

Lapeer County Road Commission 2022 Bridge Asset Management Plan



A plan describing the Lapeer County Road Commission's transportation assets and conditions

Prepared by:

Destain D. Gingell, PE
County Highway Engineer
Lapeer County Road Commission
820 Davis Lake Rad, Lapeer, Michigan 48446
Phone: (810) 664-6272
Website: www.lcrconline.com

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EXECUTIVE SUMMARY

As conduits for commerce and connections to vital services, bridges are among the most important assets in any community along with other assets like roads, culverts, traffic signs, traffic signals, and utilities that support and affect the road network. The Lapeer County Road Commission's (Lapeer CRC) bridges, other road-related assets, and support systems are some of the most valuable and extensive public assets, all of which are paid for with taxes collected from ordinary citizens and businesses. The cost of building and maintaining bridges, their importance to society, and the investment made by taxpayers all place a high level of responsibility on local agencies to plan, build, and maintain the road and bridge network in an efficient and effective manner. This asset management plan is intended to report on how Lapeer CRC is meeting its obligations to maintain the bridges for which it is responsible.

This plan overviews Lapeer CRC's bridge assets and conditions and explains how Lapeer County Road Commission works to maintain and improve the overall condition of those assets. These explanations can help answer:

- What kinds of bridge assets Lapeer CRC has in its jurisdiction and the different options for maintaining these assets.
- What tools and processes Lapeer CRC uses to track and manage bridge assets and funds.
- What condition Lapeer CRC's bridge assets are in compared to statewide averages.
- Why some bridge assets are in better condition than others and the path to maintaining and improving bridge asset conditions through proper planning and maintenance.
- How agency bridge assets are funded and where those funds come from.
- How funds are used and the costs incurred during Lapeer CRC's bridge assets' normal life cycle.
- What condition Lapeer CRC can expect of its bridge assets if those assets continue to be funded at the current funding levels
- How changes in funding levels can affect the overall condition of all of Lapeer CRC's bridge assets.

Lapeer CRC owns and/or manages 96 bridges. A summary of its historical and current bridge asset conditions, projected trends, and goals can be seen in the figure, below.



An asset management plan is required by Michigan Public Act 325 of 2018, and this document represents fulfillment of some of Lapeer CRC’s obligations towards meeting these requirements. This asset management plan also helps demonstrate Lapeer CRC’s responsible use of public funds by providing elected and appointed officials as well as the general public with inventory and condition information of Lapeer CRC’s bridge assets, and gives taxpayers the information they need to make informed decisions about investing in essential transportation infrastructure.

INTRODUCTION

Asset management is defined by Public Act 325 of 2018 as “an ongoing process of maintaining, preserving, upgrading, and operating physical assets cost effectively, based on a continuous physical inventory and condition assessment and investment to achieve established performance goals”. In other words, asset management is a process that uses data to manage and track assets, like roads and bridges, in a cost-effective manner using a combination of engineering and business principles. This process is endorsed by leaders in municipal planning and transportation infrastructure, including the Michigan Municipal League, County Road Association of Michigan, the Michigan Department of Transportation (MDOT), and the Federal Highway Administration (FHWA). The Lapeer County Road Commission is supported in its use of asset management principles and processes by the Michigan Transportation Asset Management Council (TAMC), formed by the State of Michigan.

Asset management, in the context of this plan, ensures that public funds are spent as effectively as possible to maximize the condition of the bridges in Lapeer County Road Commission’s road network. Asset management also provides a transparent decision-making process that allows the public to understand the technical and financial challenges of managing infrastructure with a limited budget.

The Lapeer County Road Commission (Lapeer CRC) has adopted an “asset management” business process to overcome the challenges presented by having limited financial, staffing, and other resources while needing to meet safety standards and bridge users’ expectations. Lapeer CRC is responsible for maintaining and operating 96 bridges.

This 2022 plan outlines how Lapeer CRC determines its strategy to maintain and upgrade bridge asset condition given agency goals, priorities of its bridge users, and resources provided. An updated plan is to be released approximately every three years to reflect changes in bridge conditions, finances, and priorities.

Questions regarding the use or content of this plan should be directed to Destain D. Gingell, PE at 820 Davis Lake, Lapeer, Michigan 48446 or at (810) 664-6272 and/or dgingell@lcrconline.com. A copy of this plan can be accessed on our website at <https://www.lcrconline.com/resources/>.

Key terms used in this plan are defined in Lapeer CRC’s comprehensive transportation asset management plan (also known as the “compliance plan”) used for compliance with PA 325 or 2018.

Knowing the basic features of an asset class is a crucial starting point to understanding the rationale behind an asset management approach. The following primer provides an introduction to bridges.

Bridge Primer

Bridge Types

Bridges are structures that span 20 feet or more. These bridges can extend across one or multiple spans.

If culverts are placed side by side to form a span of 20 feet or more (for example, three 6-foot culverts with one-foot between each culvert), then this culvert system would be defined as a bridge. (Note: The Compliance Plan Appendix C contains a primer on culverts not defined as bridges.)

Bridge types are classified based on two features: design and material.

The most common bridge design is the **girder system** (Figure 1). With this design, the bridge deck transfers vehicle loads to girders (or beams) that, in turn, transfer the load to the piers or abutments (see Figure 6).

A similar design that lacks girders (or beams) is a **slab bridge** (Figure 2, and see Figure 6). A slab bridge transfers the vehicle load directly to the abutments and, if necessary, piers.

Truss bridges were once quite common and consist of a support structure that is created when structural members are connected at joints to form interconnected triangles (Figure 4). Structural members may consist of steel tubes or angles connected at joints with gusset plates.

Another common bridge design in Michigan is the three-sided pre-cast box or arch bridge (Figure 4).

Michigan is also home to several unique bridge designs.

Adding another layer of complexity to bridge typing is the primary construction materials used (Figure 5). Bridges are generally constructed from concrete, steel, prestressed concrete, or timber. Some historical bridges or bridge components in Michigan may be constructed from stone or masonry.



Figure 1: Girder bridge



Figure 2: Slab bridge



Figure 3: Truss bridge



Figure 4: Three-sided box bridge



Figure 5: Examples of common bridge construction materials used in Michigan

Bridge Condition

Michigan inspectors rate bridge condition on a 0-9 scale known as the National Bridge Inventory (NBI) rating scale (see Table for a summary of the NBI Rating scale). Elements of the bridge's superstructure, deck, and substructure receive a 9 if they are in excellent condition down to a 0 if they are in failed condition. A complete guide for Michigan bridge condition rating according to the NBI can be found in the MDOT Bridge Field Services' *Bridge Safety Inspection NBI Rating Guidelines* (https://www.michigan.gov/documents/mdot/BIR_Ratings_Guide_Combined_2017-10-30_606610_7.pdf).

NBI Rating	General Condition
9-7	Like new/good
6-5	Fair
4-3	Poor/serious
2-0	Critical/failed

Bridge Treatments

Replacement

Replacement work is typically performed when a bridge is in poor condition (NBI rating of 4 or less) and will improve the bridge to good condition (NBI rating of 7 or more). The Local Bridge Program, a part of MDOT's Local Agency Program, defines bridge replacement as full replacement, which removes the entire bridge (superstructure, deck, and substructure) before re-building a bridge at the same location (Figure 6). The decision to perform a total replacement over rehabilitation (see below) should be made based on a life-cycle cost analysis. Generally, replacement is selected if rehabilitation costs more than two-thirds of the cost of replacement. Replacement is generally the most expensive of the treatment options.

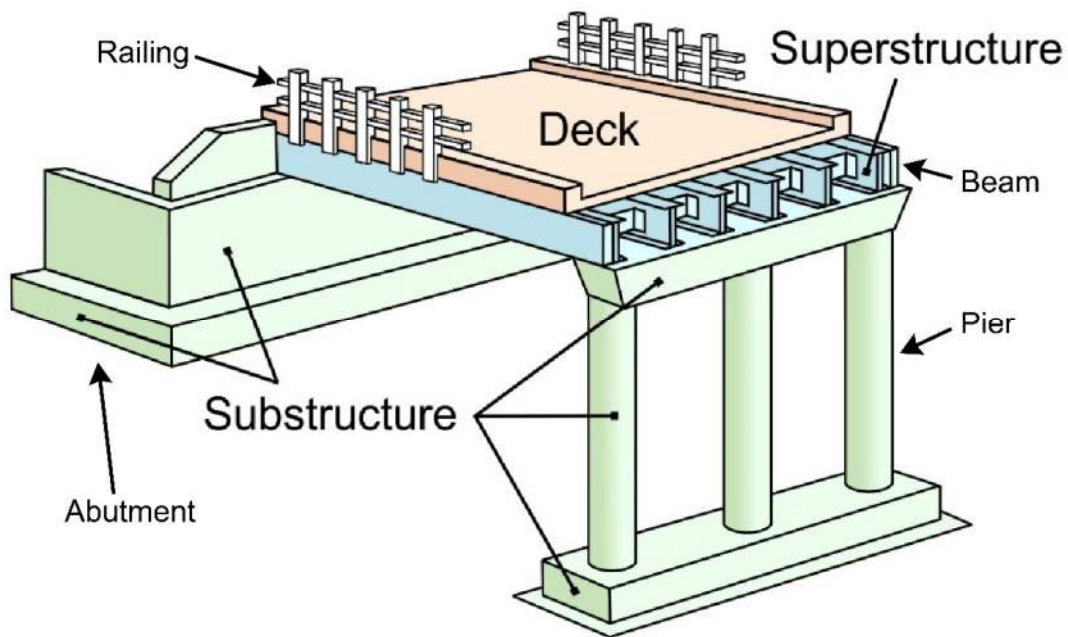


Figure 6: Diagram of basic elements of a bridge

Rehabilitation

Rehabilitation involves repairs that improve the existing condition and extend the service life of the structure and the riding surface. Most often, rehabilitation options are associated with bridges that have degraded beyond what can be fixed with preventive maintenance. Rehabilitation is typically performed on poor-rated elements (NBI rating of 4 or less) to improve them to fair or good condition (NBI rating of 5 or more). Rehabilitation can include superstructure replacement (removal and replacement of beams and deck) or deck replacement. While typically more expensive than general maintenance, rehabilitation treatments may be more cost-effective than replacing the entire structure.

- **Railing retrofit/replacement:** A railing retrofit or replacement either reinforces the existing railing or replaces it entirely (Figure 6). This rehabilitation is driven by a need for safety improvements on poor-rated railings or barriers (NBI rating less than 5).
- **Beam repair:** Beam repair corrects damage that has reduced beam strength (Figure 6). In the case of steel beams, it is performed if there is 25 percent or more of section loss in an area of the beam that affects load-carrying capacity. In the case of concrete beams, this is performed if there is 50 percent or more spalling (i.e., loss of material) at the ends of beams.
- **Substructure concrete patching and repair:** Patching and repairing the substructure is essential to keep a bridge in service. These rehabilitation efforts are performed when the abutments or piers are fair or poor (NBI rating of 5 or 4), or if spalling and delamination affect less than 30 percent of the bridge surface.

Preventive Maintenance

The Federal Highway Administration's (FHWA) *Bridge Preservation Guide* (2018) defines preventive maintenance as "a strategy of extending service life by applying cost-effective treatments to bridge elements...[that] retard future deterioration and avoid large expenses in bridge rehabilitation or replacements."

Preventive maintenance work is typically done on bridges rated fair (NBI rating of 5 or 6) in order to slow the rate of deterioration and keep them from falling into poor condition.

- **Concrete deck overlay:** A concrete deck overlay involves removing and replacing the driving surface. Typically, this is done when the deck surface is poor (NBI rating is less than 5) and the underneath portion of the deck is at least fair (NBI rating greater than 4). A shallow or deep concrete overlay may be performed depending on the condition of the bottom of the deck. The MDOT *Bridge Deck Preservation* matrices provide more detail on concrete deck overlays (see https://www.michigan.gov/mdot/0,4616,7-151-9625_24768_24773---,00.html).
- **Deck repairs:** Deck repairs include three common techniques: HMA overlay with or without waterproof membranes, concrete patching, deck sealing, crack sealing, and joint repair/replacement. An HMA overlay with an underlying waterproof membrane can be placed on bridge decks with a surface rating of fair or lower (NBI of 5 or less) and with deficiencies that cover between 15 and 30 percent of the deck surface and deck bottom. An HMA overlay without a waterproof membrane should be used on a bridge deck with a deck surface and deck bottom rating of serious condition or lower (NBI rating of 3 or less) and with deficiencies that cover greater than

30 percent of the deck surface and bottom; this is considered a temporary holdover to improve ride quality when a bridge deck is scheduled to undergo major rehabilitation within five years. All HMA overlays need to be accompanied by an updated load rating. Patching of the concrete on a bridge deck is done in response to an inspector's work recommendation or when the deck surface is in good, satisfactory, or fair condition (NBI rating of 7, 6, or 5) with minor delamination and spalling. To preserve a good bridge deck in good condition, a deck sealer can be used.

Deck sealing should only be done when the bridge deck has surface rating of fair or better (NBI of 5 or more). Concrete sealers should only be used when the top and bottom surfaces of the deck are free from major deficiencies, cracks, and spalling. An epoxy overlay may be used when between 2 and 5 percent of the deck surface has delaminations and spalls, but these deficiencies must be repaired prior to the overlay. An epoxy overlay may also be used to repair an existing epoxy overlay. Concrete crack sealing is an option to maintain concrete in otherwise good condition that has visible cracks with the potential of reaching the steel reinforcement. Crack sealing may be performed on concrete with a surface rating of good, satisfactory, or fair (NBIS rating of 7, 6, or 5) with minor surface spalling and delamination; it may also be performed in response to a work recommendation by an inspector who has determined that the frequency and size of the cracks require sealing.

- **Steel bearing repair/replacement:** Rather than sitting directly on the piers, a bridge superstructure is separated from the piers by bearings. Bearings allow for a certain degree of movement due to temperature changes or other forces. Repairing or replacing the bearings is considered preventive maintenance. Girders and a deck in at least fair condition (NBI of 5 or higher) and bearings in poor condition (NBI rating of 4 or less) identifies candidates for this maintenance activity.
- **Painting:** Re-painting a bridge structure can either be done in totality or in part. Total re-painting is done in response to an inspector's work recommendation or when the paint condition is in serious condition (NBI rating of 3 or less). Partial re-painting can either consist of zone re-painting, which is a preventive maintenance technique, or spot re-painting, which is scheduled maintenance (see below). Zone re-painting is done when less than 15 percent of the paint in a smaller area, or zone, has failed while the rest of the bridge is in good or fair condition. It is also done if the paint condition is fair or poor (NBI rating of 5 or 4).
- **Channel improvements:** Occasionally, it is necessary to make improvements to the waterway that flows underneath the bridge. Such channel improvements are driven by an inspector's work recommendation based on a hydraulic analysis or to remove vegetation, debris, or sediment from the channel and banks (Figure 6).
- **Scour countermeasures:** An inspector's work recommendations or a hydraulic analysis may require scour countermeasures (see the *Risk Management* section of this plan for more information on scour). This is done when a structure is categorized as scour critical and is not scheduled for replacement or when NBI comments in abutment and pier ratings indicate the presence of scour holes.
- **Approach repaving:** A bridge's approach is the transition area between the roadway leading up to and away from the bridge and the bridge deck. Repaving the approach areas is performed in

response to an inspector's work recommendation, when the pavement surface is in poor condition (NBI rating of 4 or less), or when the bridge deck is replaced or rehabilitated (e.g., concrete overlay).

- **Guardrail repair/replacement:** A guardrail is a safety feature on many roads and bridges that prevents or minimizes the effects of lane departure incidents. Keeping bridge guardrails in good condition is important. Repair or replacement of bridge guardrail should be done when a guardrail is missing or damaged, or when it needs a safety improvement.

Scheduled Maintenance

Scheduled maintenance activities are those activities or treatments that are regularly scheduled and intend to maintain serviceability while reducing the rate of deterioration.

- **Superstructure washing:** Washing the superstructure, or the main structure supporting the bridge, typically occurs in response to an inspector's work recommendation or when salt-contaminated dirt and debris collected on the superstructure is causing corrosion or deterioration by trapping moisture.
- **Drainage system cleanout/repair:** Keeping a bridge's drainage system clean and in good working order allows the bridge to shed water effectively. An inspector's work recommendation may indicate drainage system cleanout/repair. Signs that a drainage system needs cleaning or repair include clogs and broken, deteriorated, or damaged drainage elements.
- **Spot painting:** Spot painting is a form of partial bridge painting. This scheduled maintenance technique involves painting a small portion of a bridge. Generally, this is done in response to an inspector's work recommendation and is used for zinc-based paint systems only.
- **Slope repair/reinforcement:** The terrain on either side of the bridge that slopes down toward the channel is called the slope. At times, it is necessary to repair the slope. Situations that call for slope repair include when the slope is degraded, when the slope has significant areas of distress or failure, when the slope has settled, or if the slope is in fair or poor condition (NBI rating of 5 or less). Other times, it is necessary to reinforce the slope. Reinforcement can be added by installing Riprap, which is a side-slope covering made of stones. Riprap protects the stability of side slopes of channel banks when erosion threatens the surface.
- **Vegetation control and debris removal:** Keeping the area around a bridge structure free of vegetation and debris safeguards the bridge structure from these potentially damaging forces. Removing or restricting vegetation around bridges prevents damage to the structure. Vegetation control is done in response to an inspector's work recommendation or when vegetation traps moisture on structural elements or is growing from joints or cracks. Debris in the water channel or in the bridge can also cause damage to the structure. Removing this debris is typically done in response to an inspector's work recommendation or when vegetation, debris, or sediment accumulates on the structure or channel.
- **Miscellaneous repairs:** These are uncategorized repairs in response to an inspector's work recommendation.

1. BRIDGE ASSETS

Lapeer CRC seeks to implement an asset management program for its bridge structures. This program balances the decision to perform reconstruction, rehabilitation, preventive maintenance, scheduled maintenance, or new construction, with Lapeer CRC's bridge funding in order to maximize the useful service life and to ensure the safety of the local bridges under its jurisdiction. In other words, Lapeer CRC's bridge asset management program aims to preserve and/or improve the condition of its local bridge network within the means of its financial resources.

Nonetheless, Lapeer CRC recognizes that limited funds are available for improving the bridge network. Since preservation strategies like preventive maintenance are generally a more effective use of these funds than costly alternative management strategies like major rehabilitation or replacement, Lapeer CRC seeks to identify those bridges that will benefit from a planned maintenance program while addressing those bridges that pose usability and/or safety concerns.

The three-fold goal of Lapeer CRC's asset management program is the preservation and safety of its bridge network, increase of its bridge assets' useful service life by extending of the time that bridges remain in good and fair condition, and reduction of future maintenance costs. To quantify this goal, Lapeer CRC specifically aims to have to have 95% or more of the agency's local bridges in fair to good condition and to have less than 5% classify as structurally deficient over its three-year plan.

Thus, Lapeer CRC's asset management plan objectives are:

- To establish the current condition of the county's bridges
- To develop a "mix of fixes" that will:
 - Program scheduled maintenance actions to impede deterioration of bridges in good condition
 - Implement selective corrective repairs or rehabilitation for degraded bridge elements order to restore functionality
 - Identify and program those eligible bridges in need of replacement
- To identify available funding sources, such as:
 - Dedicated county resources
 - County funding through Michigan's Local Bridge Program
 - Opportunities to obtain other funding
- To prioritize the programmed actions within available funding limitations
- To improve the condition of bridges currently rated poor (4 or lower) and preserve bridges currently rated fair (5) or higher in their current condition in order to extend their useful service life.

Inventory

Lapeer CRC is responsible for 96 local bridges. Table 2 summarizes Lapeer CRC’s bridge assets by type, sizes by bridge type, and condition by bridge type. Additional inventory data, condition ratings, and proposed preventive maintenance actions for each bridge are contained in the tables in Appendixes 3, 4, and 5. The bridge inventory data was obtained from MDOT MiBRIDGE and other sources, and the 2022 condition data and maintenance actions are taken from the inspector’s summary report (see Appendix 2).

Types

Of the Lapeer CRC’s 96 structures, 9 are concrete bridges, 36 are steel bridges, 41 are pre-stressed concrete bridges, and 8 are timber bridges.

Locations and Sizes

Figure 7 illustrates the locations of bridge assets owned by Lapeer CRC. Details about the locations and sizes of each individual asset can be found in Lapeer CRC’s MiBRIDGE database. For more information, please refer to the agency contact listed in the *Introduction* of this bridge asset management plan.

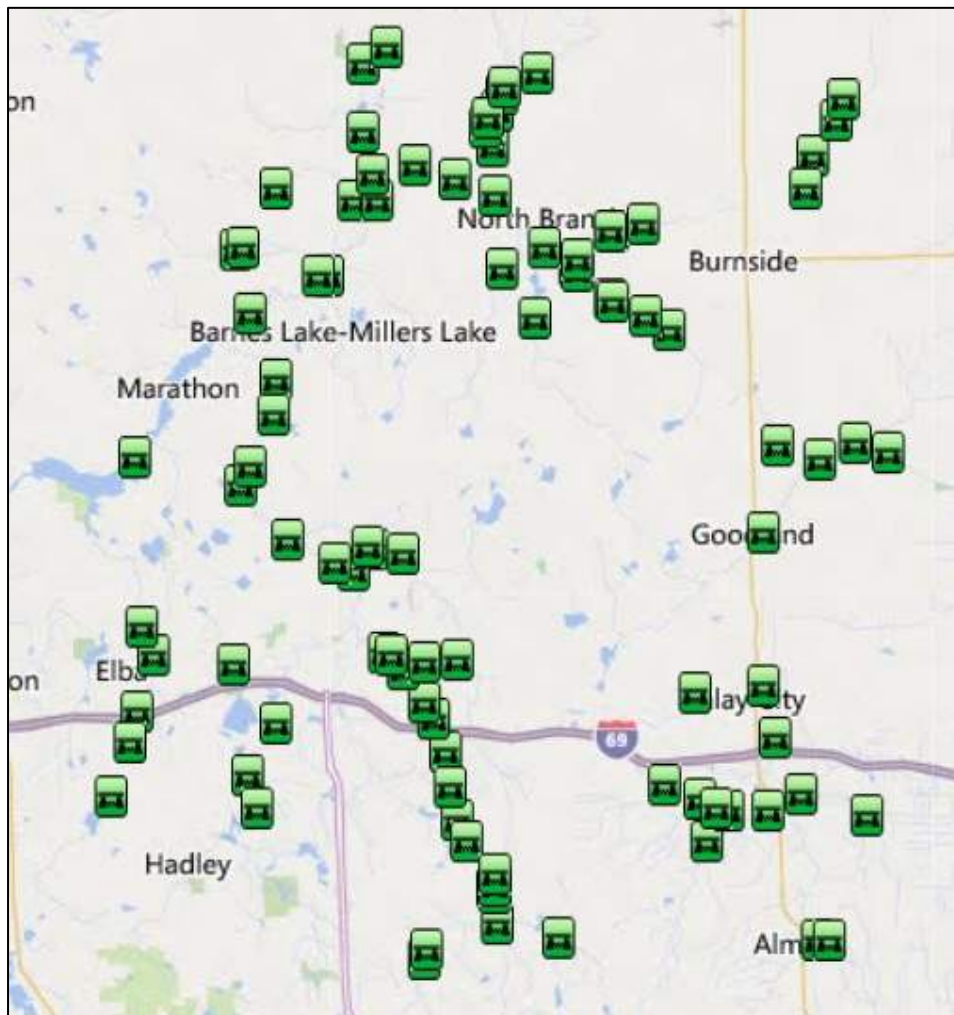


Figure 7: Map illustrating locations Lapeer CRC’s of bridge assets

Condition

Lapeer CRC evaluates its bridges according to the National Bridge Inspection Standards rating scale, with a rating of 9 to 7 being like new to good condition, a rating of 6 and 5 being fair condition, and a rating of 4 or lower being poor or serious/critical condition. The current condition of Lapeer CRC’s bridge network is 39 (41%) are good, 46 (48%) are fair, and 11 (11%) are poor or lower.

Another layer of classification of Lapeer CRC’s bridge inventory classifies 11 (11%) bridges as structurally deficient, 24 (25) bridges as posted, and 2 (2) bridges as closed. Structurally deficient bridges are those with a deck, superstructure, substructure, and/or culvert rated as “poor” according to the NBI rating scale, with a load-carrying capacity significantly below design standards, or with a waterway that regularly overtops the bridge during floods. Posted bridges are those that have declined in condition to a point where a restriction is necessary for what would be considered a safe vehicular or traffic load passing over the bridge; designating a bridge as “posted” has no influence on its condition rating. Closed bridges are those that are closed to all traffic; closing a bridge is contingent upon its ability to carry a set minimum live load.

Table 2: Bridge Assets by Type: Inventory, Size, and Condition

Bridge Type	Total Number of Bridges	Total Deck Area (sq ft)	Condition: Structurally Deficient, Posted, Closed			2022 Condition		
			Struct. Def.	Posted	Closed	Poor	Fair	Good
Aluminum – Culvert	2	2,021	0	0	0	0	1	1
Concrete – Culvert	8	7,644	0	0	0	0	0	8
Concrete – Girder and floorbeam	1	2,193	0	1	0	0	1	0
Prestressed concrete – Box beam/girders—multiple	20	40,914	0	4	0	0	10	10
Prestressed concrete – Box beam/girders—single/spread	1	2,120	0	0	0	0	0	1
Prestressed concrete – Multistringer	2	3,154	0	0	0	0	0	2
Prestressed concrete – Tee beam	18	34,451	1	6	0	1	9	8
Steel – Culvert	23	22,000	0	0	0	1	1	6
Steel – Multistringer	13	22,480	7	9	1	7	5	1
Timber – Culvert	1	440	0	1	0	0	1	0
Timber – Slab	7	9,605	2	3	1	2	3	2
Total SD/Posted/Closed			11	24	2			
Total	96	147,022				11	46	39
Percentage (%)			11%	25	2	11	48	41

Statewide, MDOT’s statistics for local agency bridges show that 14% are poor and 86% are good/fair, indicating that the Lapeer CRC has a lesser percentage of poor bridges compared to the statewide average for local agencies. Correspondingly, Lapeer CRC has 89% of its bridges in fair/good condition versus the statewide average of 86% for local agency bridges. Statewide, 12% of local agency bridge deck area classifies as structurally deficient compared to 11% of Lapeer CRC’s bridge deck area.

Goals

The goal of Lapeer CRC's asset management program is the preservation and safety of its bridge network; it also aims to extend the period of time that bridges remain in good and fair condition, thereby increasing their useful service life and reducing future maintenance costs.

Specifically, this goal translates into long-range goals of having 95% of its bridges rated fair/good and having less than 5% classify as structurally deficient within five years. These goals are juxtaposed with the historic and current condition and the projected trend in Figure 8.

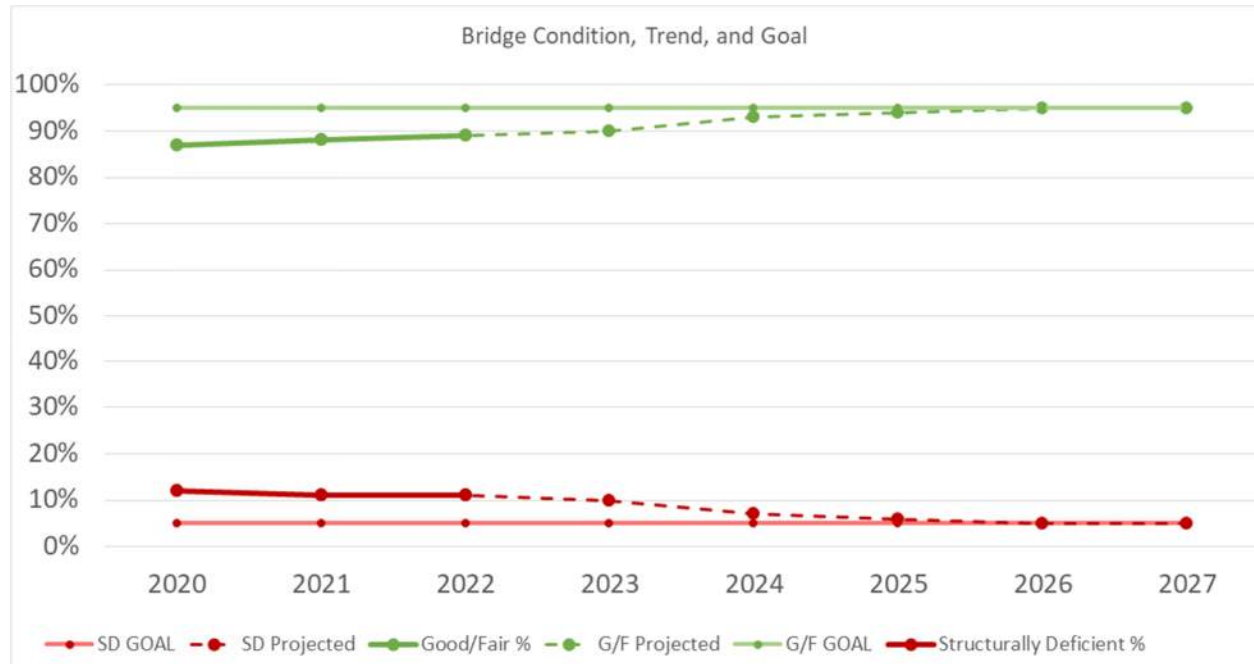


Figure 8: Progress tracking graph indicating Lapeer CRC's historic and current bridge conditions, projected trends, and goals.

Several metrics will be used to assess the effectiveness of this asset management program. Lapeer CRC will monitor and report the annual change in the number of its bridges rated fair/good (5 or higher) and the annual change in the number of its bridges classified as structurally deficient.

Based on past inspection records and condition ratings, Lapeer CRC will establish a baseline of past performance by determining the average period of time that a bridge remains in good or fair condition. The performance measure will be the increased average amount of time a bridge is in the good or fair condition status after implementation of the asset management strategy when compared to the baseline time before implementation.

Prioritization, Programmed/Funded Projects, and Planned Projects

Prioritization

Lapeer CRC’s asset management program aims to address the structures of critical concern by targeting elements rated as being in poor condition and to improve and maintain the overall condition of the bridge network to good or fair condition through a “mix of fixes” strategy. Therefore, Lapeer CRC prioritizes bridges for projects by evaluating five factors and weighting them as follows: condition –20%, load capacity –30%, traffic –15%, safety –30%, and detour –5%. There are several components within each factor that are used to arrive at its score. Each project under consideration is scored, and its total score is then compared with other proposed project to establish a priority order.

Lapeer CRC annually reviews the current condition of each of its bridges using the NBIS inspection data contained in the *MDOT Bridge Safety Inspection Report* and the inspector’s work recommendations contained in MDOT’s *Bridge Inspection Report*. The inspection inventory and condition data are consolidated in spreadsheet format for Lapeer CRC’s bridges in Appendix 3. Lapeer CRC then determines management and preservation needs and corresponding actions for each bridge (Appendix 4) As well as inspection follow-up actions (Appendix 5). The management and preservation actions are selected in accordance with criteria contained in the *Summary of Preservation Criteria* table (below) and adapted to Lapeer CRC’s specific bridge network.

Table 3: Summary of Preservation Criteria		
Preservation Action	Bridge Selection Criteria	Expected Service Life
Replacement		
Total Replacement	<ul style="list-style-type: none"> NBI rating of 3 or less [1] [2] OR Cost of rehabilitation exceeds cost of replacement [1] OR Bridge is scour critical with no counter-measures available [1] 	70 years
Rehabilitation		
Superstructure Replacement	<ul style="list-style-type: none"> NBI rating of 4 or less for the superstructure [1] [2] OR Cost of superstructure and deck rehabilitation exceeds cost of replacement [1] 	40 years ^[1]
Deck Replacement Epoxy Coated Steel Black Steel	<ul style="list-style-type: none"> Use guidelines in MDOT’s Bridge Deck Preservation Matrix [3] [4] NBI rating of 4 or less for the deck surface and deck bottom [1] [2] Deck bottom has more than 25% total area with deficiencies [1] OR Replacement cost of deck is competitive with rehabilitation [1] 	60+ years ^{[3] [4]}
Substructure Replacement (Full or Partial)	<ul style="list-style-type: none"> NBI rating of 4 or less for abutments, piers, or pier cap [1] [2] Has open vertical cracks, signs of differential settlement, or active movement [1] Pontis rating of 3 or 5 for more than 30 percent of the substructure [1] [5] OR Bridge is scour critical with no counter-measures available 	40 years ^[1]
Steel Beam Repair	<ul style="list-style-type: none"> More than 25% section loss in an area of the beam that affects load carrying capacity [1] 	40 years ^[1]

Table 3: Summary of Preservation Criteria		
Preservation Action	Bridge Selection Criteria	Expected Service Life
	<ul style="list-style-type: none"> • <i>OR</i> To correct impact damage that impairs beam strength [1] 	
Prestressed Concrete Beam Repair	<ul style="list-style-type: none"> • More than 5% spalling at ends of prestressed I-beams [1] • <i>OR</i> Impact damage that impairs beam strength or exposes prestressing strands [1] 	40 years ^[1*]
Substructure Concrete Patching and Repair	<ul style="list-style-type: none"> • NBI rating of 5 or 4 for abutments or piers, and surface has less than 30% area spalled and delaminated [1] [2] • <i>OR</i> Pontis rating of 3 or 4 for the column or pile extension, pier wall, and/or abutment wall and surface has between 2% and 30% area with deficiencies [1] [5] • <i>OR</i> In response to inspector's work recommendation for substructure patching [1] 	
Abutment Repair/Replacement	<ul style="list-style-type: none"> • NBI rating of 4 or less for the abutment [1] [2] • <i>OR</i> Has open vertical cracks, signs of differential settlement, or active movement 	
Railing/Barrier Replacement	<ul style="list-style-type: none"> • NBI rating greater than 5 for the deck [1] [2] • NBI rating less than 5 for the railing with more than 30% total area having deficiencies [1] [2] • <i>OR</i> Pontis rating is 4 for railing [1] [5] • <i>OR</i> Safety improvement is needed [1] 	
Culvert Repair/Replacement	<ul style="list-style-type: none"> • NBI rating of 4 or less for culvert or drainage outlet structure • <i>OR</i> Has open vertical cracks, signs of deformation, movement, or differential settlement 	
Preventive Maintenance		
Shallow Concrete Deck Overlay	<ul style="list-style-type: none"> • NBI rating is 5 or less for deck surface, and deck surface has more than 15% area with deficiencies [1] [2] • NBI rating of 4 or 5 for deck bottom, and deck bottom has between 5% and 30% area with deficiencies [1] [2] • <i>OR</i> In response to inspector's work recommendation [1] 	12 years
Deep Concrete Deck Overlay	<ul style="list-style-type: none"> • NBI rating of 5 or less for deck surface, and deck surface has more than 15% area with deficiencies [1] [2] • NBI deck bottom rating is 5 or 6, and deck bottom has less than 10% area with deficiencies [1] [2] • <i>OR</i> In response to inspector's work recommendation [1] 	25 years
HMA Overlay with Waterproofing Membrane	<ul style="list-style-type: none"> • NBI rating of 5 or less for deck surface, and both deck surface and bottom have between 15% and 30% area with deficiencies [1] [2] • <i>OR</i> Bridge is in poor condition and will be replaced in the near future and the most cost-effective fix is HMA overlay [1] 	
HMA Overlay Cap without Membrane	<ul style="list-style-type: none"> • Note: All HMA caps should have membranes unless scheduled for replacement within five years. • NBI rating of 3 or less for deck surface and deck bottom, and deck surface and deck bottom have more than 30% area with deficiencies. Temporary holdover to improve ride quality for a bridge in the five-year plan for rehab/replacement. [1] [2] 	3 years
Concrete Deck Patching	<ul style="list-style-type: none"> • NBI rating of 5, 6, or 7 for deck surface, and deck surface has between 2% and 5% area with delamination and spalling [1] [2] • <i>OR</i> In response to inspector's work recommendation [1] 	5 years

Table 3: Summary of Preservation Criteria		
Preservation Action	Bridge Selection Criteria	Expected Service Life
Steel Bearing Repair/Replacement	<ul style="list-style-type: none"> NBI rating of 5 or more for superstructure and deck, and NBI rating 4 or less for bearing [2] 	
Deck Joint Replacement	<ul style="list-style-type: none"> Always include when doing deep or shallow concrete overlays [1] NBI rating of 4 or less for joints [1] [2] OR Joint leaking heavily [1] OR In response to inspector's work recommendation for replacement [1] 	
Pin and Hanger Replacement	<ul style="list-style-type: none"> NBI rating of 4 or less for superstructure for pins and hangers [1] [2] Pontis rating of 1, 2, or 3 for a frozen or deformed pin and hanger [1] [5] OR Presence of excessive section loss, severe pack rust, or out-of-plane distortion [1] 	15 years
Zone Repainting	<ul style="list-style-type: none"> NBI rating of 5 or 4 for paint condition, and paint has 3% to 15% total area failing [1] [2] OR During routine maintenance on beam ends or pins and hangers [1] OR less than 15% of existing paint area has failed and remainder of paint system is in good or fair condition [1] 	10 years
Complete Repainting	<ul style="list-style-type: none"> NBI rating of 3 or less for paint condition [1] [2] OR Painted steel beams that have greater than 15% of the existing paint area failing [1] 	
Partial Repainting	<ul style="list-style-type: none"> See Zone or Spot Painting 	
Channel Improvements	<ul style="list-style-type: none"> Removal of vegetation, debris, or sediment from channel and banks to improve channel flow OR in response to inspector's work recommendation 	
Scour Countermeasures	<ul style="list-style-type: none"> Pontis scour rating of 2 or 3 and is not scheduled for replacement [1] [5] OR NBI comments in abutment and pier ratings indicate presence of scour holes [1] [2] 	
Approach Repaving	<ul style="list-style-type: none"> Approach pavement relief joints should be included in all projects that contain a significant amount of concrete roadway (in excess of 1000' adjacent to the structure). The purpose is to alleviate the effects of pavement growth that may cause distress to the structure. Signs of pavement growth include: <ul style="list-style-type: none"> Abutment spalling under bearings [1] Beam end contact [1] Closed expansion joints and/or pin and hangers [1] Damaged railing and deck fascia at joints [1] Cracking in deck at reference line (45 degree angle) [1] 	
Guard Rail Repair/Replacement	<ul style="list-style-type: none"> Guard rail missing or damaged^[2*] OR Safety improvement is needed^[2*] 	
Scheduled Maintenance		
Superstructure Washing	<ul style="list-style-type: none"> When salt contaminated dirt and debris collected on superstructure is causing corrosion or deterioration by trapping moisture [1] OR Expansion or construction joints are to be replaced and the steel is not to be repainted [1] 	2 years

Table 3: Summary of Preservation Criteria		
Preservation Action	Bridge Selection Criteria	Expected Service Life
	<ul style="list-style-type: none"> • OR Prior to a detailed replacement [1] • OR In response to inspector's work recommendation [1] 	
Drainage System Clean-Out/Repair	<ul style="list-style-type: none"> • When drainage system is clogged with debris [1] • OR Drainage elements are broken, deteriorated, or damaged [1] • OR NBI rating comments for drainage system indicate need for cleaning or repair [1] [2] 	2 years
Spot Repainting	<ul style="list-style-type: none"> • For zinc-based paint systems only. Do not spot paint with lead-based paints. • Less than 5% of paint area has failed in isolated areas [1] • OR In response to inspector's work recommendation [1] 	5 years
Slope Paving Repair	<ul style="list-style-type: none"> • NBI rating is 5 or less for slope protection [1] [2] • OR Slope is degraded or sloughed • OR Slope paving has significant areas of distress, failure, or has settled [1] 	
Riprap Installation	<ul style="list-style-type: none"> • To protect surface when erosion threatens the stability of side slopes of channel banks 	
Vegetation Control	<ul style="list-style-type: none"> • When vegetation traps moisture on structural elements [1] • OR Vegetation is growing from joints or cracks [1] • OR In response to inspector's work recommendation for brush cut [1] 	1 year
Debris Removal	<ul style="list-style-type: none"> • When vegetation, debris, or sediment accumulates on the structure or in the channel • OR In response to inspectors work recommendation 	1 year
Deck Joint Repair	<ul style="list-style-type: none"> • Do not repair compression joint seals, assembly joint seals, steel armor expansions joints, and block out expansion joints; these should always be replaced. [1] • NBI rating is 5 for joint [1] [2] • OR In response to inspector's work recommendation for repair [1] 	
Concrete Sealing	<ul style="list-style-type: none"> • Top surface of pier or abutments are below deck joints and, when contaminated with salt, salt can collect on the surface [1] • OR Surface of the concrete has heavy salt exposure. Horizontal surfaces of substructure elements are directly below expansion joints [1] 	
Concrete Crack Sealing	<ul style="list-style-type: none"> • Concrete is in good or fair condition, and cracks extend to the depth of the steel reinforcement [1] • OR NBI rating of 5, 6, or 7 for deck surface, and deck surface has between 2% and 5% area with deficiencies [1] [2] • OR Unsealed cracks exist that are narrow and/or less than 1/8" wide and spaced more than 8' apart [1] • OR In response to inspector's work recommendation [1] 	5 years
Minor Concrete Patching	<ul style="list-style-type: none"> • Repair minor delaminations and spalling that cover less than 30% of the concrete substructure [1] • OR NBI rating of 5 or 4 for abutments or piers, and comments indicate that their surface has less than 30% spalling or delamination [1] [2] 	

Table 3: Summary of Preservation Criteria		
Preservation Action	Bridge Selection Criteria	Expected Service Life
	<ul style="list-style-type: none"> • OR Pontis rating of 3 or 4 for the column or pile extension, pier wall and/or abutment wall, and surface has between 2% and 30% area with deficiencies [1] [5] • OR In response to inspector's work recommendation [1] 	
HMA Surface Repair/Replacement	<ul style="list-style-type: none"> • HMA surface is in poor condition • OR In response to inspector's work recommendation 	
Seal HMA Cracks/Joints	<ul style="list-style-type: none"> • HMA surface is in good or fair condition, and cracks extend to the surface of the underlying slab or sub course • OR In response to inspector's work recommendation 	
Timber Repair	<ul style="list-style-type: none"> • NBI rating of 4 or less for substructure for timber members • OR To repair extensive rot, checking, or insect infestation 	
Miscellaneous Repair	<ul style="list-style-type: none"> • Uncategorized repairs in response to inspector's work recommendation 	
<p>This table was produced by TransSystems and includes information from the following sources:</p> <p>[1] MDOT, <i>Project Scoping Manual</i>, MDOT, 2019.</p> <p>[2] MDOT, <i>MDOT NBI Rating Guidelines</i>, MDOT, 2017.</p> <p>[3] MDOT, <i>Bridge Deck Preservation Matrix - Decks with Uncoated "Black" Rebar</i>, MDOT, 2017.</p> <p>[4] MDOT, <i>Bridge Deck Preservation Matrix - Decks with Epoxy Coated Rebar</i>, 2017.</p> <p>[5] MDOT, <i>Pontis Bridge Inspection Manual</i>, MDOT, 2009.</p> <p>* From source with interpretation added.</p>		

In terms of management and preservation actions, Lapeer CRC’s asset management program uses a “mix of fixes” strategy that is made up of replacement, rehabilitation, preventive maintenance, and scheduled maintenance.

Replacement involves substantial changes to the existing structure, such as bridge deck replacement, superstructure replacement, or complete structure replacement, and is intended to improve critical or closed bridges to a good condition rating.

Rehabilitation is undertaken to extend the service life of existing bridges. The work will restore deficient bridges to a condition of structural or functional adequacy, and may include upgrading geometric features. Rehabilitation actions are intended to improve the poor or fair condition bridges to fair or good condition.

Preventive maintenance work will improve and extend the service life of fair bridges, and will be performed with the understanding that future rehabilitation or replacement projects will contain appropriate safety and geometric enhancements. Preventive maintenance projects are directed at limited bridge elements that are rated in fair condition with the intent of improving these elements to a good rating. Most preventive maintenance projects will be one-time actions in response to a condition state need. Routine preventive work will be performed by the agency’s in-house maintenance crews while larger, more complex work will be contracted.

Lapeer CRC's **scheduled maintenance** program is an integral part of the preservation plan, and is intended to extend the service life of fair and good structures by preserving the bridges in their current condition for a longer period of time. Scheduled maintenance is proactive and not necessarily condition driven. In-house maintenance crews will perform much of this work.

Certain of the severely degraded and structurally deficient bridges require replacement or major rehabilitation. Several of the remaining bridges require one-time preventive maintenance actions to repair defects and restore the structure to a higher condition rating. Most bridges are included in a scheduled maintenance plan with appropriate maintenance actions programmed for groups of bridges of similar material and type, bundled by location.

The replacement, rehabilitation, and preventive maintenance projects are generally eligible for funding under the local bridge program, and any requests for funding will be submitted with Lapeer County Road Commission's annual applications.

To achieve its goals, a primary objective of Lapeer CRC's asset management program is improvement of four bridges rated poor (4 or lower) to a rating of fair (5) or higher within a three-year time period through management and/or preservation activities. The primary work activities that will be used to meet this improvement objective include replacement, rehabilitation, and preventive maintenance. The work has been prioritized by considering each individual bridge's needs, its importance, the present costs of improvements, and the impact of deferral (i.e., cost increase due to increased degradation). Additionally, Lapeer CRC's asset management program incorporates preservation of bridges currently rated fair (5) or higher in their current condition in order to extend their useful service life. The primary work activities used to meet this preservation objective include preventive maintenance. A bridge-by-bridge preservation—or maintenance—plan is presented in the Appendix 4.

Programmed/Funded Projects

Lapeer CRC received \$5,767,000 in total funding per year for the years 2023-2025. To achieve its goals, Lapeer CRC plans to spend \$50,000 per year on preventive maintenance of bridges. Lapeer CRC plans to replace four bridges at a cost of \$5,717,000. By performing the aforementioned preventive maintenance and replacement of bridge structures, Lapeer CRC may or may not meet its overall bridge network condition goals.

Lapeer CRC computes the estimated cost of each typical management and/or preservation action using unit prices in the latest *Bridge Repair Cost Estimate* spreadsheet contained in MDOT's *Local Bridge Program Call for Projects*. The cost of items of varying complexity, such as maintenance of traffic, staged construction, scour countermeasures, and so forth, are computed on a bridge-by-bridge basis. The cost estimates are reviewed and updated annually. A summary of the programmed/funded projects and investments can be found in Table 4, the Cost Projection table, below.

Planned Projects

Lapeer CRC identifies additional priority projects that remain unfunded. These are identified according to high, medium, and low priority in Table 4.

Table 4: Cost Projection Table

Strategy	2022	2023	2024	2025	2026	GAP
New						
Subtotal	\$0	\$0	\$0	\$0	\$0	\$0
Replacement						
5423		\$1,609,000				
5470		\$1,830,000				
5450			\$1,342,000			
5429			\$1,396,000			
5409				\$1,693,000		
5469				\$3,645,000		
5400					\$1,448,000	
Subtotal	\$0	\$3,439,000	\$2,738,000	\$5,338,000	\$1,448,000	\$0
Rehabilitation						
5462						\$1,086,000
5394						\$1,220,000
Subtotal	\$0	\$0	\$0	\$0	\$0	\$2,306,000
Scheduled Maintenance						
Subtotal	\$0	\$0	\$0	\$0	\$0	\$0
Preventive Maintenance						
5388	\$110,000					
5371	\$179,000					
5417	\$179,000					
5416	\$128,000					
5414	\$127,000					
5421	\$123,000					
5374				\$749,000		
Subtotal	\$846,000	\$0	\$0	\$749,000	\$0	\$0
Other						
Subtotal	\$0	\$0	\$0	\$0	\$0	\$0

Gap Analysis

When Lapeer CRC compares its funding and its programmed/funded projects with all of its prioritized projects as shown in Table 4, Lapeer CRC believes it should be able to achieve most of its asset management goals for the period of this plan. For projects that it is unable to complete, Lapeer CRC will continue to monitor those bridge assets and take any necessary steps within its budget to prevent or mitigate a condition decline or a need to post or close the structure.

2. FINANCIAL RESOURCES

Anticipated Revenues

Lapeer CRC has programmed project and/or has been granted MDOT local-aid funding and federal funding and MDOT local-aid funding, a county appropriation of monies for bridge preservation, and federal funding. This funding is for the purpose(s) of replacement and preventive maintenance, for the following bridge(s): 5371, 5388, 5414, 5416, 5417, 5421, 5423, 5429, 5450, and 5470. This funding is intended for use in the year(s) 2022, 2023, and 2024.

Lapeer CRC applied for and/or has been granted funding from several sources including, but not limited to MDOT local aid, a county appropriation of monies for bridge preservation, and federal programs. This funding was requested in the application year(s) 2022, for the purpose(s) of replacement or preventive maintenance, for the following bridge(s): 5374, 5409, and 5469. This funding is intended for use in the year(s) 2025. Lapeer CRC has applications pending preparation and submission for MDOT local-aid funding, a county appropriation of monies for bridge preservation, and federal funding and funding from several sources including, but not limited to MDOT local aid, a county appropriation of monies for bridge preservation, and federal programs. This funding will be requested in the application year(s) 2023, for the purpose(s) of replacement, for the following bridge(s): 5400. This funding is intended for use in the year(s) 2025 and 2026.

Any projects submitted to the local aid program that are not selected for funding will be submitted in the following years call for projects.

Anticipated Expenses

Scheduled maintenance activities and minor repairs that are not affiliated with any applications, grants, or other funded projects will be performed by the agency's in-house maintenance forces and funded through the agency's annual operating budget.

3. RISK MANAGEMENT

Lapeer CRC recognizes that the potential risks associated with bridges generally fall into several categories:

- Personal injury and property damage resulting from a bridge collapse or partial failure;
- Loss of access to a region or individual properties resulting from bridge closures, restricted load postings, or extended outages for rehabilitation and repair activities; and
- Delays, congestion, and inconvenience due to serviceability issues, such as poor quality riding surface, loose expansion joints, or missing expansion joints.

Lapeer CRC addresses these risks by implementing regular bridge inspections and a preservation strategy consisting of preventive maintenance.

Lapeer CRC administers the biennial inspection of its bridges in accordance with NBIS and MDOT requirements. The inspection reports document the condition of Lapeer CRC’s bridges and evaluates them in order to identify new defects and monitor advancing deterioration. The summary inspection report in Appendix 1 identifies items needing follow-up, special inspection actions, and recommended bridge-by-bridge maintenance activities.

Bridges that are considered “scour critical” pose a risk to Lapeer CRC’s road and bridge network. Scour is the depletion of sediment from around the foundation elements of a bridge commonly caused by fast-moving water. According to MDOT’s *Michigan Structure Inventory and Appraisal Coding Guide*, a scour critical bridge is one that has unstable abutment(s) and/or pier(s) due to observed or potential (based on an evaluation study) scour. Bridges receiving a scour rating of 3 or less are considered scour critical. Lapeer CRC has scour critical bridges, which are listed in Table 5.

Table 5: Bridges that are Considered Scour Critical

Scour Critical Bridges	
Bridge Structure Number	Scour Critical Rating
5377	3
5382	3
5389	3
5396	3
5400	3
5423	3
5426	3
5450	3
5452	3

The preservation strategy identifies actions in the operations and maintenance plan that are preventive or are responsive to specific bridge conditions. The actions are prioritized to correct critical structural safety and traffic issues first, and then to address other needs based on the operational importance of each bridge and the long-term preservation of the network. The inspection results serve as a basis for modifying and updating the operations and maintenance plan annually.

Appendix 1

Lapeer County Road Commission 2021 Bridge Inspection Report Summary of Additional Inspection Recommendations

Appendix 2

Lapeer County Road Commission 2021 Bridge Inspection Report Executive Summary

Almont Township

5366 – Almont Road over the North Branch of the Clinton River

Constructed: 1966 **Section:** 22-27 **General Condition:** Good

Posted: Not Posted

Description: This is a twin CMP arch culvert, with newer HMA pavement. The CMP culverts have all hardware in place, no leaking noted, and a slight sag under the roadway of the west culvert. Slight erosion between the culverts at the northeast end. The majority of the flow is through the east culvert, with riprap at outlet end in channel bottom. The guardrail in the northeast quadrant has been impacted with a broken post.

Recommendations: Remove vegetation around culvert ends. Repair erosion between culverts at the northeasterly end.

5367 – Almont Road over the North Branch of the Clinton River

Constructed: 1968 **Section:** 22-27 **General Condition:** Fair

Posted: Not Posted

Description: This is a twin CMP arch culvert, with newer HMA pavement. Two posts on the north guardrail are missing blocks. The CMP culverts have all hardware in place, no leakage noted, a slight sag in the top under the roadway, the sag is more pronounced in the east culvert, the west culvert has several areas of rust at the joints and waterline. Majority of the flow is through the east culvert, while the west culvert has sediment and muck built up throughout.

Recommendations: Cut brush along slopes on north side.

5386 – Glover Road over the Belle River Drain

Constructed: 1968 **Section:** 1-2 **General Condition:** Fair

Posted: Not Posted

Description: This is a single span, steel beam bridge with a concrete deck, HMA overlay, and thrie beam guardrail railings. The HMA surface has an open centerline crack with some spalling and partially cold patched, block cracking in the southbound lane, and transverse and random cracking in the northbound lane. The concrete deck has minor map cracking on the bottom surface, and a 4 ft long crack in the east fascia at the north end. Steel beams 1W and 6W have minor corrosion, and spot failure of paint system. Large deflection of the superstructure was noted when heavy trucks cross. The concrete abutments have a minor vertical crack at centerline and cracks with efflorescence in the northwest and northeast wingwalls. The HMA approaches have unsealed transverse and block cracking and settled up to 1 inch.

Recommendations: Perform load rating due to observed deflection of superstructure under loading, wedge approaches to prevent vehicle impact at reference lines, and remove and replace HMA overlay including the approaches.

5392 – Hollow Corners Road over the West Pond Creek

Constructed: 1970 **Section:** 6 **General Condition:** Good

Posted: Not Posted

Description: This is a twin CMP arch culvert with gravel surface. There is impact damage to the top of culverts at the south end, light rust at waterline, and the west culvert is slightly higher than the east culvert. Both culverts are taking flow, high water and debris in both spans partially blocking flow. There is no leakage noted.

Recommendations: Brush cut. Remove trees over culvert on north side of road.

5394 – Webster Road over the Weston Drain

Constructed: 1980 **Section:** 4 **General Condition:** Poor

Posted: Not Posted

Description: This is a triple CMP culvert with a gravel surface. The culverts have heavy rusting at the waterline with some small holes, surface rust above waterline. There is impact damage to the upstream ends, the west pipe has up to 5" diameter holes through corrugations at the water line with gravel coming through. The center pipe has several 4" holes in the corrugations with exposed gravel at the waterline, and a separated joint at midspan completely apart and bent. The eastern pipe has holes up to 1 ft diameter in corrugations at the water line with gravel coming through, the joint at midspan is dented and separated with gravel coming through. Scour holes at the downstream end of all pipes. Scour was noted upstream of culverts up to 1 ft deep and the culverts are undermined up to 4 ft.

Recommendations: Remove brush between and around culverts. Begin to think about funding options due to corrosion at waterline.

5395 – Muir Road over the Weston Drain

Constructed: 1983 **Section:** 6 **General Condition:** Good

Posted: Not Posted

Description: This is a two span, timber bridge with an HMA surface and guardrail on timber posts. The HMA surface has numerous longitudinal and transverse cracks, alligator cracks in the wheel path, spalling, and scraping from plows, gravel has tracked onto the deck. The timber deck has efflorescence and evidence of leakage throughout, and the north spreader beam is missing 3 bolts, there is a 3 ft rotted section in span 1S. The timber abutments and retaining walls are in good condition, the south abutment has a 1 inch gap between the bottom retaining boards. The timber pier has leaning piles (possibly from construction). Riprap is in place along each abutment.

Recommendations: Mill and overlay deck. Clean bridge deck. Clean out scuppers on east side.

Attica Township

5396 – Winslow Road over the Weston Drain Extension

Constructed: 1945 **Section:** 35-36 **General Condition:** Fair

Posted: 42/68/82

Description: This is a single span, steel beam bridge with concrete deck, gravel surface, and three tube steel railings. The concrete deck bottom surface has spot rusting and light honeycombing throughout and incipient spalls. There is a 3'x6" patch at the south end of bay 5w. The steel beams have light surface rusting throughout with up to 5% section loss and 100% paint failure. Beams 3w and 4w have up to 20% section loss on the top flanges. The concrete abutments have minor horizontal cracking with efflorescence on the backwalls, cracking with efflorescence and spalling at the corners, and spalls to steel in all four slopewalls and top corners. No slope protection in front of abutments, the south abutment has footing exposed up to 9" for 15' in the southwest quadrant. There is no scour noted at the north abutment.

Recommendations: Brush cut. Retrofit railing and add approach guardrail. Add riprap to the front of abutments.

Burlington Township

5379 – Barnes Road over the Indian Creek Drain

Constructed: 2017 **Section:** 19-30 **General Condition:** Good

Posted: Not Posted

Description: This is a precast concrete box culvert with grouted joints. Segments 1s-9s have hairline transverse cracking at midspan. There are cast-in-place concrete wingwalls and headwalls with no deficiencies noted.

Recommendations: None at this time.

5385 – Jefferson Road over the Indian Creek Drain

Constructed: 2017 **Section:** 16-17 **General Condition:** Good

Posted: Not Posted

Description: Four-sided precast concrete box culvert with grouted joints. Segments 3w-10w have hairline transverse cracks near midspan. The cast-in-place wingwalls and headwalls have no deficiencies noted.

Recommendations: None at this time.

5397 – Castle Road over the North Branch of the Flint River

Constructed: 2011 **Section:** 31 **General Condition:** Good

Posted: Not Posted

Description: This is a single span, concrete I-beam bridge with a concrete deck, concrete open parapet railings, and concrete curtainwall abutments. The concrete deck has an epoxy overlay, which is starting to peel in the WB lane and several areas where overlay has lost adhesion to surface. There is a small spall near the centerline. The concrete deck bottom surface has diagonal cracking at the east abutment with efflorescence and one spall to steel. Hairline transverse cracking in bays 1s and 3s. The beams are in good condition with no deficiencies noted. The east abutment has two minor hairline vertical cracks under the southeast deck fascia and the NEQ slope wall has shrinkage cracks. Heavy riprap protects each abutment. The gabion basket retaining wall in the southwest quadrant has a slight bulge in the second row worth monitoring.

Recommendations: Remove debris from the expansion joint device. Patch areas of peeling epoxy overlay.

5399 – Law Road over the Indian Creek Drain

Constructed: 1991 **Section:** 30 **General Condition:** Good

Posted: Not Posted

Description: This is a two span, timber bridge with an HMA surface, timber railing, timber pile pier, and timber pile abutment with timber retaining walls. The HMA surface has heavy map cracking throughout with a wide transverse crack over the centerline of the pier that is partially sealed. The timber deck has a slight sag and sealer between timber planks starting to fall, minor chips and splits, with all hardware in place. The timber piles at the pier have debris caught at each pile. There is riprap in place along both abutments with up to 20% missing at the west abutment, no scour noted. The HMA approaches have more than ¼ inch settlement at the reference lines and open transverse and longitudinal cracks.

Recommendations: Seal cracks and remove gravel debris from deck. Seal abutment and pier reference line joints. Remove debris from along pier, and replace riprap at the west abutment.

5400 – McKillop Road over the Indian Creek Drain

Constructed: 1976

Section: 19

General Condition: Serious

Posted: 10/NN/NN

Description: This is a one lane, single span, timber bridge with gravel surface, guardrail railing, and concrete abutments. The timber deck is completely covered with gravel. Both railings lean outward up to 10 degrees. The timber deck has splits in 2 planks. The concrete abutments have steel sheeting left in place in front of the lower pour. The east abutment has a hairline vertical crack at centerline and the steel sheeting has areas of 100% section loss. The west abutment footing toe has sheared off and the wall is undermined up to 2 ft, the sheeting is leaning toward the drain, the abutment has a 1 ft diameter spall. The northwest quadrant wingwall has a crack that is open up to 1/2" with no differential movement at this time.

Recommendations: Place approach guardrail. Prepare for structure replacement, apply for LBP funding. Monitor west abutment scour and crack in the NWQ for further shifting.

5401 – Millington Road over the Indian Creek Drain

Constructed: 2017

Section: 18-19

General Condition: Good

Posted: Not Posted

Description: Precast concrete box culvert segments with grouted joints. All segments have hairline transverse cracking near midspan. Wingwalls and headwalls are concrete cast-in-place with no deficiencies noted.

Recommendations: None at this time.

5402 – Merrill Road over the Indian Creek Drain

Constructed: 1995

Section: 19

General Condition: Good

Posted: Not Posted

Description: This is a single span, precast C beam bridge with HMA surface, concrete open parapet railings, and concrete curtainwall abutments. HMA surface has heavy block cracking and a 1" wide longitudinal crack along the centerline of structure. The railings are map cracked throughout with leaching. Beams 1w and 8w have minor spalls to steel from construction and map cracking on the fascia beam webs, a few beams have hairline cracks in end blocks.

Recommendations: Brush cut in all 4 quadrants. Seal crack in HMA surface.

5404 – Hathaway Road over the Indian Creek Drain

Constructed: 2017

Section: 17-18

General Condition: Good

Posted: Not Posted

Description: Four-sided precast concrete box culvert segments with grouted joints. No deficiencies noted. Cast-in-place concrete headwall and wingwalls. No deficiencies in wingwalls, east headwall is uneven, blown from construction. Structure buried; no scour noted. Riprap in place in all quads. Washout forming behind NW wingwall.

Recommendations: Repair washout in NW quadrant.

Burnside Township

5380 – Peck Road over the Weaver Drain

Constructed: 1970 **Section:** 26,27,34,35 **General Condition:** Fair

Posted: Not Posted

Description: This is a twin CMP arch culvert with HMA pavement, type B guardrail and bag riprap headwalls. The HMA pavement has open transverse and random cracks. The guardrail is too low, there are scrapes along both rails and an impact to the northeast quadrant ending. The bag riprap headwalls are deteriorating and covered in vegetation and embankment, there is an erosion hole behind the north headwall. The culverts have impacts to the upstream ends, light efflorescence along joints, and light scaling along the waterline. The east culvert has a slight dip under the roadway, a 5'x6" rust hole near the north end and a 2.5'x12" hole near the south end. The west culvert has 3 rusted bolts, with one bolt missing on the west side and a 0.5'x4' hole near the north end along the floor near spring point of west wall.

Recommendations: Replace guardrail.

5405 – Stiles Road over the Weaver Drain

Constructed: 1962 **Section:** 3-34 **General Condition:** Fair

Posted: Not Posted

Description: This is a twin CMP arch culvert with gravel surface. The culverts have light rusting along waterline and a minor deflection under the roadway with no leakage noted. The east culvert has holes in the bottom, approximately 2"x12", and pack rust in the bottom of the west culvert. A scour hole and debris buildup were noted downstream.

Recommendations: Place riprap around upstream to prevent scour.

5408 – Index Road over the South Branch of the Cass River Drain

Constructed: 1965 **Section:** 23-26 **General Condition:** Serious

Posted: 05/NN/NN

Description: This is a single span, steel beam bridge with HMA filled deck pans, two rows of guardrail railing, and steel H-pile abutments with steel sheeting retaining wall. The top surface is covered with gravel, with minor potholes in wheel paths. The metal deck pans have considerable pack rust along the beams and scaling rust at all deck joints and drain holes. The steel beams have up to 50% section loss on the bottom flange at midspan, 100% section loss on the top flanges, and 100% paint failure, all beams are uneven. The steel pile abutments have pack rust along the ground line and one pile on the east abutment has shifted inward up to 4" at the top.

Recommendations: Replace the bridge.

5409 – Gosline Road over the South Branch of the Cass River Drain

Constructed: 1965

Section: 23-24

General Condition: Serious

Posted: 05/NN/NN

Description: This is a single span, steel beam bridge with a concrete deck on metal deck pans, two rows of guardrail railing, and steel H-pile abutments with steel sheeting retaining wall and beam supports. The concrete deck is covered with gravel. The metal deck pans have surface rust. The steel beams have heavy pack rust and holes over the original abutments, and up to 10% section loss at midspan and are in serious condition. Beam 9w has an additional cover plate on the lower flange for approximately 90% of the beam length. There is 100% section loss in beams at existing abutment bearings. Approximately 40% of the paint system has failed. The abutments have pack rust at the ground line and at the angle bracket connection, the angles along both backwalls have fallen away and are leaking dirt, there is 100% section loss in the slopewalls.

Recommendations: Replace the bridge.

Deerfield Township

5410 – Burnside Road over the North Branch of the Flint River

Constructed: 1978 **Section:** 8-17 **General Condition:** Fair

Posted: 42/61/72

Description: This is a one lane, single span, adjacent box beam bridge with a new HMA overlay with up to 4.5 inches at midpoint of structure, three beam guardrail railing, and concrete abutments. The HMA surface has transverse hairline cracks at a 1 to 3 foot spacing, and a few hairline beamline cracks. The beams are not grouted and have moisture with efflorescence at some joints, and Beam 2s seems to be sagging below the other beams. The abutments have minor hairline vertical cracks and light surface scaling, shallow surface spalls on the top of the west abutment, with spalling at the top of the slopewalls.

Recommendations: Perform load rating with additional 1.5 inches of HMA overlay. Create spillways to improve drainage off structure.

5411 – Burnside Road over the North Branch of the Flint River Overflow

Constructed: 2020 **Section:** 8-17 **General Condition:** Good

Posted: Not Posted

Description: This is a new precast 22'x11' concrete box culvert. Minor chipping at pick points from installation. Precast concrete returnwalls in all four quadrants and reinforced concrete headwalls along each fascia segment all with no deficiencies noted. There is heavy riprap in every quadrants.

Recommendations: None at this time.

Dryden Township

5412 – Casey Road over the Whigville Creek

Constructed: 1993 **Section:** 20 **General Condition:** Fair

Posted: Not Posted

Description: This is a triple span, timber culvert with gravel surface and guardrail railing. The south railing is leaning outward. The timber culvert is sagging longitudinally with the roadway. The timber piers are sagging transversely to the roadway, unable to determine the amount of sag due to sediment buildup in the span. The north fascia of the western span is starting to rot.

Recommendations: Monitor deflection of underside of culverts both longitudinally and transversely to the roadway.

5414 – Thornville Road over the South Branch of the Flint River

Constructed: 1985 **Section:** 19 **General Condition:** Good

Posted: Not Posted

Description: This is a single span, adjacent box beam bridge with an HMA surface, double guardrail railing, and concrete curtainwall abutments. The HMA surface has beamline cracking and moderate to wide block cracking throughout surface with gravel debris built up along the shoulders. The adjacent concrete box beams are in good condition with minor areas of grout falling away near midspan. The concrete abutments are in good condition, south abutment has 1 hairline horizontal crack with efflorescence. The HMA approach pavement is map cracked and has approximately 1 ½” settlement at the reference lines.

Recommendations: Clear brush from NE, NW, and SW quadrants of the bridge. Mill and overlay, with new waterproof membrane.

5415 – Thornville Road over the South Branch of the Flint River

Constructed: 1989 **Section:** 18 **General Condition:** Good

Posted: Not Posted

Description: This is a single span, adjacent box beam bridge with an HMA surface, guardrail railing, and concrete curtainwall abutments. The HMA surface has 5 beamline cracks. The adjacent concrete box beams are in good condition with minor efflorescence along grout lines. The north abutment has a minor spall under joint 1w/2w. The south abutment has up to 4 feet of scour but is not undermined at this time. The HMA approach pavement has transverse cracking and minor map cracking, the northbound lane at the south approach has a 5'x5' pot hole area where the patching has spalled away.

Recommendations: Remove and replace HMA approaches and seal reference line joints.

5416 – Thornville Road over the South Branch of the Flint River

Constructed: 1986 **Section:** 7 **General Condition:** Fair

Posted: Not Posted

Description: This is a single span, adjacent box beam bridge with an HMA surface, double guardrail railing, and concrete abutments. The HMA surface has a centerline crack and is map cracked throughout, there is gravel build up over 40% of the bridge. The approach guardrail is too low. The adjacent concrete box beams are in good condition with minor efflorescence along grout lines. Some light leakage noted in isolated grout lines. The concrete abutments are in good condition, the north abutment has one vertical hairline crack. South abutment cap sheet piling visible halfway along abutment. Sheet piling detected 9” inward from abutment cap face.

Recommendations: Raise/replace the approach guardrail to standards. Mill and overlay, with waterproof membrane. Clean gravel off sides of bridge deck to promote drainage.

5417 – Thornville Road over the South Branch of the Flint River

Constructed: 1989

Section: 7

General Condition: Poor

Posted: Not Posted

Description: This is a two span, prestressed concrete C beam bridge with HMA surface, concrete open parapet railings, concrete pile cap on sheet piling abutments, and concrete wall pier. The HMA surface has open longitudinal cracking up to ½" wide, transverse cracks propagating from longitudinal cracking spaced 2'-4', and gravel build up along shoulders. There are large pot holes along north reference line. The east fascia beam has areas of small spalls due to lack of cover on tie steel. Span 1s beams 1w and 7w exhibit 1'x6" spalls on bottom of the webs and beams 3w-5w have hairline vertical cracks. The north concrete pile cap abutment has hairline cracks and 6" diameter holes in the top of the sheeting. The concrete pier has severe spalls and spalls to steel (underwater at easterly side). Shallow spall 1'x2' on north side of the pier. 1'x2' shallow spall at waterline at west nose of pier. There is also an 8-foot-long spall on the south side, near westerly end of the pier.

Recommendations: Add riprap at east end of the pier. Remove channel debris and tree. Mill and overlay deck surface. Repair the pier.

Elba Township

5370 – Lippincott Road over the Famers Creek

Constructed: 1963 **Section:** 13-24 **General Condition:** Fair

Posted: Not Posted

Description: This is a single span, steel beam bridge with concrete deck, thrie beam retrofit railings, and concrete curtainwall abutments. The concrete deck has a new thin epoxy overlay. The bottom surface has transverse, longitudinal, and map cracking with efflorescence and stalactites present throughout. The deck fascias have areas of cracking with spalling, leakage, efflorescence and stalactites. The steel beams have paint failure with surface corrosion beginning, all beams have been cleaned and coated within 6' of each abutment. Beam 1s has a hole in the bottom flange at the east abutment and up to 30% section loss on the web. Pack rust is forming at the guardrail anchorage locations and on the top flanges at midspan. The east abutment has a full height crack at centerline.

Recommendations: Replace beams and bridge deck due to section loss and deck condition.

5371 – Genesee Road over the Hasler Creek Drain

Constructed: 1948 **Section:** 17 **General Condition:** Fair

Posted: 42/63/71

Description: This is a single span, steel beam bridge with HMA surface over concrete deck, thrie beam retrofit over R4 railings, and concrete abutments. The HMA surface has spalling along lane lines and wide longitudinal cracking in WB lane with wide transverse cracks. The railing has been impacted in the northwest quadrant. The concrete deck has minor transverse cracking in all bays, some bays showing efflorescence. There is a minor spall to steel at midspan in bay 2s, and minor incipient spalls along beam 8s. The steel beams have minor surface rusting throughout, mostly at the top flanges. The concrete abutments have hairline vertical cracks near the centerline and 2 additional hairline cracks. No leakage noted at either abutment. The HMA approach pavement has transverse, longitudinal, and map cracking with less than 1 inch of settlement at the reference lines.

Recommendations: Load rate. Place slope protection at the southeast quadrant of the bridge to prevent further movement of the channel to the east. Remove and replace HMA surface and approaches. Clean out and extend deck drains.

5372 – Genesee Road over CN North America RR

Constructed: 2003 **Section:** 11 **General Condition:** Good

Posted: Not Posted

Description: This is a three span, adjacent concrete box beam bridge with concrete deck, type 4 barriers, concrete curtain wall abutments, and concrete piers. The concrete deck surface has hairline longitudinal cracks spaced approximately every 3' o.c. in the traffic lanes. Diagonal cracks extend outward from saw cut joints over piers. Hairline transverse crack over pier 1w and hairline map cracking over each pier. The type 4 barriers have vertical cracking with light efflorescence, beginning to see map cracking on the south railing. The adjacent concrete box beams have minor cracking along grout lines and efflorescence at beam pockets. There are 3 hairline vertical cracks in the east abutment, and hairline vertical cracks in the slopewalls. The concrete piers consist of a concrete crash wall with concrete columns and a concrete pier cap, there is 1 hairline vertical crack in pier 1w crash wall near the joint. The concrete slope paving is cracked at several panels with sediment washed out, vegetation growing in cracks, and the southeast quadrant is undermined up to 6 inches and broken in two sections. The east slope paving is buckling in three sections. The approach pavement has vegetation growing in joints along the approach curb and gutter, and settled up to 1" in the western quadrants.

Recommendations: Repair broken/settled concrete slope paving, backfill voided areas. Seal cracks in deck.

5388 – Davison Road over the Hasler Creek Drain

Constructed: 1993 **Section:** 5 **General Condition:** Fair

Posted: Not Posted

Description: This is single span, concrete double-T beam bridge with concrete deck, concrete open parapet railings, and concrete curtain wall abutments. The concrete deck surface has hairline beamline to 1/16" cracks and minor concrete spalls along the fascias. The concrete open parapet railings have map cracking with a longitudinal crack developing on both rails. There is a spall to steel on beam 1s, and an incipient spall on beam 7s in the top flange with longitudinal cracks, small spalls to steel, and rust staining. There are minor spalls around sole plates. The east abutment has map cracking along the north bottom half, and 5 vertical hairline cracks. The west abutment has 2 vertical hairline cracks and map cracking starting in the southwest quadrant. The geotextile under the riprap at both abutments is visible and undermined. The approach HMA pavement has reflective cracking throughout and up to 3/4 inch of settlement on the east side of the bridge.

Recommendations: Replace riprap where it has been removed in front of the abutments. Seal cracks in deck. Remove rock dam in channel.

5418 – Merwin Road over the Farmers Creek

Constructed: 1960 **Section:** 26 **General Condition:** Fair

Posted: Not Posted

Description: This is a twin CMP arch culvert with gravel surface. The culverts have slight rusting along waterline with no leakage noted, are slightly sagging under the roadway, and light surface rust on the top of the west pipe at the north end. A log is blocking the flow at the south side, and a fallen tree is on the north side. There is a dent in the east pipe at north side near crown.

Recommendations: Remove debris in northwest quadrant. Add guardrail.

5419 – Lippincott Road over the Hasler Creek Drain

Constructed: 1985 **Section:** 20 **General Condition:** Fair

Posted: Not Posted

Description: This is a single span, concrete double-T beam bridge with HMA surface, concrete open parapet railings, and concrete curtain wall abutments. The HMA surface has beamline cracking and block cracking developing, minor hairline cracking at the east reference line, and a previous concrete repair on the south side of the bridge centerline. The expansion joints have spalling along the header and are filled with cold patch, dirt, and debris. The metal anchor plates for the railing under the beam are rusted or fallen away. The prestressed, concrete double-T beams have delaminations on fascia overhangs, minor cracking and spalling between beam lines with some spalls to steel, and a repair has been completed along the joint just south of the centerline. The concrete abutments have hairline cracks with minor leakage along backwalls. No riprap remains in front of east abutment, and 30% remains in front of west abutment. HMA approach pavement has unsealed transverse and random cracking, open up to 1/4 inch, and scattered cold patches.

Recommendations: Trim brush in SE, NE, and NW quadrants. Clean, patch, and seal joints. Repair delaminations on underside of fascias. Seal deck cracks and remove and replace HMA surface and HMA approaches.

5420 – Hasler Lake Road over the Hasler Creek Drain

Constructed: 1960 **Section:** 31 **General Condition:** Fair

Posted: Not Posted

Description: This is a twin CMP arch culvert with HMA surface and concrete bag riprap headwalls. The HMA pavement has longitudinal, transverse, random, and alligator cracking. The concrete bag riprap headwalls are severely deteriorated, the east headwall is beginning to lean slightly over the north culvert, and the west headwall has a large void between the culverts. A slight depression is beginning to develop along the shoulder possibly due to the erosion behind the headwalls. The CMP culverts have minor rusting and scaling along the waterline. The south culvert is sagging slightly in the middle third and has debris at the upstream end.

Recommendations: Remove brush/trees around west headwall and remove vines from east headwall. Repair concrete bag riprap headwalls to prevent further erosion. Remove debris blocking inlet of south culvert.

5421 – Mitchell Road over the Farmers Creek

Constructed: 1985 **Section:** 35 **General Condition:** Fair

Posted: Not Posted

Description: This is a single span, timber bridge with HMA surface, guardrail on timber posts, and timber piles with timber backwall abutments. The HMA surface has open transverse and longitudinal cracking greater than ¼" wide throughout, and is slightly rutted with cold patches. Approximately 25sft of spalling along the north half of structure. Both railings lean slightly outward, timber toe boards are starting to peel in the south rail line. The timber post-tensioned decking has a slight sag along the centerline of the roadway with minor leakage. The timber abutments have a concrete apron with steel sheeting, the east sheeting is pulling away from the concrete. The HMA approaches are cracked with up to 1 inch of settlement at the reference lines and the gravel approaches have severe potholes.

Recommendations: Remove and replace HMA surface.

Goodland Township

5387 – Brown City Road over the North Branch of the Mill Creek Drain

Constructed: 1990 **Section:** 10-11 **General Condition:** Good

Posted: Not Posted

Description: This is a single span, concrete I beam bridge with concrete deck, type 4 barriers, and concrete cantilever abutments. The concrete deck surface has a new healer sealer applied. The type 4 barriers have hairline vertical cracks. The deck bottom surface has diagonal cracks in the outside bays with leakage and efflorescence, and Bay 3w has a transverse crack at midspan. No deficiencies were noted on the concrete I beams. The abutment returnwalls have minor vertical hairline cracks with efflorescence. There are new concrete approaches with concrete curb and gutter.

Recommendations: None at this time.

5422 – Armstrong Road over the North Branch of the Mill Creek Drain

Constructed: 2003 **Section:** 21-28 **General Condition:** Good

Posted: Not Posted

Description: This is a single span, adjacent concrete box beam bridge with HMA surface, type 4 barriers, and concrete cantilever abutments. The HMA surface has moderate wear throughout and is heavily polished with large aggregate visible. The type 4 barriers have hairline vertical cracks with rust stains. The adjacent concrete box beams have efflorescence on the post tension pockets, efflorescence along joint 1s/2s with small stalactites, and hairline cracks on the south fascia.

Recommendations: Brush cut in all four quadrants. Seal reference lines with HPR.

5423 – Bohms Road over the Madison Drain

Constructed: 1930 **Section:** 9 **General Condition:** Fair

Posted: 15/36/62

Description: This is a single span, steel I beam bridge with concrete deck, guardrail railing, and concrete cantilever abutments. The concrete deck surface has open longitudinal, transverse, and diagonal cracks up to 1/8" wide with plow scrapes and gravel along shoulders. The guardrail posts are rusty and bent outward and are in danger of failing. The concrete deck bottom surface has heavy honeycombing throughout entire deck, transverse cracks with moisture at midspan, and 2 spalls to steel. Beam 5s has scaling pack rust along the top and bottom flanges at west abutment. Beams 5s-7s exhibit holes in web near west abutment. Approximately 50% of the paint system has failed and the overall section loss is estimated to be 15%. The concrete abutments are heavily map cracked with leachate. The footings are cracked with efflorescence and are exposed but not undermined.

Recommendations: Repair railings or place temporary crash worthy barriers over the structure. Prepare for structure replacement.

5424 – Wheeling Road over the North Branch of the Mill Creek Drain

Constructed: 2004 **Section:** 11-12 **General Condition:** Good

Posted: Not Posted

Description: This is a single span, adjacent concrete box beam bridge with concrete deck, concrete open parapet railing, and concrete curtainwall abutments. The concrete deck surface has hairline longitudinal cracking starting from the reference lines. The barriers have minor, hairline vertical cracks. The adjacent box beams are in good condition with efflorescence on post tension pockets 2s and 3s on the east fascia. The concrete curtainwall abutments have no deficiencies noted. Concrete approach slabs have no deficiencies noted.

Recommendations: None at this time.

5425 – Cade Road over the North Branch of the Mill Creek Drain

Constructed: 1984

Section: 12

General Condition: Good

Posted: Not Posted

Description: This is single span, concrete double-T beam bridge with HMA surface, double guardrail railing, and concrete cantilever abutments. The HMA surface has extensive block cracking spaced at 1'-2', some cracks have been sealed. The precast concrete double T beams have isolated spalls to stirrups on the web bottoms from lack of cover and evidence of moisture along beam joints. The concrete abutments have full height, hairline, vertical cracks with leachate, and minor map cracking under bearings in random locations. The east corner of the north abutment has map cracking. There is no slope protection at either abutment wall, the south abutment has 6 feet exposed up to 8 inches at the west end near weep hole. The HMA approaches have extensive unsealed map cracking and up to 1.5 inches of settlement at the reference lines.

Recommendations: Apply HPR along all HMA cracks. Upgrade approach guardrails. Apply HPR along abutment reference lines and along all HMA cracks in the deck surface.

Imlay Township

5391 – Imlay City Road over the Belle River Drain

Constructed: 2017 **Section:** 16 **General Condition:** Good

Posted: Not Posted

Description: This is a single span, spread concrete box beam bridge, concrete deck, aesthetic parapet tube railings, and concrete cantilever abutments. There is an epoxy overlay on the deck surface, which covers the sawcuts which are reflecting through the overlay at the reference lines. The aesthetic parapet tube railing has vertical hairline cracks at 3' – 6' spacing. The deck bottom surface has metal stay in place forms, no deficiencies noted. The bearing at beam 1w at the south abutment is bulging slightly on the west side. Both abutments have hairline vertical cracks starting at the centerline.

Recommendations: None at this time.

5426 – Newark Road over the Belle River Drain

Constructed: 1985 **Section:** 21-28 **General Condition:** Good

Posted: Not Posted

Description: This is a precast concrete box culvert with HMA pavement, concrete bag riprap headwalls, and guardrail railings. The HMA pavement has minor cracks. The bag riprap headwalls have vegetation growing through the bags and the top is deteriorating. The south side has erosion behind the headwall. The precast concrete box culvert has minor edge spalls from fabrication and installation and evidence of leakage at most joints and lift holes. 18"x3"x1" deep spall at 3rd southern section at second joint. There are minor spalls to steel on the top of the outlet from the lack of cover.

Recommendations: None at this time.

5427 – Summers Road over the Weston Drain

Constructed: 1992 **Section:** 31 **General Condition:** Fair

Posted: Not Posted

Description: This is single span, concrete double-T beam bridge with HMA surface, concrete open parapet railing, and concrete curtainwall abutments. The HMA surface has open full length beamline cracks, (2) ¾" wide longitudinal cracks near centerline with transverse finger cracking, and debris along the fascias. The concrete open parapet railings have heavy map cracking/shrinkage cracking with open longitudinal cracks forming, thrie beams are anchored at the ends with impact in the northeast quadrant. The precast concrete double-T beams have minor rust staining at the joints, a spall to strand on the bottom of Beam 2w, and a spall to stirrup on Beam 5w from lack of cover, a 2 foot spall and a 3 foot incipient spall at the 1/3 point. The concrete abutments have map cracking, up to 1/8 inch wide, and efflorescence at the south backwalls. There is silt covered heavy riprap in front of each abutment wall, the south abutment has missing riprap with exposed geotextile. The HMA approaches have longitudinal and transverse cracks with up to 1.5 inches of settlement at the reference lines.

Recommendations: Apply HPR along all HMA cracks, brush cut all four quadrants, and clean reference line joints and apply HPR to abutment reference line joints.

5428 – Blacks Corners Road over the Weston Drain

Constructed: 1972 **Section:** 31 **General Condition:** Fair

Posted: Not Posted

Description: This is a twin CMP arch culvert with gravel roadway. The CMP culverts have minor leakage, light surface corrosion on bolts, and surface rust at the waterline. There is a 1 inch hole near the inlet of the south pipe. There is up to 6 inches of scour at each end of both culverts. Dent in top of the north pipe in the southwest end. Debris is across both pipes.

Recommendations: Remove tree growing between culverts. Remove debris at inlets.

5429 – Bowman Road over the Belle River Drain

Constructed: 1968 **Section:** 33-34 **General Condition:** Serious

Posted: 8/NN/NN

Description: This is a single span, steel I-beam bridge with concrete deck with metal deck pans, three beam guardrail railings, and steel sheeting abutments. The concrete deck surface has minor surface spalls, minor map cracking, and debris along fascias. The approach guardrail is too low, post 2s on the east railing is leaning outward slightly with impact scrapes. Beam 9w has a 6 foot long hole with the bottom flange sagging and several smaller holes through the web. Beam 1w has two small holes in the web near mid span, there is pack rust starting on the bottom flange of several beams. There is approximately 50% paint failure. The steel sheeting abutments have light surface corrosion and isolated regions of 100% section loss in the backwalls. Daylight visible near the top of the north abutment backwall. The HMA approaches are rutted, have open transverse and longitudinal cracks, and up to 1.5 inches of settlement at the reference lines and heavy gravel coverage with ponding in both approaches. There is a 6 sft patch at the south reference line.

Recommendations: Fill joint along north reference line. Monitor beam 1w and 9w. Prepare funding for future bridge replacement.

5430 – Summers Road over the CN North America RR

Constructed: 2004 **Section:** 18 **General Condition:** Fair

Posted: Not Posted

Description: This is a three span, adjacent concrete box beam bridge with concrete deck, type 4 barriers, concrete curtainwall abutments, and concrete piers. The concrete deck surface has full length hairline longitudinal cracks that are not sealed. The expansion joint devices are filled with debris and the HPR joints at the abutment reference lines are punched and leaking with vegetation growing. The type 4 barriers have random tight vertical cracks with rust staining. The adjacent concrete box beams have minor efflorescence at abutment. The south concrete abutment is undermined in 2 locations with the piles visible. The piers consist of concrete crashwalls, concrete columns, and a concrete pile cap. The heavy riprap has voids along the abutments.

Recommendations: Reseal abutment reference line joints and clean EJD glands.

Lapeer Township

5369 – Newark Road over the South Branch of the Flint River

Constructed: 1994 **Section:** 23-26 **General Condition:** Good

Posted: Not Posted

Description: This is a single span, adjacent concrete box beam bridge with HMA surface, concrete open parapet railing, and concrete cantilever abutments. The HMA surface has no deficiencies noted. The concrete open parapets have map cracking and vertical cracks with efflorescence on both sides. The adjacent concrete box beams have efflorescence and stalactites along the centerline joint. Light hairline cracks forming in grout. Horizontal cracking on north fascia beam with minor leakage. The west abutment has a hairline vertical crack under beam 9s.

Recommendations: Brush cut. Seal reference line joints. Seal cracks in deck. Mill existing HMA, place new waterproof membrane, and overlay. Clean dirt and debris from approach shoulders.

5390 – Wilder Road over the Pine Creek Drain

Constructed: 2017 **Section:** 11-12 **General Condition:** Good

Posted: Not Posted

Description: This is an aluminum box culvert with aluminum wingwalls and headwalls and an HMA surface. This is a new structure, no deficiencies noted. Heavy riprap in front of wingwalls.

Recommendations: None at this time.

5431 – Sutton Road over the South Branch of the Flint River

Constructed: 1978 **Section:** 35 **General Condition:** Fair

Posted: Not Posted

Description: This is a single span, adjacent concrete box beam bridge with HMA surface, double guardrail railings, and concrete curtainwall abutments. The HMA surface is partially covered with gravel with random unsealed 1/8 inch cracks. The adjacent box beams have leakage with efflorescence between all beams, and the south fascia is cracked with efflorescence within 5 feet of the east and west abutment. The west abutment has spalling along the waterline, a vertical crack 2 feet from the south corner and a hairline vertical crack at the centerline with some leaching.

Recommendations: Brush cut all four quadrants. Add riprap to southwest, southeast and northeast quadrants.

5432 – Hunters Creek Road over the South Branch of the Flint River

Constructed: 1985 **Section:** 26-35 **General Condition:** Fair

Posted: Not Posted

Description: This is single span, concrete double-T beam bridge with HMA surface, concrete open parapet railing, and concrete curtainwall abutments. The HMA surface has scrapes from farm equipment and sediment on the shoulders, few transvers unsealed cracks, one longitudinal crack near centerline up to ½" wide. The concrete open parapet railings have scrapes along both rails and weathering throughout. The precast concrete double T beams have longitudinal cracks, leakage with efflorescence, and minor spalling between all beam joints. Beam 5s has a 3 foot spall to steel at midspan on the south flange. No deficiencies were noted on the concrete abutments.

Recommendations: Seal cracks along reference lines, HMA surface and approaches.

5433 – Greenwood Road over the South Branch of the Flint River

Constructed: 1981 **Section:** 14-23 **General Condition:** Good

Posted: Not Posted

Description: This is a single span, adjacent concrete box beam bridge with HMA surface, double guardrail railings, and concrete curtainwall abutments. The HMA surface has open blocking throughout up to ¾" wide throughout. The guardrail is missing bolts and nuts in the B rail. The adjacent concrete box beams have small grout failures between beams with no leakage noted. There are few hairline vertical cracks forming in both abutments. Footings were probed with minor scour noted. The west abutment has a 3ft water depth adjacent to abutment and the east abutment has 1ft of water adjacent, with neither footing exposed. The HMA approaches are heavily map cracked with up to 1 inch of settlement at the reference lines.

Recommendations: Wedge approaches. Replace bolts in guardrail. Seal reference line joints and cracks in deck. Mill existing HMA surface, place waterproof membrane and overlay. Place riprap along west abutment. Clean debris off approach shoulders. Brush cut in all four quads.

5434 – Higley Road over the South Branch of the Flint River

Constructed: 1977 **Section:** 15 **General Condition:** Fair

Posted: Not Posted

Description: This is a single span, adjacent concrete box beam bridge widened with metal deck pans, with HMA surface, thrie beam railing, and steel sheeting and concrete cap abutments. The chip sealed HMA surface has reflective longitudinal cracking up to ½" wide and moderate block cracking near centerline of structure. The metal deck pans are rusting and the south fascia has 100% section loss. The adjacent concrete box beams have spalls to steel with strands exposed and rust staining and signs of moisture and efflorescence between beams. The concrete along the south fascia is spalling along the stay in place forms. The concrete abutment caps have vertical cracks and the sheeting has pack rust and approximately 15%-20% section loss. The chip sealed HMA approach pavement has transverse and longitudinal cracks, 1 inch of settlement at the reference lines, and a pothole in the eastbound lane at the reference line.

Recommendations: Wedge approaches. Perform detailed inspection of beam 1s and load rate structure.

5435 – Peppermill Road over the South Branch of the Flint River

Constructed: 1991 **Section:** 10 **General Condition:** Fair

Posted: Not Posted

Description: This is single span, concrete double-T beam bridge with HMA surface, concrete open parapet railing, and concrete cantilever abutments. The HMA surface has one longitudinal crack with transverse fingers that is well sealed and random small longitudinal and transverse cracking that is unsealed. The railing is map cracked throughout with cracks starting to open. The precast concrete double T beams have hairline cracking between all joints. Bays 1s and 2s have a diagonal crack with efflorescence in the east backwall, beam 4s has incipient spalls, and a minor spall to steel due to lack of cover. The concrete abutments have vertical cracks and hairline map cracking on slopewalls. 1 sft spall at fence post in the SE wingwall. The HMA approach pavement has well sealed transverse cracks in west approach and no deficiencies in the east approach.

Recommendations: None at this time.

5436 – Peppermill Road over the South Branch of the Flint River

Constructed: 1982 **Section:** 4-9 **General Condition:** Fair

Posted: Not Posted

Description: This is a single span, adjacent concrete box beam bridge with HMA surface, three beam railings, and concrete curtainwall abutments. The HMA surface is a new overlay on the deck and approaches, joints have been paved over, there are cracks at the east reference line. There are scrapes along the south railing, impacts in the southwest and southeast quadrants, and a heavy impact with broken guardrail and 4 broken posts in the northeast quadrant. The adjacent concrete box beams have been repaired with FRP, beam 1s has efflorescence at drain holes and cracking on the outside of the fascia beam, there is a spall to steel at the east abutment with 1 strand exposed. There is leaking with efflorescence and stalactites between most beams. No deficiencies were found in the concrete abutments.

Recommendations: Seal east reference line joint with HPR.

5437 – Morris Road over the South Branch of the Flint River

Constructed: 1967 **Section:** 9-10 **General Condition:** Poor

Posted: 42/72/82

Description: This is a single span, steel I-beam bridge with HMA surface over metal deck pans, three beam railing, and steel pile and steel sheeting abutments. The HMA surface has a longitudinal centerline crack up to 1" wide with vegetation growing along both fascias. The three beam railing has an impact to the north 2 posts on the east rail. The metal deck pans have surface corrosion in all bays and some severe corrosion in bays 5w, 8w, and 9w with 20% section loss in bay 9w. The steel beams have thick surface corrosion on all beams, up to 10% corrosion at beam ends, beam 1w and 2w exhibit pack rust starting along the bottom flange, up to 30% section loss on the bottom flange of beam 9w throughout, and 5% section loss throughout the bottom flange of beam 10w. The steel pile and steel sheeting abutments are uniformly rusted with surface corrosion.

Recommendations: Add riprap along north abutment.

12604 – Maple Grove Road over the Pine Creek Drain

Constructed: 1989 **Section:** 10-11 **General Condition:** Good

Posted: Not Posted

Description: This is a concrete box culvert with HMA pavement, guardrail, and concrete headwalls. The HMA pavement has open transverse, longitudinal, and random cracks. One approach guardrail post is broken in the northwest quadrant. The concrete headwalls have 1 hairline crack. The concrete box culvert has a 8' long x 1' wide incipient spall at Joint 1w showing leakage, joint filler material is hanging out of joint 2w, small spalls to steel due to lack of cover along Joint 3w, and a small spall at the north end of joint 4w with staining at all joints with no leakage noted on joints 2w-7w. 2 inches of scour was noted at the east end and is not undermined.

Recommendations: Brush cut. Replace broken posts in guardrail.

Marathon Township

5376 – Columbiaville Road over the South Branch of the Flint River

Constructed: 1996 **Section:** 25-36 **General Condition:** Good

Posted: Not Posted

Description: This is a three span, concrete double-T beam bridge with HMA surface, concrete open parapet railing, concrete curtainwall abutments, and steel pile with concrete pile cap piers. The chip sealed HMA surface has random pop outs throughout and 50 sft of cold patched areas are along each lane line and centerline. The expansion joint devices have edge spalls on the concrete headers and are debris filled with minor rust on armor. The concrete open parapet railings have minor hairline vertical and map cracks, and impact scrapes on the south barrier. The precast concrete double T beams have efflorescence and leachate on webs under pier joints and minor moisture stains along beam joints. Beam 1s has spalling in span 2w near pier 2w and the top flange exhibits 10 lineal feet of spalling. The concrete abutments each have minor hairline vertical cracks under the bearings. The pier 2w cap has cracks in the top.

Recommendations: Apply HPR along abutment reference lines and all HMA cracks.

5438 – Norway Lake Road over the South Branch of the Flint River

Constructed: 1991 **Section:** 36 **General Condition:** Good

Posted: Not Posted

Description: This is a three span, concrete C beam bridge with HMA surface, concrete open parapet railing, concrete curtainwall abutments, and steel pile with concrete pile cap piers. The HMA surface has longitudinal beamline cracks with several transverse fingers. The concrete open parapet railings have heavy map cracking. The precast concrete C beams have moisture along multiple joints and a few spalls to steel due to lack of cover on web bottoms. Both concrete abutments have minor hairline cracks. The pile bent piers have moisture staining under beam joints, vegetation growth on the pier noses, and Pier 2w has a horizontal hairline crack under Beam 6s with leachate. Pier 2w has trees and debris on the upstream nose. The HMA approach pavement has transverse and longitudinal cracks and up to 2 inches of settlement at the reference lines.

Recommendations: Wedge approaches with HMA at abutment reference lines. Seal open joints and all surface cracks with HPR. Remove tree and other debris from upstream nose of Pier 2w.

5439 – Barnes Lake Road over the North Branch of the Flint River

Constructed: 1994 **Section:** 13-24 **General Condition:** Good

Posted: Not Posted

Description: This is a two span, concrete double-T beam bridge with HMA surface, concrete open parapet railing, concrete curtainwall abutments, and steel pile with concrete pile cap pier. The HMA surface has beamline cracks with transverse fingers. The expansion joint device is debris filled and armor is rusting. The concrete open parapet railings are map cracked. The precast concrete double T beams are leaking between joints 2s and 3s, and beam 3s is delaminated with a spall to steel. No deficiencies were noted on the concrete abutments, there are light surface stains at the waterline of the pier piles. Steel sheet piling acts as scour protection in front of abutments and is leaning toward the river in some locations with isolated washouts. The HMA approach pavement has minor longitudinal and transverse cracks with up to 3/4 inch settlement at the reference lines.

Recommendations: Apply HPR along all cracks in approaches, reference lines, and deck.

13998 – Cyclone Road over the Forest Drain

Constructed: 1977

Section: 11

General Condition: Good

Posted: Not Posted

Description: This is a twin CMP arch culvert with a gravel roadway. The south culvert has damage to the top, surface rust along the waterline, and a slight depression under the roadway. There is severe damage to the top of the north pipe at west end. There is sediment built up in the south culvert so there is no flow.

Recommendations: Bend the west outlet of the north pipe to re-create a cylindrical opening.

13999 – Fostoria Road over the Forest Drain

Constructed: 1972

Section: 1

General Condition: Good

Posted: Not Posted

Description: This is a twin CMP arch culvert with a gravel roadway. The culverts have surface rust along the waterline, and a slight depression under the roadway. All flow is through the north pipe, debris in the south pipe is blocking flow.

Recommendations: None at this time.

Mayfield Township

5373 – Daley Road over the Plum Creek Drain

Constructed: 1976 **Section:** 21-28 **General Condition:** Good

Posted: Not Posted

Description: This is a twin CMP arch culvert with HMA pavement and guardrail. The HMA pavement has widespread cracks. The guardrail is too low, there is an impact to the north rail. The CMP culverts have minor rusting at joints and waterline, and up to 6 inches of sag under the roadway.

Recommendations: None at this time.

5389 – Saginaw Road over the South Branch of the Flint River

Constructed: 1935 **Section:** 28-29 **General Condition:** Fair

Posted: Not Posted

Description: This is a single span, steel I beam bridge with HMA surface, concrete deck, three beam retrofit railing, and concrete abutments. The HMA surface has scattered longitudinal and transverse open cracks up to 1 inch, debris buildup along the shoulders. The concrete deck bottom surface has transverse cracks with efflorescence in most bays and some spalls to steel. The steel beams have minor section loss, approximately 50% paint failure on the bottom flanges, and approximately 25% paint failure on webs. Fascia beam concrete is cracked and spalled along the bottom 2 inches of both fascias. The concrete abutment return walls have cracking with efflorescence, top of the north footing is exposed with up to 1 foot of scour, horizontal crack under beams 1w – 3w at the north abutment. The HMA approach pavement has no deficiencies.

Recommendations: Fix erosion in the northeast and northwest quadrant. Seal all open cracks in the HMA deck surface.

5442 – Mayfield Road over the South Branch of the Flint River

Constructed: 1988 **Section:** 29 **General Condition:** Good

Posted: Not Posted

Description: This is a four span, timber bridge with HMA surface, timber railings, timber piles with timber retaining wall abutments, and timber pile bent piers. The HMA surface has longitudinal cracks in both lanes. No deficiencies were noted in the timber deck system. Spreader beam in span 4s is slightly twisted along the entire length. No deficiencies were noted in the abutments or piers. River debris was found at the upstream noses of Piers 2s and 3s.

Recommendations: Seal cracks along abutment and pier reference lines.

5443 – Roods Lake Road over the Plum Creek Drain

Constructed: 1976 **Section:** 27 **General Condition:** Good

Posted: Not Posted

Description: This is a twin CMP arch culvert with HMA pavement. The HMA pavement has minor sealed longitudinal cracks and unsealed transverse cracks. There is erosion within 4 feet of the lane line on both sides of the roadway. The CMP culverts have minor corrosion on connections, surface rust along waterline, slight dip in the top less than 4 inches, flow in the north culvert only, and debris on upstream ends.

Recommendations: Remove wedge debris from inside culverts.

5444 – Millville Road over the South Branch of the Flint River

Constructed: 1978 **Section:** 19 **General Condition:** Fair

Posted: Not Posted

Description: This is a two span, adjacent concrete box beam bridge with HMA surface, double guardrail railing, concrete curtainwall abutments, and pile bent pier with concrete cap. The HMA surface has beamline cracks, and some map cracking forming in the southbound lane. The adjacent concrete box beams have moisture and leachate at random beam joints. The west fascia has minor spalls at the top in span 1s and a spall to strand in span 2s with several other 6" corner spalls at rail posts, east fascia has a spall to strand at post 5s. The abutments have minor hairline vertical cracks. The pier cap has been patched and surface sealed, moisture stains on face of pier cap, the north face has horizontal cracking up to 1/16" wide with efflorescence and the south face has random hairline cracking with a minor spall at the west end. The HMA approach pavement has open longitudinal and transverse cracks.

Recommendations: Apply HPR along all HMA cracks in approaches, along abutment reference lines, and all HMA cracks in the deck.

5446 – Farnsworth Road over the Plum Creek Drain

Constructed: 1976 **Section:** 21 **General Condition:** Good

Posted: Not Posted

Description: This is a twin CMP arch culvert with HMA pavement and guardrail. The HMA pavement has transverse cracks and a longitudinal crack along the centerline. There is guardrail across the structure, with impacts in the northwest quadrant. The CMP culverts have minor corrosion at connections, and 4 to 6 inches of deflection in the top of the pipes.

Recommendations: None at this time.

Metamora Township

5368 – Dryden Road over the South Branch of the Flint River

Constructed: 1994 **Section:** 12-13 **General Condition:** Fair

Posted: Not Posted

Description: This is a single span, adjacent concrete box beam bridge with HMA surface, concrete open parapet railings, and concrete abutments. There is a new HMA overlay surface. The concrete open parapet railings have hairline cracking throughout. The adjacent concrete box beams have longitudinal and diagonal cracking on both fascias, and cracking with efflorescence on grout lines. The concrete abutments have several hairline vertical cracks. The approaches have a new HMA overlay.

Recommendations: None at this time.

5450 – Wilder Road over the South Branch of the Flint River

Constructed: 1938 **Section:** 1 **General Condition:** Serious

Posted: 07/09/15

Description: This is a single span, steel beam bridge with a concrete deck, metal stay in place forms, steel panel barriers, and concrete abutments. The concrete top surface has heavy scaling throughout with a centerline crack open at 2" wide with gravel built up along the shoulders only. The steel panel barriers are severely deteriorated with areas severed. The metal stay in place forms have light surface corrosion and efflorescence along the seams and the flange interface. Bay 5w at midspan has an area of heavy corrosion with up to 20% section loss in the stay in place form. The steel beams have approximately 80% paint failure on the interior beams and 100% failure on the fascia beams, pack rust along the bottom flanges and at beam ends, and up to 25% section loss at the beam ends. The steel plate bearings have heavy pack rust. The concrete abutments have evidence of surface patching. The footing is exposed in the northeast quadrant up to 8 inches, not undermined. There is a scour hole in the southeast quadrant, footing is not exposed.

Recommendations: Prepare for funding for a complete bridge replacement.

14000 – Brocker Road over the South Branch of the Flint River

Constructed: 2015 **Section:** 27 **General Condition:** Good

Posted: Not Posted

Description: This is a three sided CMP arch culvert with bolted connections and a metal headwall. The gravel approaches are well graded. There is surface rust along the waterline, no evidence of leakage at the connections. There is some vegetation growing in the arch of the metal headwall, and some washouts behind the metal headwalls in the southeast quadrant.

Recommendations: None at this time.

North Branch Township

5377 – Burnside Road over the Grave Creek

Constructed: 1985

Section: 7-8

General Condition: Good

Posted: Not Posted

Description: This is a single span, precast C beam bridge with HMA surface, double guardrail railing, and concrete abutment panels. The HMA surface has no deficiencies noted. The precast concrete C beams have small spalls to steel due to lack of cover and larger spalls on the bottom of diaphragms. The concrete abutment panels have erosion behind the northwest and southeast wingwalls, and efflorescence built up along panel joints. The HMA approaches have no deficiencies noted.

Recommendations: Place riprap in front of abutments. Replace guardrail and replace embankment behind NEQ wingwall where it has eroded.

5378 – Burnside Road over the Cedar Creek

Constructed: 1983

Section: 9-16

General Condition: Poor

Posted: 42/68/82

Description: This is a single span, adjacent concrete box beam bridge with HMA surface, double guardrail railings, and concrete curtainwall abutments. The HMA surface has open longitudinal, centerline, transverse, and block cracking up to ½" wide. The adjacent concrete box beams have efflorescence and stalactites at joints, longitudinal cracking, incipient spalls, and rust staining from leakage. The east abutment has a spall at centerline 12"x10", there is leakage at the tops of both abutments, and slight erosion behind the southwest wingwall. The HMA approaches have transverse and random cracking and have settled up to 1 inch at the reference lines.

Recommendations: Wedge and seal cracks in approaches. Seal reference line joints and cracks in deck. Remove existing HMA surface, place waterproof membrane and apply new HMA overlay. Remove tree in NEQ.

5383 – Lake Pleasant Road over the Cedar Creek

Constructed: 1992

Section: 15-16

General Condition: Fair

Posted: Not Posted

Description: This is a single span, precast concrete double T beam bridge with HMA surface, concrete open parapet railings, and concrete curtainwall abutments. The HMA surface has longitudinal cracks in the southbound lane wheel paths near the north reference line. The concrete open parapet railing has map cracking throughout, longitudinal cracks in the top of rails, and the end blocks have heavy cracking. The precast concrete double T beams have leakage between beams, hairline longitudinal cracks, incipient spalls, and a diagonal crack. Joints 2/3w and 3/4w show signs of leakage and several incipient spalls. Longitudinal cracking along joint 2/3w. The east fascia flange is 30% scaled due to lack of cover on the bottom of the outside web. The concrete abutments have hairline map cracking, and hairline vertical cracks. The top corner of the northeast quadrant slopewall is crumbling, the northwest quadrant slopewall is cracking with efflorescence.

Recommendations: Brush cut in east quadrants.

5384 – Lake Pleasant Road over the Elm Creek Drain

Constructed: 1978 **Section:** 9-10 **General Condition:** Fair

Posted: Not Posted

Description: This is a twin CMP arch culvert with HMA pavement and guardrail. The HMA pavement has transverse and map cracking in wheel paths. Erosion is occurring on both sides of the road between the culverts, about 6 foot from the shoulders. The CMP culverts have a slight dip under the roadway, corrosion with light rusting along the bottom with approximately 20% section loss, and the outlets are slightly perched. The south culvert bottom is bulging 8 inches near the inlet. Erosion on both sides between culverts, about 6ft from the shoulder.

Recommendations: Brush cut in southwest quadrant.

5452 – Hasslick Road over the Cedar Creek

Constructed: 1982 **Section:** 24-25 **General Condition:** Fair

Posted: Not Posted

Description: This is a single span, precast C beam bridge with concrete deck, guardrail railing, and concrete cantilever abutments. The concrete deck is completely covered by gravel. The guardrail railing has rust on posts, rails, and connections plates, with missing bolts in the rail and approach wood posts are rotted. The precast concrete C beams have hairline cracks with efflorescence, shallow popouts from lack of cover, and evidence of leakage and rust staining at all joints. Beam 6s has a 1 square foot delamination in the bottom of the web, beam 7s has light cracking at the end block. Beam 6s has a 1sft delamination of web. The concrete abutments have hairline cracking and light leakage at the construction joints, there is silt built up in front of the west abutment and water against the east abutment.

Recommendations: Update approach guardrail. Remove gravel from deck and seal deck.

5453 – Martus Road over the Cedar Creek

Constructed: 1986 **Section:** 15-22 **General Condition:** Good

Posted: Not Posted

Description: This is a two span, precast C beam bridge with HMA surface, double guardrail railing, concrete cantilever abutments, and concrete solid wall pier. The HMA surface has open beamline and transverse cracks propagating. The precast concrete C beams have small spalls due to lack of cover and leakage between joints. The west concrete abutment has light scaling at each side of centerline and a spall in the southwest quadrant. The concrete wall pier has vegetation growing on the pier nose and light leakage. The HMA approaches are covered with gravel and have settled up to 1” at the reference lines, the east approach has open 1/2 inch cracks.

Recommendations: Wedge approaches. Brush cut in all four quadrants. Seal joint at pier and abutment reference lines. Seal pavement cracks.

5455 – Elm Creek Road over the Elm Creek Drain

Constructed: 1979 **Section:** 2-11 **General Condition:** Fair

Posted: Not Posted

Description: This is a twin CMP arch culvert with gravel surface and bag riprap headwalls. The bag riprap headwalls are severely deteriorated and covered in vegetation with erosion behind headwalls. The CMP culverts have a slight sag under the roadway, minor corrosion at waterline, erosion at the downstream ends of the culverts, and debris blocking the upstream ends.

Recommendations: Brush cut. Remove tree from south side of culvert. Remove debris from upstream ends of culvert.

5456 – Cedar Creek Road over the Cedar Creek

Constructed: 1984 **Section:** 22-23 **General Condition:** Fair

Posted: Not Posted

Description: This is a single span, precast C beam bridge with HMA surface, double guardrail railing, and steel sheet pile with concrete cap abutments. The HMA surface has open unsealed longitudinal cracks up to 1" wide and transverse cracks. The precast concrete C beams have leakage at the joints, minor spalls to steel from lack of cover, and fascias have vertical hairline cracks with leachate. The steel sheet pile with concrete cap abutments have minor rust on sheeting. The HMA approaches have open cracks throughout, wedges at reference lines, 1/2 inch of settlement, and heavy map cracking in the south approach.

Recommendations: Trim brush. Seal cracks in deck and approaches. Remove grass and debris in front of the guardrail. Replace approach guardrail terminals.

5457 – Slattery Road over the Cedar Creek

Constructed: 1995 **Section:** 23-24 **General Condition:** Fair

Posted: Not Posted

Description: This is a single span, precast C beam bridge with HMA surface, concrete open parapet railings, and concrete curtainwall abutments. The HMA surface has unsealed longitudinal cracking. The concrete open parapet railing is map cracked throughout, starting to open. The precast concrete C beams have hairline longitudinal cracks and leaking joints. The concrete abutments have hairline cracking, map cracking in the south abutment, and the southeast and northeast slopewalls have 1/8 inch cracks with efflorescence. The southeast slopewall corner is crumbling. The HMA approaches have settled up to 1/2 inch at the reference lines, and unsealed longitudinal and transverse cracks.

Recommendations: Wedge settlement at approaches. Seal reference line cracks. Seal deck cracks.

5460 – Jefferson Road over the Elm Creek Drain

Constructed: 1981 **Section:** 8-9 **General Condition:** Fair

Posted: Not Posted

Description: This is a triple CMP culvert with HMA pavement and guardrail. The HMA pavement has longitudinal cracking and transverse fingers. The guardrail is missing blocks in the west side, and there is an impact to the southwest quadrant. The CMP culverts have a separated joint, light surface rust in bottom half, and indents from guardrail posts.

Recommendations: Brush cut. Replace missing blocks in guardrail. Remove debris from culverts.

5461 – Cedar Creek Road over the Elm Creek Drain

Constructed: 1979 **Section:** 10-11 **General Condition:** Fair

Posted: Not Posted

Description: This is a twin CMP arch culvert with gravel surface and severely deteriorated bag riprap headwalls. The CMP culverts have minor joint openings at splice plates, slight separation of joints but no erosion noted. Light to moderate corrosion at waterline and no scour noted.

Recommendations: Remove debris from upstream end of culvert.

5462 – Slattery Road over the Elm Creek Drain

Constructed: 1979 **Section:** 1-2 **General Condition:** Fair

Posted: Not Posted

Description: This is a twin CMP arch culvert with gravel surface and deteriorated bag riprap headwalls. The CMP culverts have surface corrosion at waterline, several perforations at the west ends of both culverts, separated joints on bottom of both culverts, a slight dip under the roadway, debris buildup at the upstream end, south culvert is partially blocked, and both culverts are moderately perched at downstream end with 1 foot of scour.

Recommendations: Brush cut. Clean debris from upstream ends of culverts. Start to plan for culvert replacement due to corrosion holes in bottom of culvert.

12605 – Gravel Creek Road over the Bottom Creek Drain

Constructed: 1984 **Section:** 20 **General Condition:** Fair

Posted: Not Posted

Description: This is a single span, timber bridge with gravel surface, guardrail on timber railings, and timber pile with timber retaining wall abutments. The gravel surface is well graded. The timber decking is in good condition, the spreader beam has 2 loose nuts. Spreader beam exhibits a ¼" gap between bottom of timber deck and top of spreader beam along the south half of the structure. One pile on the timber abutments is leaning outward approximately 1ft , but appears to have been driven this way.

Recommendations: Place riprap along abutments. Clean out scuppers.

Oregon Township

5374 – Mt. Morris Road over the Flint River

Constructed: 1953

Section: 5-8

General Condition: Fair

Posted: 43/54/60

Description: This is three span, steel beam bridge with HMA surface, concrete deck, three beam railing, concrete curtainwall abutments, and concrete solid wall piers. The HMA surface has heavy open block cracking up to 3/4" wide, open reflective cracks along each substructure reference line, and some regions of cold patching. The concrete deck has transverse cracks with efflorescence and stalactites in most bays spaced 3'-5' in span 1w, random spacing in span 2w, and spaced 10'-15' in span 3w. Longitudinal cracking up to 1/8" wide in most bays and cracks with efflorescence around most of the deck drains. The steel beams have approximately 40% paint failure, flaking pack rust on fascia beam webs, and less than 10% overall section loss. The steel plate bearings have some surface rust. Ends of concrete wingwalls are map cracked with some efflorescence. The solid concrete wall piers have light scaling at the waterline and a few hairline vertical cracks in the east face of pier 2w. The HMA approaches have open transverse and longitudinal cracks, with up to 3/4 inch settlement at the reference lines. The west approach has been wedged with cold patch.

Recommendations: Apply HPR along all HMA cracks and at the substructure reference lines. Remove and replace HMA surface and apply new waterproofing membrane. Paint the fascia beams and add deck drain extensions.

5463 – Oregon Road over the Hasler Creek Drain

Constructed: 1978

Section: 32

General Condition: Fair

Posted: Not Posted

Description: This is a twin CMP arch culvert with HMA pavement and bag riprap headwalls. The HMA pavement has open transverse and longitudinal cracks, and large areas of cold patching. There is a "Dip" warning sign in place for WB Oregon traffic over structure. The bag riprap headwalls are deteriorated and there is a 4'x4'x4' deep erosion hole behind the west header in south headwall. The CMP culverts have efflorescence at the bolts, light surface rust on pipe ends and at the waterline, and small deflections along the top of the pipes. The west culvert has large holes up to 12 inches in length in several locations, middle of pipe is buckled, 18" of scour and is undermined up to 2 foot. The east culvert has several small holes along the waterline and pack rust forming.

Recommendations: Apply HPR along all open cracks in approach pavement. Repair erosion behind bag headers at each end of the culvert.

5465 – Stanley Road over the South Branch of the Flint River

Constructed: 1986 **Section:** 11-14 **General Condition:** Good

Posted: Not Posted

Description: This is a two span, adjacent concrete box beam bridge with HMA surface, double guardrail railing, concrete curtainwall abutments, and a concrete solid wall pier. The HMA surface has a longitudinal crack down the centerline and moderate longitudinal and diagonal cracking emanating from pier in each span. There is an impact to the south rail from a tree fall. The expansion joint device over the pier is debris filled. There are minor sporadic spalls in the grouted joints between adjacent box beams, some joints have minor efflorescence. Span 1w joints 6s and 7s have minor efflorescence. No deficiencies were noted in the concrete abutments. The concrete solid wall pier has vegetation on the pier noses and debris built up against the pier nose. Both HMA approaches have a longitudinal crack at roadway centerline with transverse fingers.

Recommendations: Brush cut in all four quadrants. Seal cracks in surface and seal cracks over abutment reference lines with HPR.

5466 – Flint River Road over the South Branch of the Flint River

Constructed: 1976 **Section:** 11-12 **General Condition:** Good

Posted: Not Posted

Description: This is a single span, adjacent concrete box beam bridge with a new HMA surface, double guardrail railing, and concrete curtainwall abutments. There is a new HMA surface over the adjacent concrete box beams. The guardrail is mounted on steel I-posts that are anchored to fascia beams, has minor surface rust throughout, and an impact to the southeast quadrant approach. The adjacent concrete box beams are not grouted and have moisture at the beam joints, and beam 5w has an 8 foot long spall to steel. The concrete abutments have hairline vertical cracks, and light erosion in the northwest quadrant behind the slope wall. There is new HMA approach pavement off each end of the structure with no deficiencies noted.

Recommendations: None at this time.

Rich Township

5382 – Silverwood Road over the North Branch of the Flint River

Constructed: 1928 **Section:** 36 **General Condition:** Fair

Posted: 18/36/63

Description: This is a single span, camelback through girder bridge with a chipsealed HMA surface and concrete cantilever abutments. The structure is under construction at this time the HMA surface has been removed. The concrete girder barriers have random surface spalls to steel. The concrete deck has a previous patch with a delamination, spalls to steel, and transverse cracks with efflorescence and stalactites. The camelback through girders have shallow spalls to steel and minor map cracking in each girder. Shallow spalls and delamination at midspan on west through girder. The concrete abutments have minor honeycombing at the waterline, and small hairline cracking in the west backwall. The approach pavement has been removed to be replaced during construction.

Recommendations: Under construction.

5468 – Castle Road over the Squaw Creek Drain

Constructed: 2001 **Section:** 33 **General Condition:** Good

Posted: Not Posted

Description: This is a single span, adjacent concrete box beam bridge with HMA surface, concrete open parapet railings, and concrete curtainwall abutments. The HMA surface has open transverse and longitudinal cracks and wide spaced block cracking starting to form. The concrete open parapet railing has map cracking and hairline vertical cracks. The adjacent concrete box beams have moisture staining along grout lines with small stalactites, heavy map cracking on fascia beams, horizontal hairline cracking with efflorescence on south fascia, post tensioning pockets are map cracked, and longitudinal hairline cracking noted in most beams. No deficiencies were noted in the concrete abutments. The HMA approaches have up to 1.5 inches of settlement at the reference lines with open transverse cracking in each approach.

Recommendations: Fill in areas of missing riprap along abutments, apply HPR along all HMA cracks, remove existing HMA surface and replace waterproof membrane and HMA surface and approaches. Brush cut in all four quadrants.

5469 – Castle Road over the North Branch of the Flint River

Constructed: 1940 **Section:** 34 **General Condition:** Poor

Posted: 3/NN/NN

Description: This is a three span, steel beam bridge with HMA surface, concrete deck, R4 railing, concrete cantilever abutments, and concrete piers. The HMA surface is delaminated over 50% with HMA patches and spalls. Each bridge shoulder is severely deteriorated, and debris covered. The R4 railing has spalls to the concrete posts and concrete brush blocks, and impact damage to panel 1w on the north barrier. The full length of the north brush block toe is spalled. The concrete deck bottom surface has extensive map cracking with efflorescence and stalactites in all bays, heaviest in spa 3w. There is transverse spall to steel under the expansion joint over pier 2w. The steel beams have approximately 25% paint failure and heavy pack rust on all beam end flanges and webs near the piers and east abutment, and at midspan on the beams in span 3w. Section loss in the web estimated 25%, and on the bottom flange at mid span up to 63%. The concrete abutments have random full height random vertical hairline cracks. The concrete column and concrete cap piers have vertical, diagonal, and longitudinal cracks with efflorescence, delaminations, and spalls to steel.

Recommendations: Prepare for replacement.

5470 – Squaw Creek Road over the Squaw Creek Drain

Constructed: 1968 **Section:** 34 **General Condition:** Critical
Posted: 10/NN/NN

Description: This is a single span, timber bridge with gravel surface, guardrail on timber railings, and timber pile bent abutments. The gravel surface has small potholes throughout, there is vegetation growing along each header, and a 1 foot deep erosion hole developing at the west end of the south header. The railings are leaning outward, the timber post in the southwest end is rotted. The timber deck has moisture throughout with up to 2" of sag at midspan and minor splits and checks. The timber piles and timber retaining wall abutments are in critical condition with the northeast wingwall pulling away from abutment and settled with erosion behind wingwall. The northwest quadrant wingwall piling is rotted from the top down 3 feet, the southeast and northeast quadrant piles are partially rotted.

Recommendations: Refill erosion pocket behind northeast wingwall. Will need monitoring or additional repair work to correct this issue. Seek funding for a replacement structure at this crossing.

5471 – Murphy Lake Road over the Squaw Creek Drain

Constructed: 1965 **Section:** 9-16 **General Condition:** Fair
Posted: Not Posted

Description: This is a twin CMP arch culvert with gravel roadway. The gravel roadway is rutted over the twin pipes. The CMP culverts have minor corrosion on bolts and nuts, flow along one side of each pipe, surface corrosion at the waterline and up to 1 foot of sag over entire length of both culverts. Both culverts are slightly undermined at each end of culvert.

Recommendations: Monitor pipe deflection.

5472 – McTaggart Road over the North Branch of the Flint River

Constructed: 1995 **Section:** 34-35 **General Condition:** Good
Posted: Not Posted

Description: This is a two span, precast C beam bridge with HMA surface, concrete open parapet railings, concrete curtainwall abutments, and a pile bent pier. The HMA surface has an open longitudinal and transverse cracks. The concrete open parapet railings are surface sealed with a shallow spall at the structure name plate in the southeast quadrant and hairline vertical cracks. The precast concrete C beams have minor web edge spalls and evidence of leakage at joints. The concrete abutments have minor hairline cracks on the returnwalls. The pile bent pier has vegetation growing on the pier cap noses. Both HMA approaches have random open longitudinal and transverse cracks.

Recommendations: Apply HPR along joints and deck cracks. Brush cut in all four quadrants.

5475 – Willits Road over the Fostoria Drain

Constructed: 1965 **Section:** 31 **General Condition:** Good
Posted: Not Posted

Description: This is a twin CMP arch culvert with gravel roadway. The CMP culverts have isolated corrosion on some nuts and bolts, no leakage, and minor top deflections of up to 6 inches. South pipe is perched at east end with up to 9 inches of undermining.

Recommendations: None at this time.

5477 – Graves Road over the Squaw Creek Drain

Constructed: 2002 **Section:** 10 **General Condition:** Good

Posted: Not Posted

Description: This is a single span, adjacent concrete box beam bridge with HMA surface, type 4 concrete barriers, and concrete cantilever abutments. The HMA surface has open diagonal and block cracks up to 3/4 inch and sandy debris along the toes of the barriers. There are open reflective cracks along the abutment reference lines up to 1 inch. The type 4 barriers have hairline vertical cracks spaced at 4 to 6 feet. The adjacent concrete box beams have map cracking on fascias and efflorescence on grout pockets and joint lines. The north abutment has a small hairline vertical crack. Both approaches have open transverse cracks up to 3/4" wide, longitudinal and diagonal cracks.

Recommendations: Apply HPR along deck and approach cracks.

12692 – Barnes Road over the Squaw Creek Drain

Constructed: 1994 **Section:** 21-28 **General Condition:** Fair

Posted: 15 tons

Description: This is a CMP arch culvert with HMA pavement and guardrail. The HMA pavement has been replaced and is new with no deficiencies noted. The CMP culvert has a deflection in the top up to 6" and fill was added to structure to increase load capacity in 2020.

Recommendations: None at this time.

Steel - Culvert	5462	44316H000238010	SLATTERY ROAD	ELM CREEK DRAIN	3	19	2	22		440								
Steel - Culvert	5463	44317H000028010	OREGON ROAD	HASLER CREEK DRAIN	3	19	2	25.9		774								
Prestressed concrete - Box beam/girders--multiple	5465	44317H000188010	STANLEY ROAD	SOUTH BR. FLINT RIVER	5	5	2	99.7	31	3091								
Prestressed concrete - Box beam/girders--multiple	5466	44317H000328010	FLINT RIVER ROAD	SOUTH BR. FLINT RIVER	5	5	1	63	30.5	1922								
Prestressed concrete - Box beam/girders--multiple	5468	44318H000018010	CASTLE ROAD	SQUAW CREEK DRAIN	5	5	1	50.9	34.1	1736								
Steel - Multistringer	5469	44318H000018020	CASTLE ROAD	NORTH BR. FLINT RIVER	3	2	3	110.9	40.4	4480								
Timber - Slab	5470	44318H000068010	SQUAW CREEK ROAD	SQUAW CREEK DRAIN	7	1	1	32.8	25.6	840								
Steel - Culvert	5471	44318H000168010	MURPHY LAKE ROAD	SQUAW CREEK DRAIN	3	19	2	31.8		636								
Prestressed concrete - Tee beam	5472	44318H000248010	MCTAGGART ROAD	NORTH BR. FLINT RIVER	5	4	2	71.9	32.2	2315								
Steel - Culvert	5475	44318H000288010	WILLITS ROAD	FOSTORIA DRAIN	3	19	2	21		420								
Prestressed concrete - Box beam/girders--multiple	5477	44318H000368010	GRAVES ROAD	SQUAW CREEK DRAIN	5	5	1	46	31.1	1431								
Concrete - Culvert	12604	44312H000208010	MAPLE GROVE ROAD	PINE CREEK DRAIN	1	19	1	20	34	680								
Timber - Slab	12605	44316H000048010	GRAVEL CREEK ROAD	BOTTOM CREEK DRAIN	7	1	1	25.9	27.2	704								
Aluminum - Culvert	12692	442000330008020	BARNES ROAD	SQUAW CREEK DRAIN	9	19	1	24.9		695								
Steel - Culvert	13998	44200062000C010	CYCLONE RD	FOREST DRAIN	3	19	2	20.3	62	1259								
Steel - Culvert	13999	44313H00033C010	FOSTORIA RD	FOREST DRAIN	3	19	2	20.7	44	911								
Steel - Culvert	14000	44315H00005C010	BROCKER RD	S BR OF FLINT RIVER	3	19	1	24	50	1200								
Concrete - Culvert	14414	44315H00018C010	GARDNER RD	S BR FLINT RIVER	1	19	1	24.5	32	784								