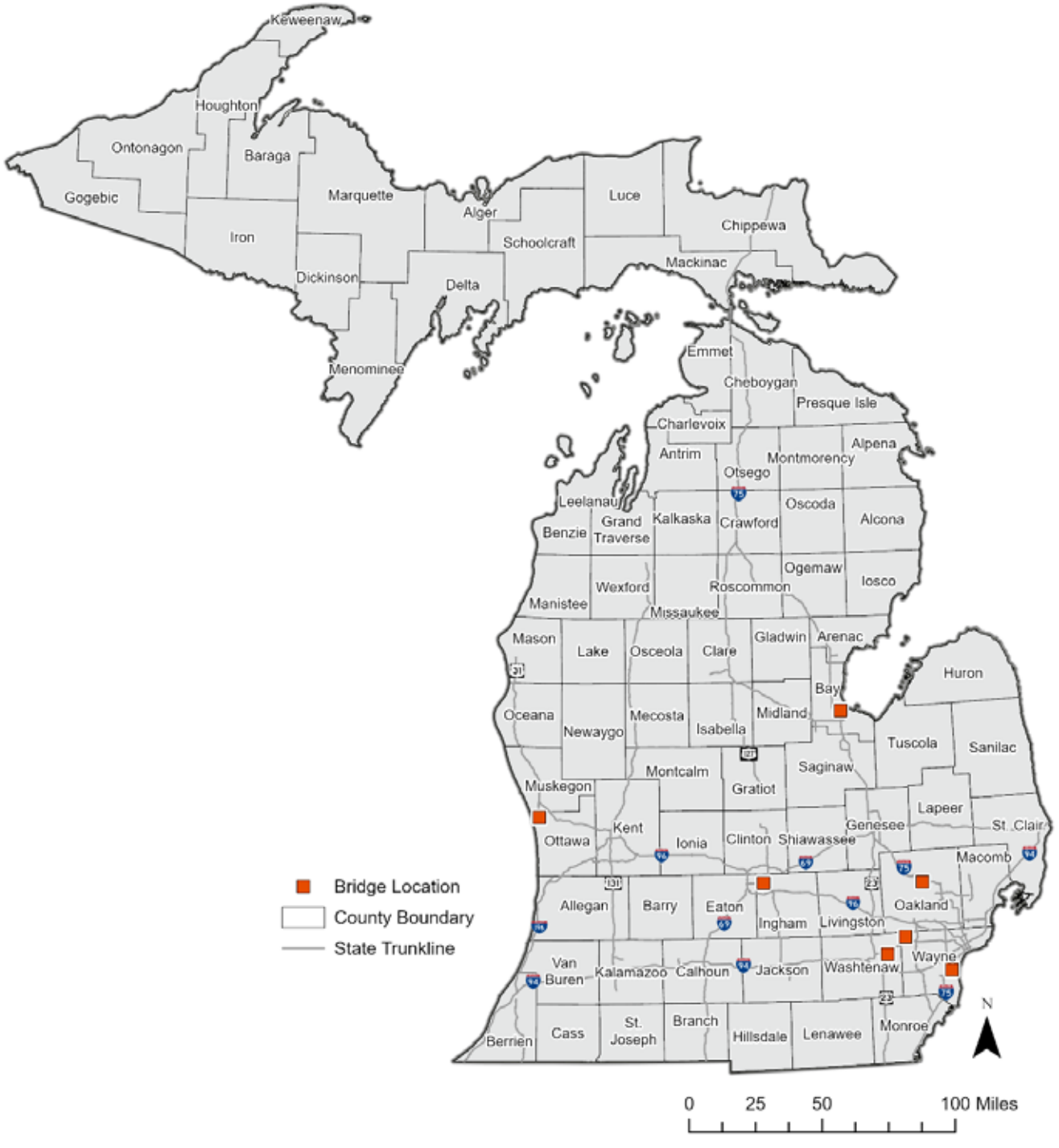
- 5 Design-Bid-Build Bundles
  - 1 bridge replacement combined with ER funding in North Region – awarded
  - 1 permanent removal in North Region – FY24
  - 2 bridge replacements in Grand / Southwest Regions – FY24
  - 5 bridge replacements in University / Southwest Regions – FY25
  - 5 bridge replacements in Bay Region – FY26

www.Michigan.gov/bridgebundling

Local Bridge Bundle – Phase III / Grant Application

- DB bundle with 2 urban bridges funded under Phase III used as matching funds for a grant application which includes 5 additional urban bridges.
  - The 2 original bridges will be delivered even if the grant application is not successful.
  - Requesting $34M in grant funding
  - FY26

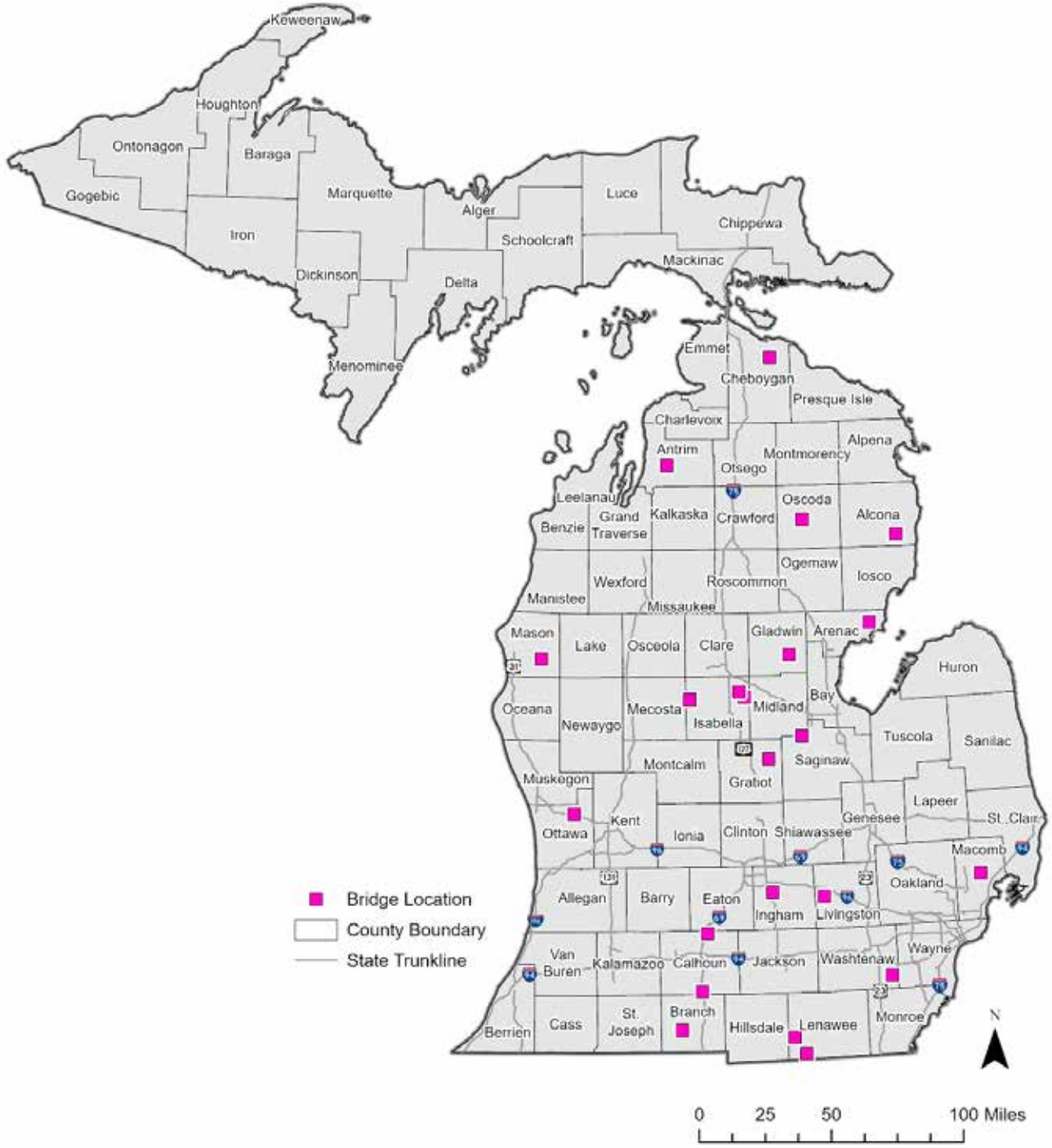
www.Michigan.gov/bridgebundling



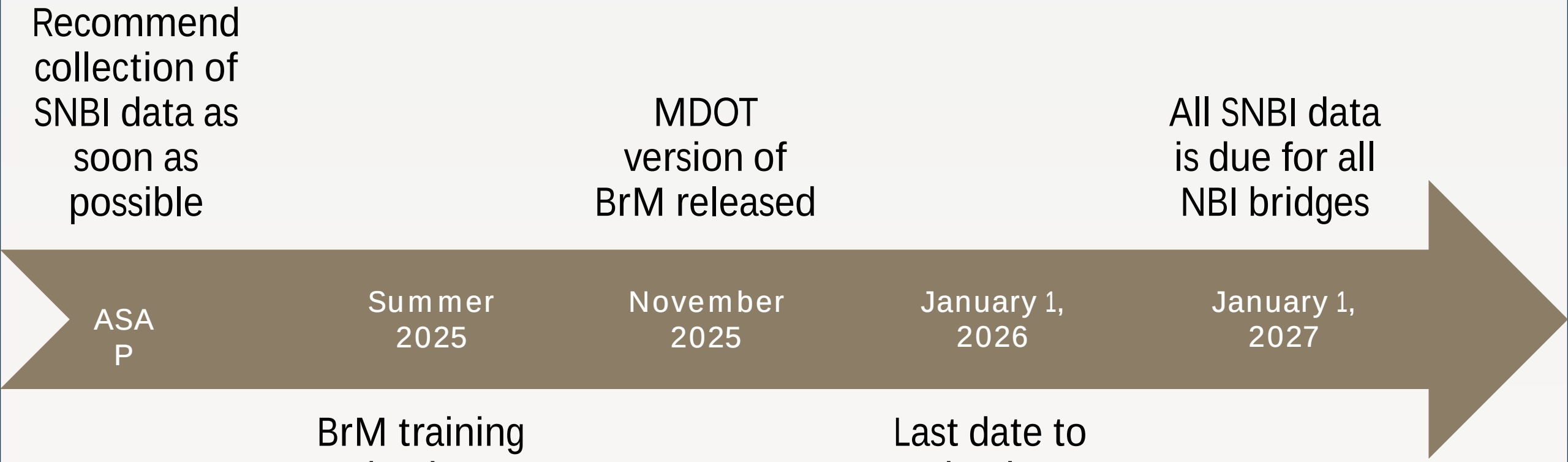
Local Bridge Bundle – Phase III / Grant Application

- DB bundle with 5 rural bridges funded under Phase III used as matching funds for a grant application which includes 17 additional rural bridges.
  - The 5 original bridges will be delivered even if the grant application is not successful.
  - Requesting $72M in grant funding
  - FY 26

www.Michigan.gov/bridgebundling



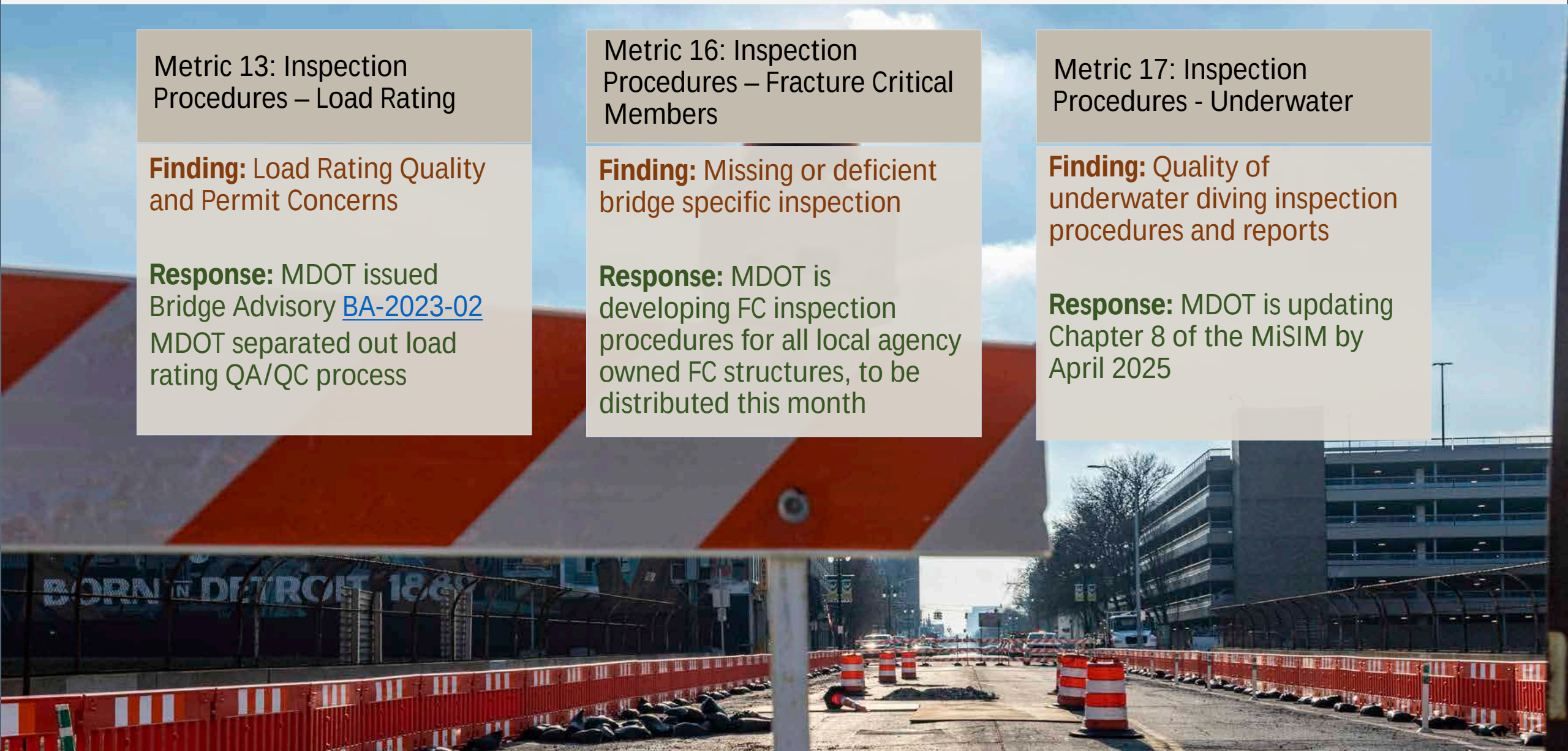
NBIS / SNBI Implementation



Michigan Department of Transportation
Bureau of Bridges and Structures

Active Plans of Corrective Action or Improvement Plans

Metric 13: Inspection Procedures – Load Rating	Metric 16: Inspection Procedures – Fracture Critical Members	Metric 17: Inspection Procedures - Underwater
Finding: Load Rating Quality and Permit Concerns	**Finding:** Missing or deficient bridge specific inspection	**Finding:** Quality of underwater diving inspection procedures and reports
Response: MDOT issued Bridge Advisory BA-2023-02 MDOT separated out load rating QA/QC process	**Response:** MDOT is developing FC inspection procedures for all local agency owned FC structures, to be distributed this month	**Response:** MDOT is updating Chapter 8 of the MiSIM by April 2025



Michigan Weathering Steel (A-588)

History

MDOT began using A-588 steel in the mid 1960's

Based on MDOT research on performance, unpainted A-588 steel was discontinued in 1980

Began requiring zone painting for Rehab projects with section loss

Present

BA-2023-01 : Inspection Finding Follow-up Actions for Uncoated Weathering Steel Bridges

- Next quarterly report due April 12, 2024
- Group 2 due November 1, 2025

A-588 Steel bridges with current maintenance practices are performing on par with the overall population

Ornamental Fence Policy

Aesthetic Elements in MDOT ROW

For installation of aesthetic elements, reference the MDOT Highway Aesthetic Element Guidelines and reach out to the TSC.

Ornamental Fencing must follow Chapter 7 of the MDOT Bridge Design Guide.

Key Requirements

Outside Clear Zone

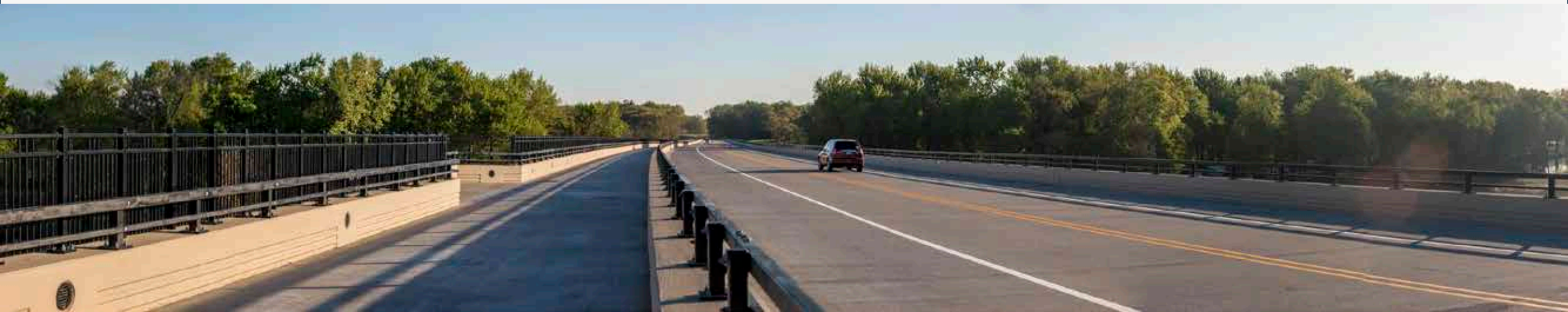
- may be mounted to railing or deck without additional offsets or protection

Inside Clear Zone & Design Speed ≤ 40 mph

- Installed on top of or behind bridge railing and min 12-in from the top of railing face

Inside Clear Zone & Design Speed > 40 mph

- must be protected by a separate crash tested bridge railing



Adhesive Anchoring of Bridge Railings

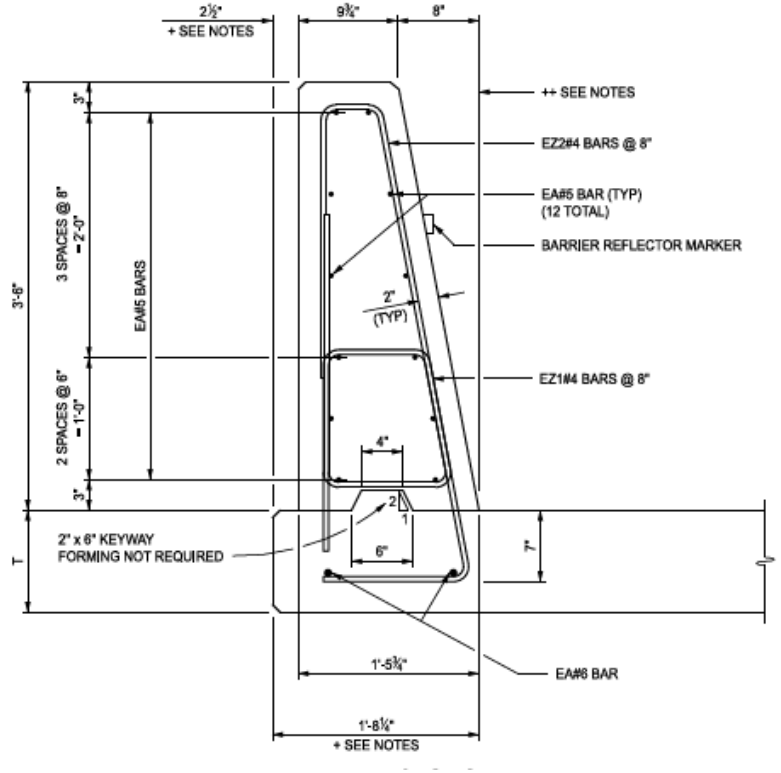
Section 12.05.01 of the MDOT Bridge Design Manual

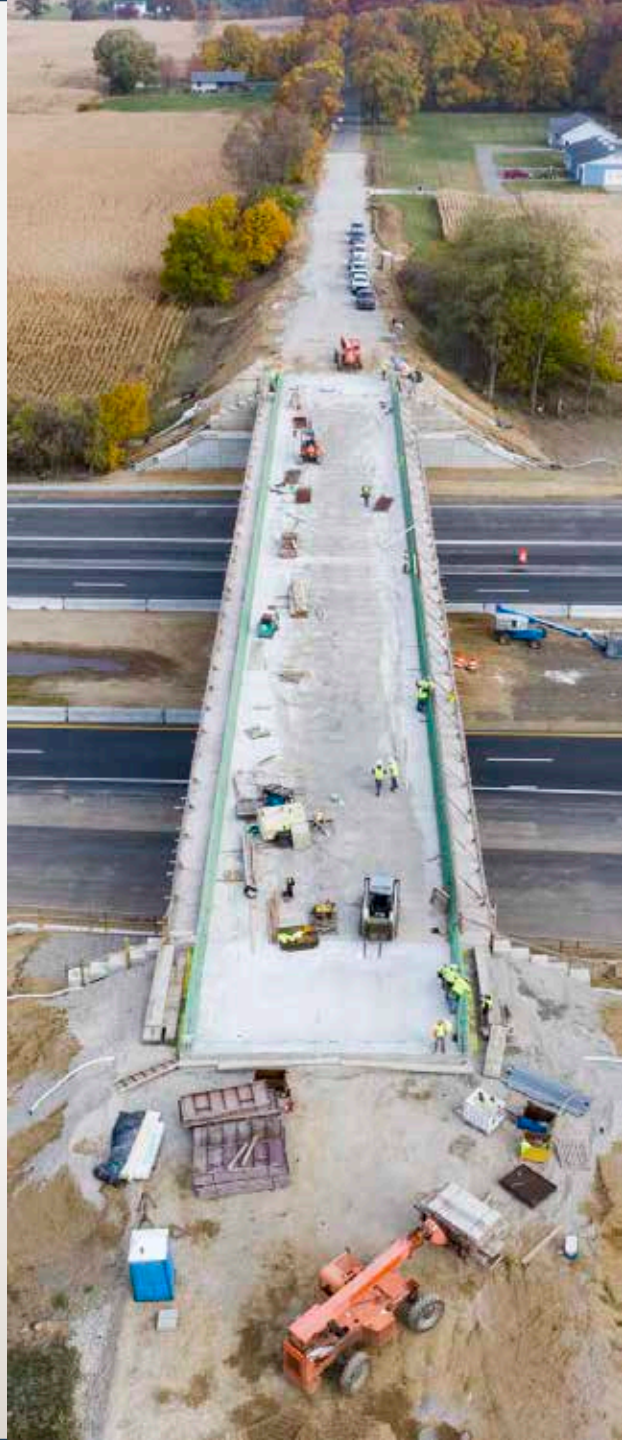
To meet MASH requirements, MDOT sunset Type 4 and 5 barriers and incorporated Type 6 and 7 railings

Adhesive anchored barriers are prohibited on bridges carrying the NHS

- Exceptions can be made for superstructure types where superstructure replacement would be required

Adhesive Anchored Type 6 is allowed on Non-NHS routes





Adhesive Anchoring of Bridge Railings

Appendix A13 of AASHTO LRFD BDS

Table A13.2-1—Design Forces for Traffic Railings

Design Forces and Designations	Railing Test Levels					
	TL-1	TL-2	TL-3	TL-4	TL-5	TL-6
F_t Transverse (kips)	13.5	27.0	54.0	54.0	124.0	175.0
F_L Longitudinal (kips)	4.5	9.0	18.0	18.0	41.0	58.0
F_v Vertical (kips) Down	4.5	4.5	4.5	18.0	80.0	80.0
L_t and L_L (ft)	4.0	4.0	4.0	3.5	8.0	8.0
L_v (ft)	18.0	18.0	18.0	18.0	40.0	40.0
H_e (min) (in.)	18.0	20.0	24.0	32.0	42.0	56.0
Minimum H Height of Rail (in.)	27.0	27.0	27.0	32.0	42.0	90.0

This shows the concrete around an adhesive anchored bar after the required field test was performed. The cracks in the concrete are along the failure plane.

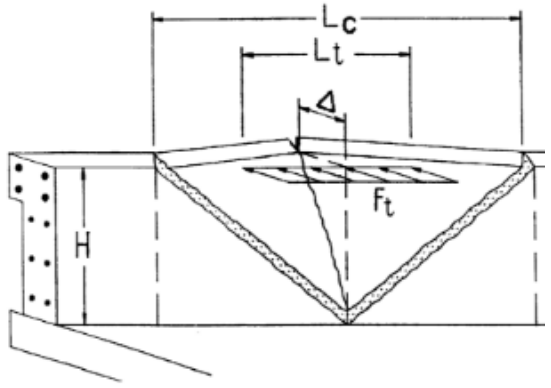


Figure CA13.3.1-1—Yield Line Analysis of Concrete Parapet Walls for Impact within Wall Segment

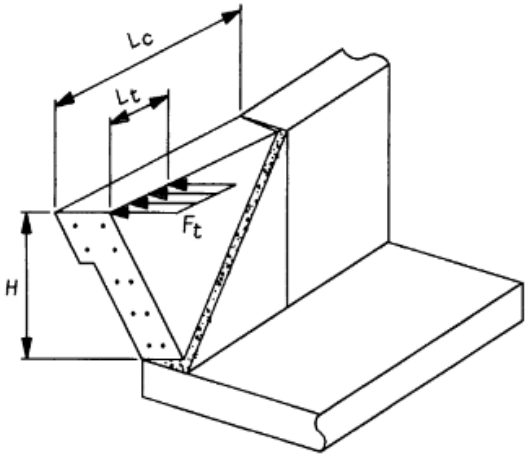
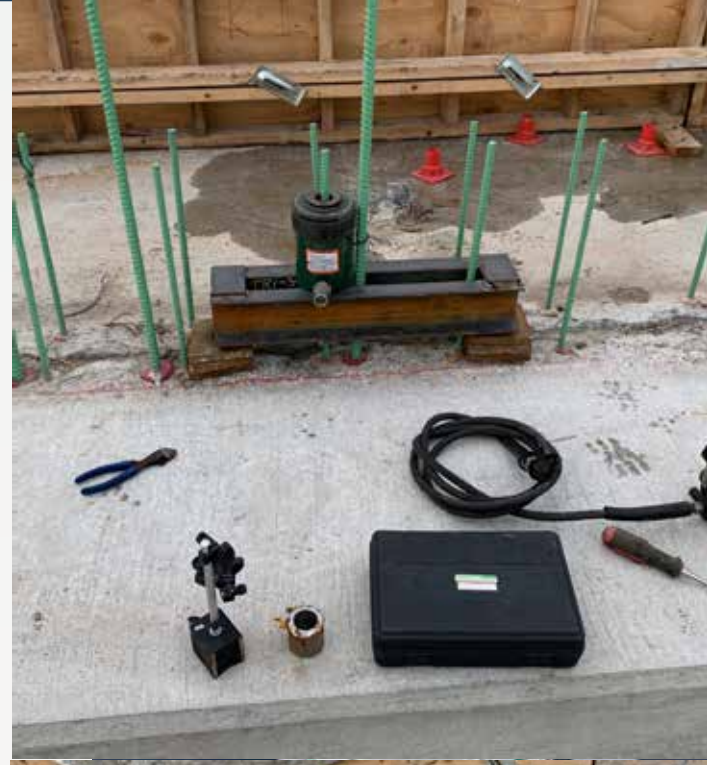


Figure CA13.3.1-2—Yield Line Analysis of Concrete Parapet Walls for Impact near End of Wall Segment



Self Consolidating Concrete (SCC)

Why use SCC?

SCC is a mix designed to flow around congested reinforcement. The mix doesn't require energy to compact it and get the air out (i.e. no vibration).

This leads to improved surface finish, increased safety, reduced labor and time to cast units, and reduced project costs.

Recent Specification Change

Fabricators need to design the SCC mix and do a mockup of different shapes, length, product type. This is done per shop, not per project.

The shapes are cut as directed by engineer so that the distribution of aggregate can be examined.

The slump is very high and the aggregate is distributed well in this sample.

Importance of Fabrication Inspection

Recent Fabrication Inspection Findings

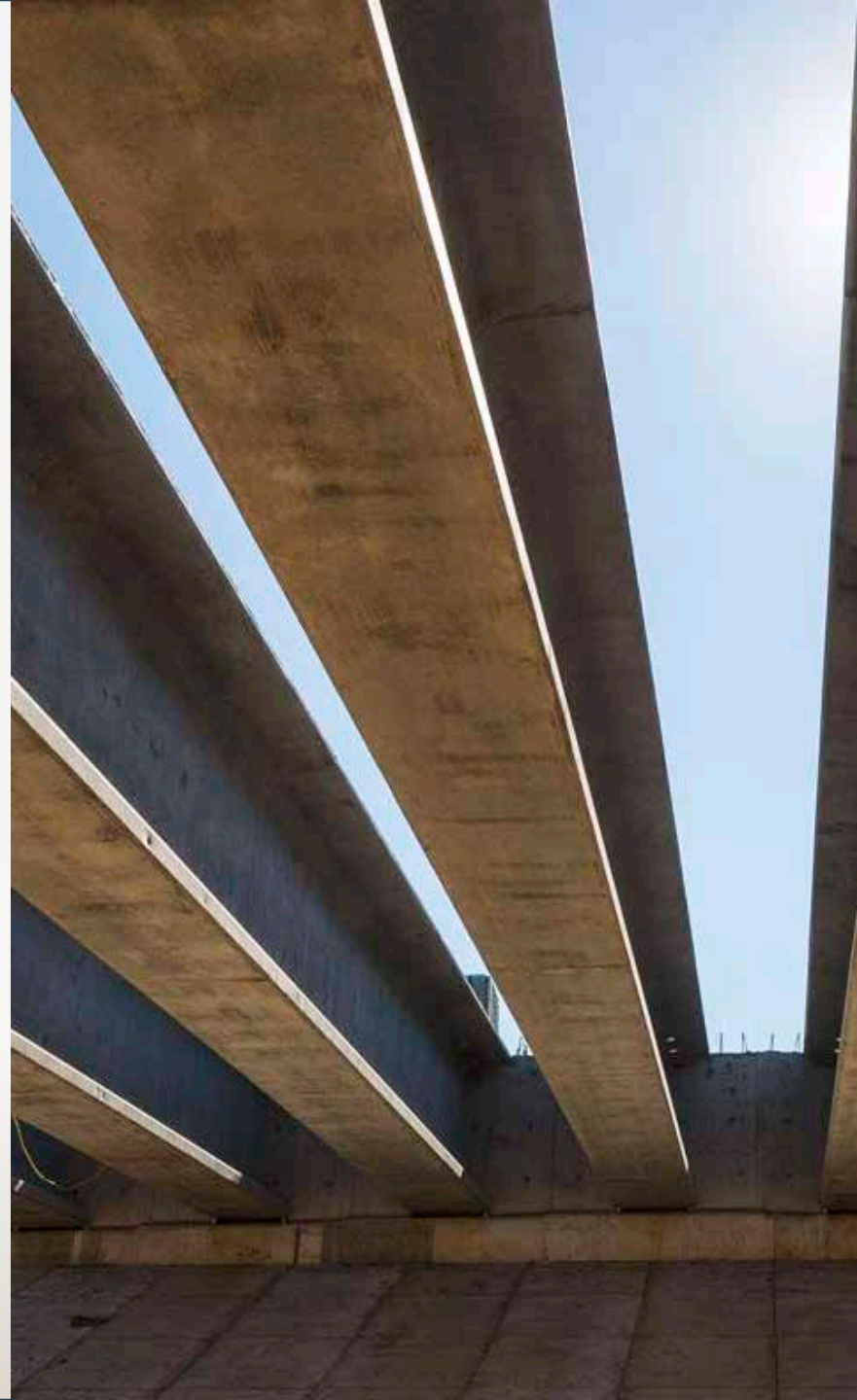
Many precast fabricators are utilizing welded wire mats instead of rebar in culverts.

When the mats are bent, the proper bending radii must be used and transverse bars should not be in the bending area to avoid deformity and stress concentrations.

The sample shows a fractured bar in the bend area as well as cut pieces of the transverse bar due to improper procedure.

Shop Inspection found snow in forms. While typically beam casting is avoided in winter, the weather has been more unpredictable. Snow or other precipitation could lead to increased water/cement ratio in the bottom flange, which could have an impact on concrete strength and durability.

Inspector delayed approval until snow was removed.



Rebar Protection Using Anodes

Why use anodes?

Anodes generate an electrical current to mitigate the corrosion of reinforcing steel.

The unit needs to be attached to clean reinforcing steel and there needs to be steel continuity within the patch.

Epoxy Coated Reinforcement

As epoxy coated bridges age, there will need to be rehabilitation projects. Anodes are also recommended for epoxy coated reinforcement.

The specifications and manufacturers recommendations need to be followed to ensure effectiveness.

Rebar Damage during Partial Demolition

Anodes Epoxy Coated Reinforcement

Epoxy reinforcement can be damaged during partial demolition as part of a rehabilitation project.

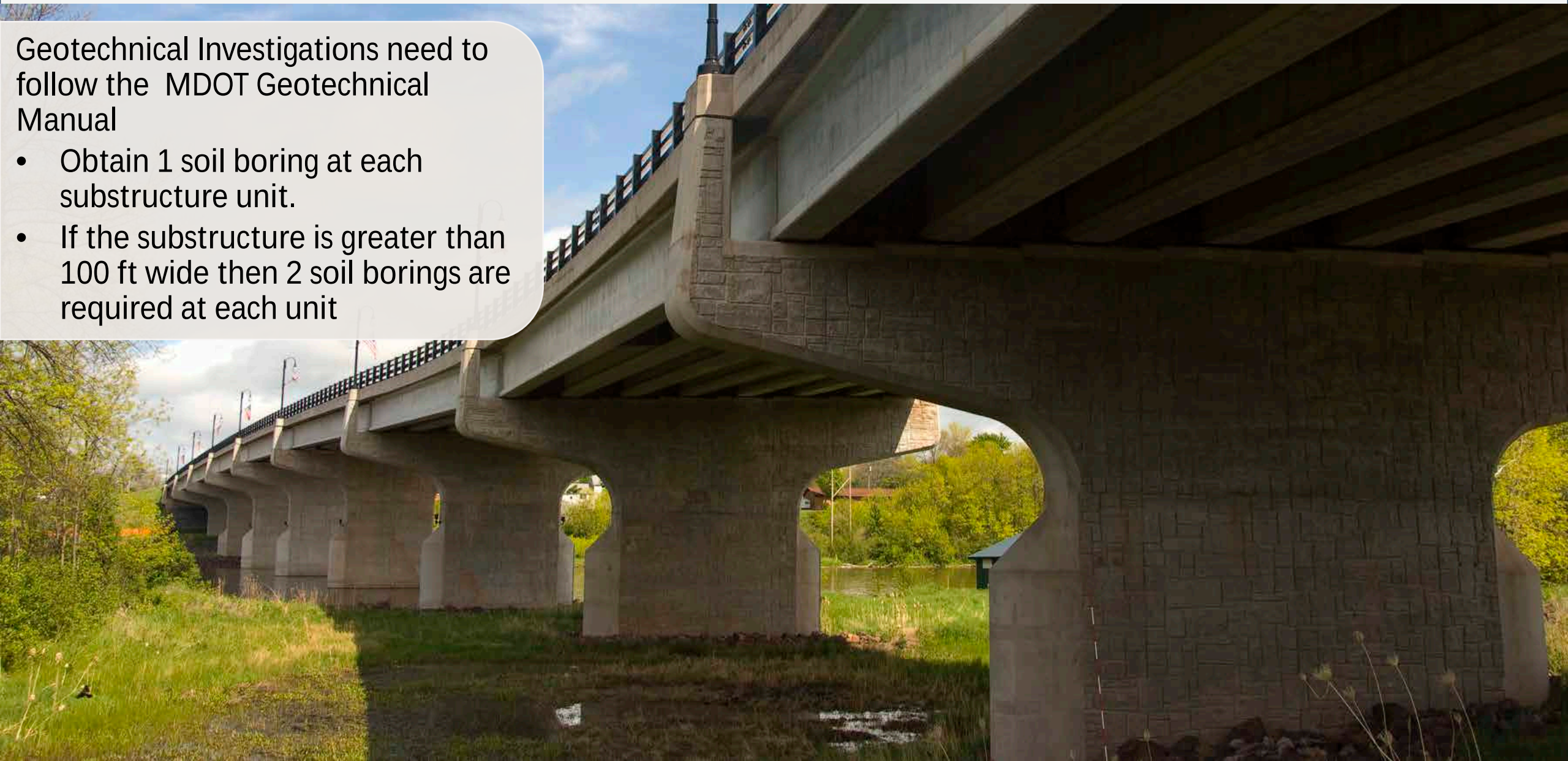
The epoxy repair reference in the standard spec book is only for new bar and not existing.

Anodes need to be installed to maintain the integrity of the patch.

Geotechnical Requirements

Geotechnical Investigations need to follow the MDOT Geotechnical Manual

- Obtain 1 soil boring at each substructure unit.
- If the substructure is greater than 100 ft wide then 2 soil borings are required at each unit



Geotechnical Requirements

Spread Footing Foundations

- For spread footings, the depth of soil boring must extend at least 50 ft below the bottom of footing, unless rock is encountered.
- For spread footings on bedrock, rock core to at least a footing width below the bottom of footing.

Driven Pile Foundations

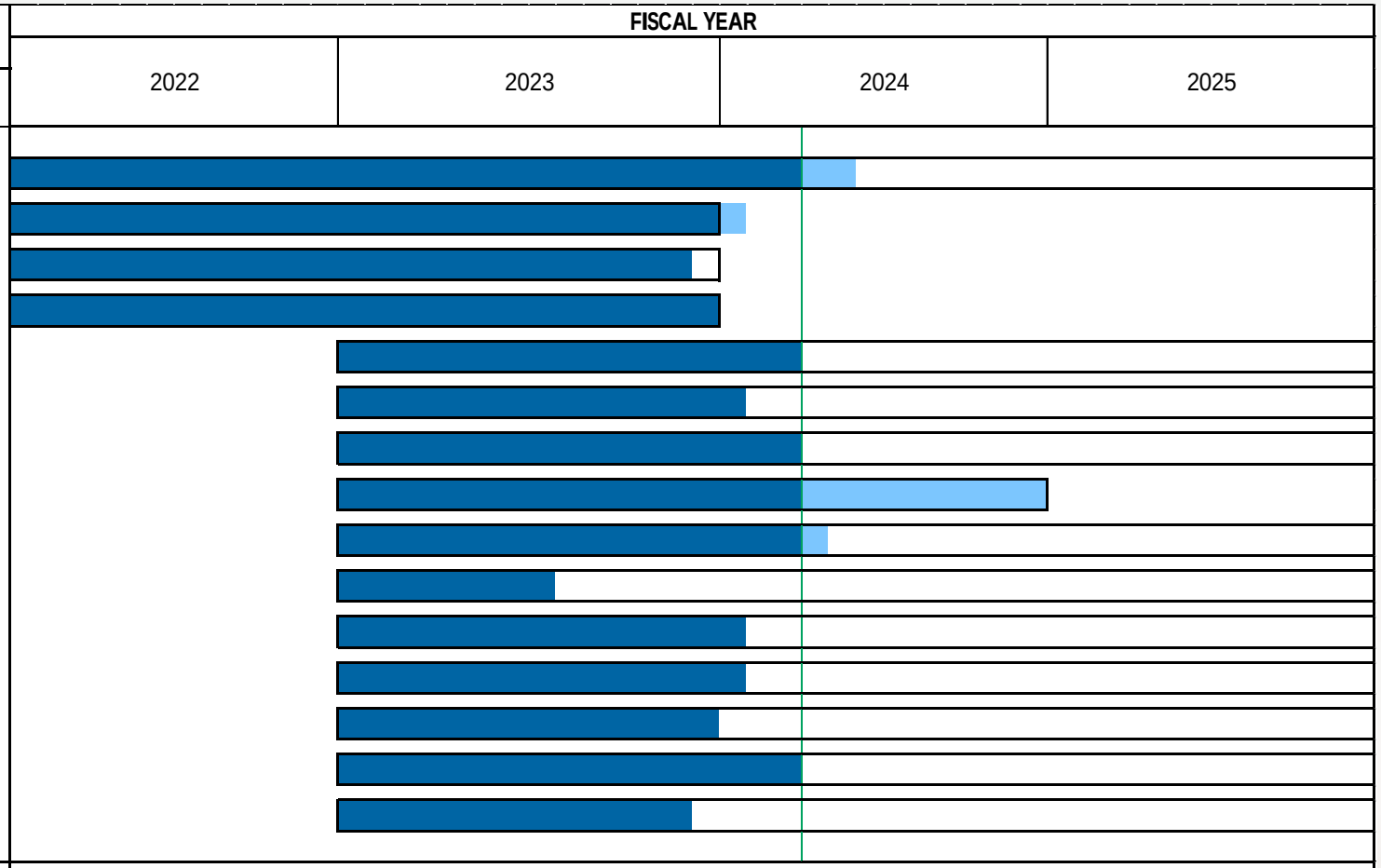
- For driven piles, the depth of soil borings must extend at least 20 ft below the anticipated pile tip elevation.
- For driven piles bearing on rock, perform a 10 ft rock core at the structure to the soil boring didn’t end on a boulder.

Do not estimate the pile tip elevation at the bottom of the soil boring or beyond the end of the soil boring.

Ancillary Structures

Inspection Roadmap

Asset Type	Inspection Progress	2/25/2020 Inventory	1/8/2024 Inventory	Inspections Completed
Culvert less than 10 feet	60%	36869	28646	16918
Retaining wall	107%	279787	287738	281339
Sign - Truss	97%	832	966	815
Sign - Cantilever	101%	918	1036	872
Noise Wall	31%	348911	359398	112367
Spun Conc Pole	26%	297	328	86
Steel Strain Pole	33%	386	5948	127
Embedded Steel and Wood Poles	203%	390	2896	792
Mast Arms	69%	97	794	67
DMS Support Structure	12%	193	223	26
Communication Tower	25%	23	25	6
ESS Tower	25%	102	89	28
High-Mast Lighting Towers	23%	157	233	36
Frangible Pole Structure	32%	760	386	246
Non Frangible Pole Structure	20%	946	479	187



Legend:
% of Expected Completed:
% Beyond Expected Completed:

The green line above represents where our inspection goal is based on the date: 1/08/2024.

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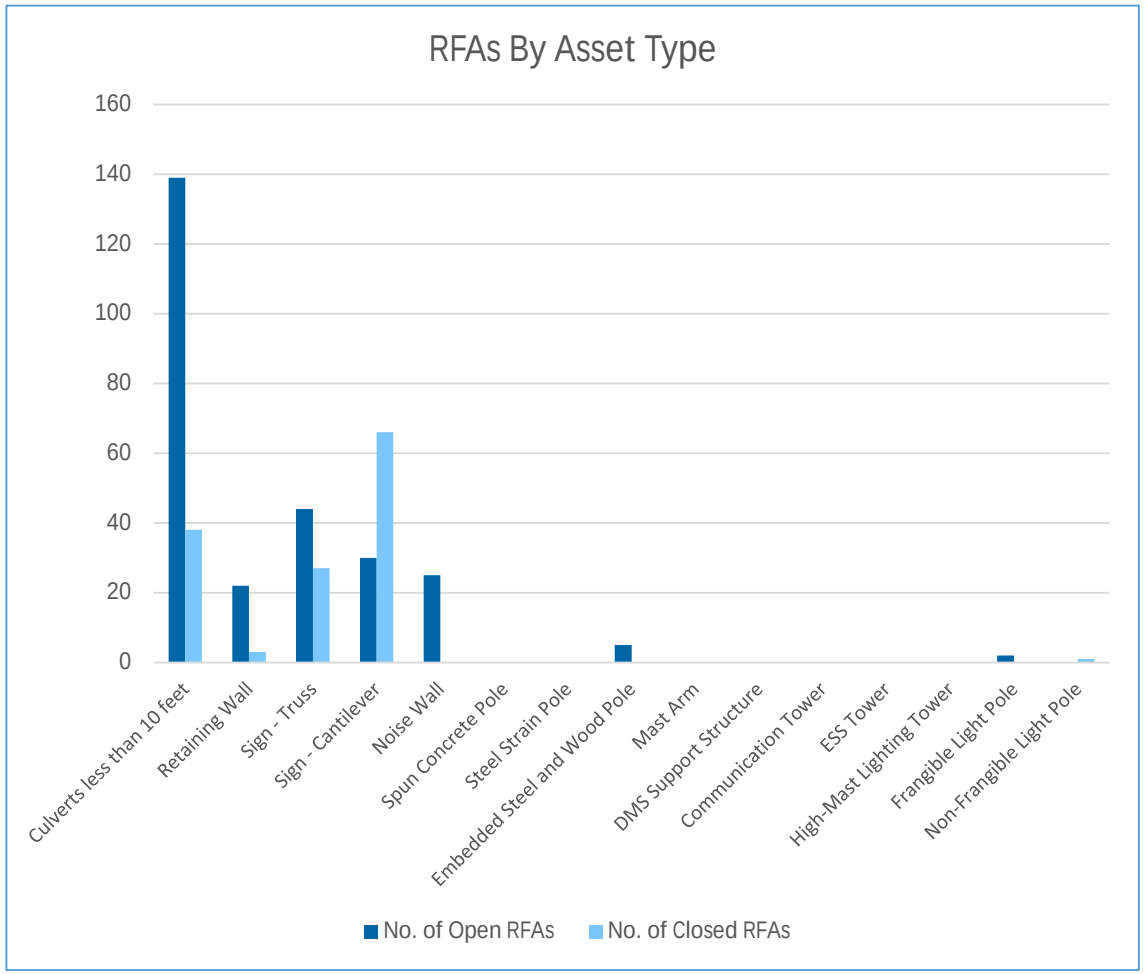
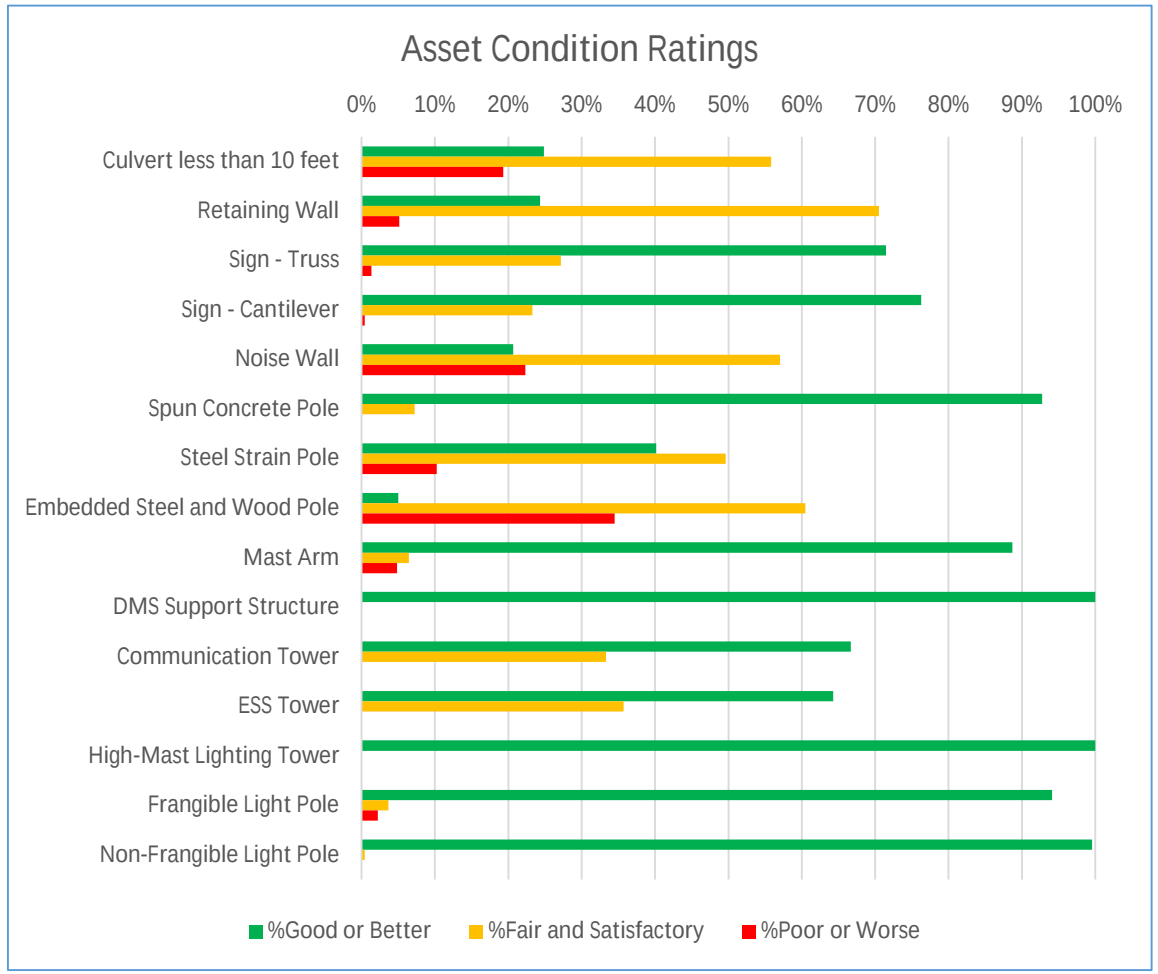
Bureau of Bridges and Structures

Ancillary Structures





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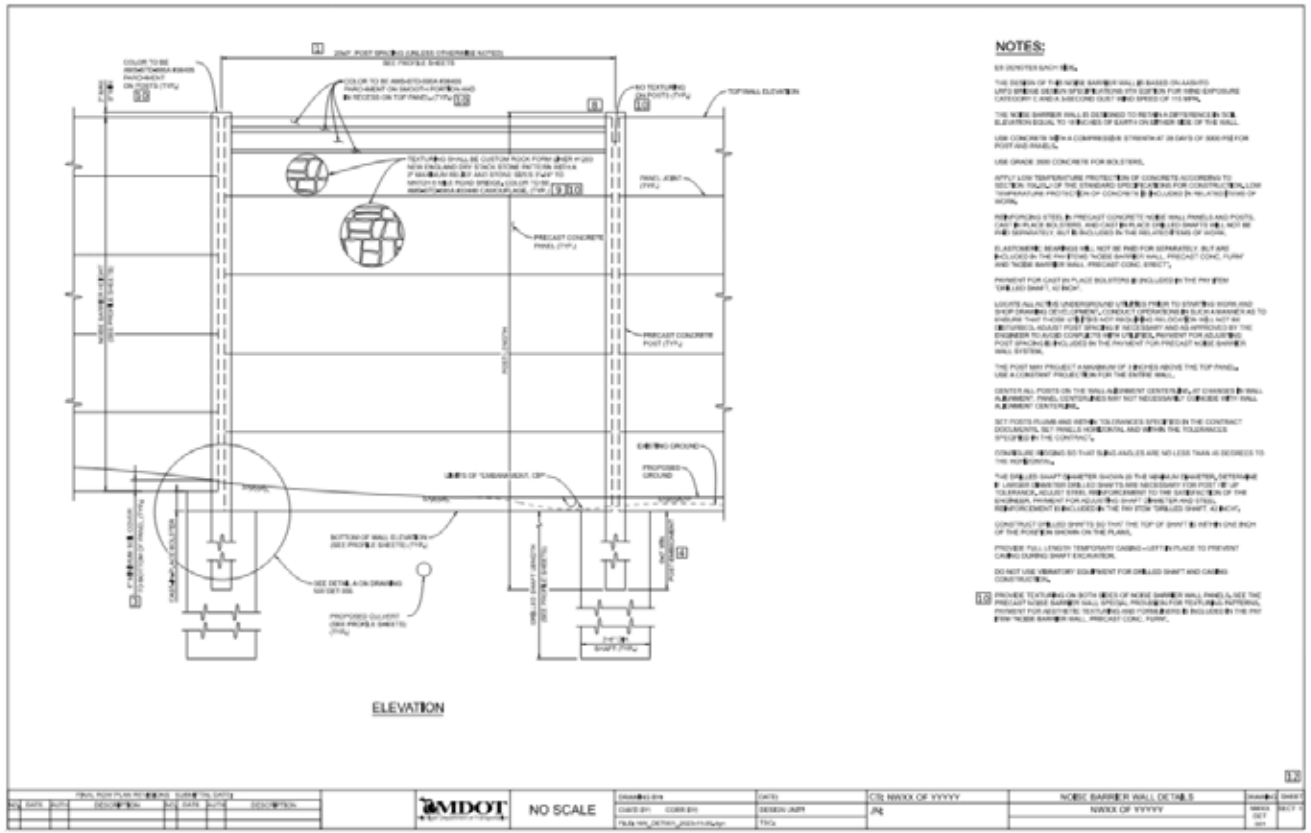
Ancillary Structures

Standards Updates

- Lighting Special Details
  - Released for May Letting
- Noise Wall Standards – In Process
- Culvert Standards - In Process
- Signal Strain Pole
  - Phase II
- Small ITS Application Pole



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Bureau of Bridges and Structures

Innovative Inspection Solution for Culvert Inspections and More...


Questions?