Midland County Road Commission
2024 Transportation
Asset Management Plan

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

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EXECUTIVE SUMMARY

As conduits for commerce and connections to vital services, roads and bridges are some of the most important assets in any community, and other assets like culverts, traffic signs, traffic signals, and utilities support and affect roads and bridges. The Midland County Road Commission's (MCRC) roads, bridges, and support systems are also 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 these assets, 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 roads, bridges, and support assets in an efficient and effective manner. This asset management plan is intended to report on how MCRC is meeting its obligations to maintain the public assets for which it is responsible.

This plan identifies MCRC's assets and condition and how MCRC maintains and plans to improve the overall condition of those assets. An asset management plan is required by Michigan Public Act 325 of 2018, and this document represents fulfillment of some of MCRC's obligations towards meeting these requirements. However, this plan and its supporting documents are intended to be much more than a fulfillment of required reporting. This asset management plan helps to demonstrate MCRC's responsible use of public funds by providing elected and appointed officials as well as the general public with the inventory and condition information of MCRC's assets, and it gives taxpayers the information they need to make informed decisions about investing in MCRC's 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 Midland 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 road and bridge network. Asset management also provides a transparent decision-making process that allows the public to understand the technical and financial challenges of managing transportation infrastructure with a limited budget.

The Midland County Road Commission (MCRC) has adopted an “asset management” business process to overcome the challenges presented by having limited financial, staffing, and other resources while needing to meet road users’ expectations. MCRC is responsible for maintaining and operating over 862.94 centerline miles of roads and 88 bridge structures. It is also responsible for 2,547 culverts and 4 signals.

This 2024 plan identifies MCRC’s transportation assets and their condition as well as the strategy that MCRC uses to maintain and upgrade particular assets given MCRC’s condition goals, priorities of network’s road users, and resources. An updated plan is to be released approximately every three years both to comply with Public Act 325 and to reflect changes in road conditions, finances, and priorities.

Questions regarding the use or content of this plan should be directed to Jonathan Myers at 2334 N Meridian Rd, Sanford, MI 48657 or at 989-687-9060.

1. PAVEMENT ASSETS

MCRC is responsible for 862.94 centerline miles of public roads. An inventory of these miles divides them into different network classes based on road purpose/use and funding priorities as identified at the state level: county primary road network, which is prioritized for state-level funding, and county local road network.

Inventory of Assets

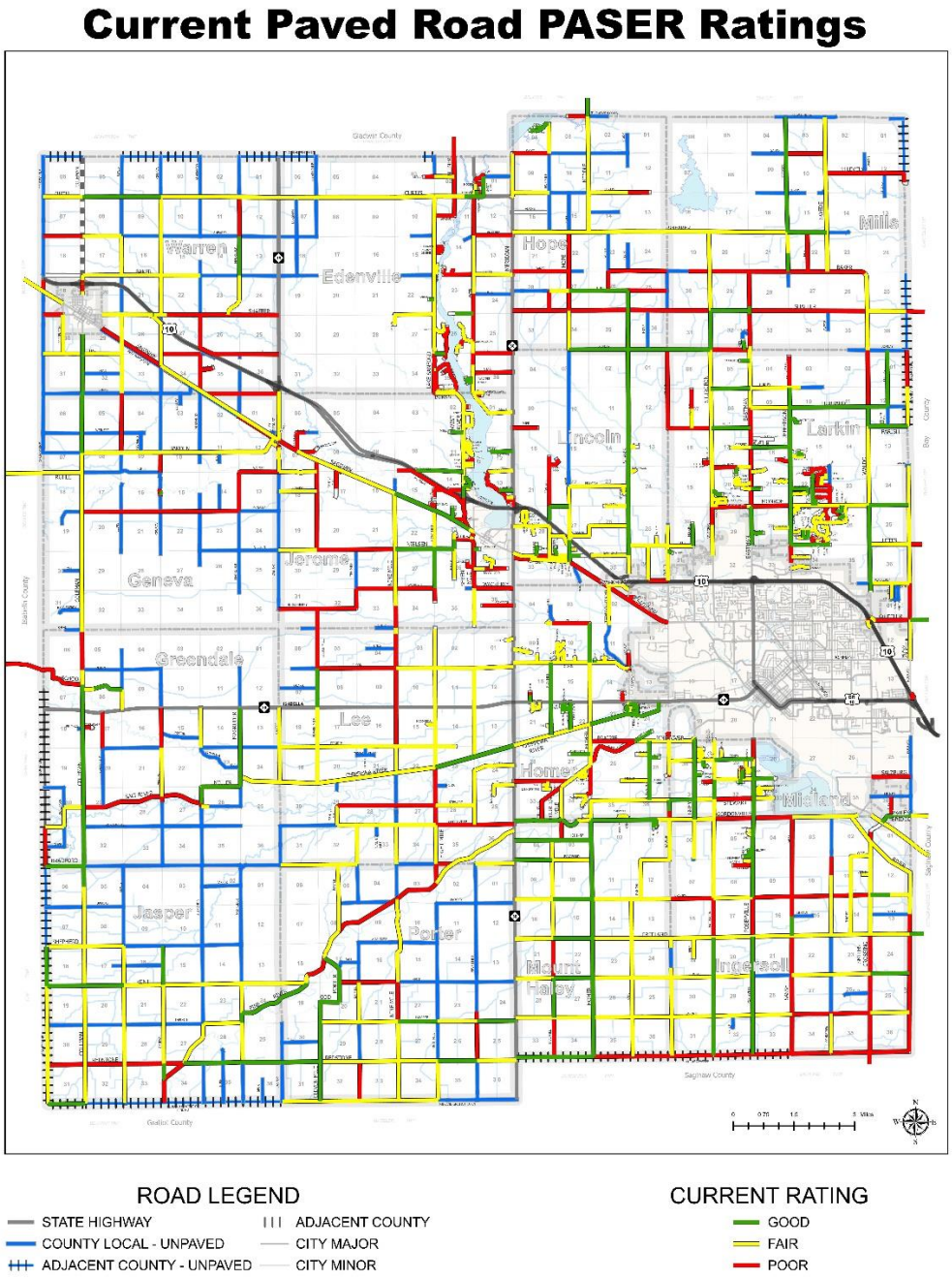

Figure 1: Map showing location or roads managed by MCRC and the current condition for paved roads in green for good (PASER 10, 9, 8), yellow for fair (PASER 7, 6, 5), and red for poor (PASER 4, 3, 2, 1) and for unpaved roads in blue

Of MCRC's 862.94 miles of road, 287.06 miles are classified as county primary and 575.88 miles are classified as county local (Figure 1 identifies these paved roads in green, yellow, and red with the colors being determined based on the road segment's condition). MCRC also manages 1.16 miles that are classified as part of the National Highway System (NHS); the NHS is subject to special rules and regulations and has its own performance metrics dictated by the FHWA. In addition, MCRC has 196.60 miles of unpaved roads (Figure 1 identifies these unpaved roads in blue).

More detail about these road assets can be found in MCRC's Roadsoft database or by contacting MCRC.

Types

MCRC has multiple types of pavements in its jurisdiction, including asphalt, concrete, and undefined; it also has unpaved roads (i.e., gravel and/or earth). Figure 2 shows a breakdown of these pavement types for all of MCRC's road assets.

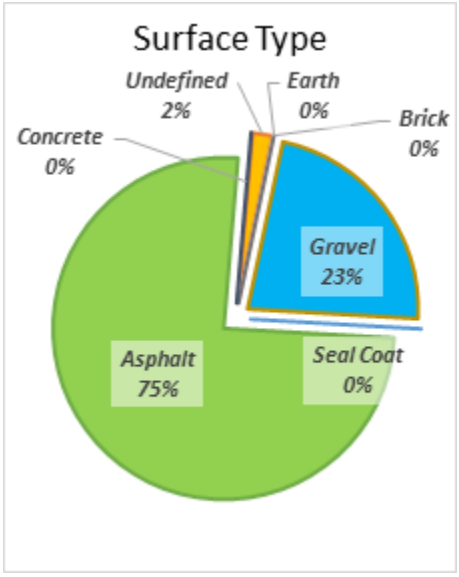

Figure 2: Pavement type by percentage maintained by MCRC. Undefined pavements have not been inventoried in MCRC's asset management system to date, but will be included as data becomes available.

Condition, Goals, and Trend

Paved Roads

Paved roads in Michigan are rated using the Pavement Surface Evaluation and Rating (PASER) system, which is a 1 to 10 scale with 10 being a newly constructed surface and 1 being a completely failed surface. PASER scores are grouped into TAMC definition categories of good (8-10), fair (5-7), and poor (1-4) categories. MCRC collects PASER data every year on 100 percent of those portions of its county primary network that are eligible for federal funding. In addition, MCRC uses its own staff and resources to collect PASER data on 50 percent of its county local networks every other year that are not eligible for federal funding.

Currently, the county primary network has 27% of its roads in good condition, 46% in fair condition, and 27% in poor condition, and the county local network has 38% of its roads in good condition, 27% in fair condition, and 35% in poor condition. It is important to note that the local network has not been fully rated and only represents about half of the county Townships. MCRC's long-range goal for the county primary network is to have 30% of roads in good condition, 60% in fair condition, and 10% in poor condition, and for the county local network is to have 20% of roads in good condition, 60% in fair condition, and 20% in poor condition. Figure 3 illustrates the historical and current condition (solid bars) of MCRC's county primary network; they also illustrate the projected trend (shaded bars), the overall trend in condition (trendlines), and MCRC's goal (final solid bar).

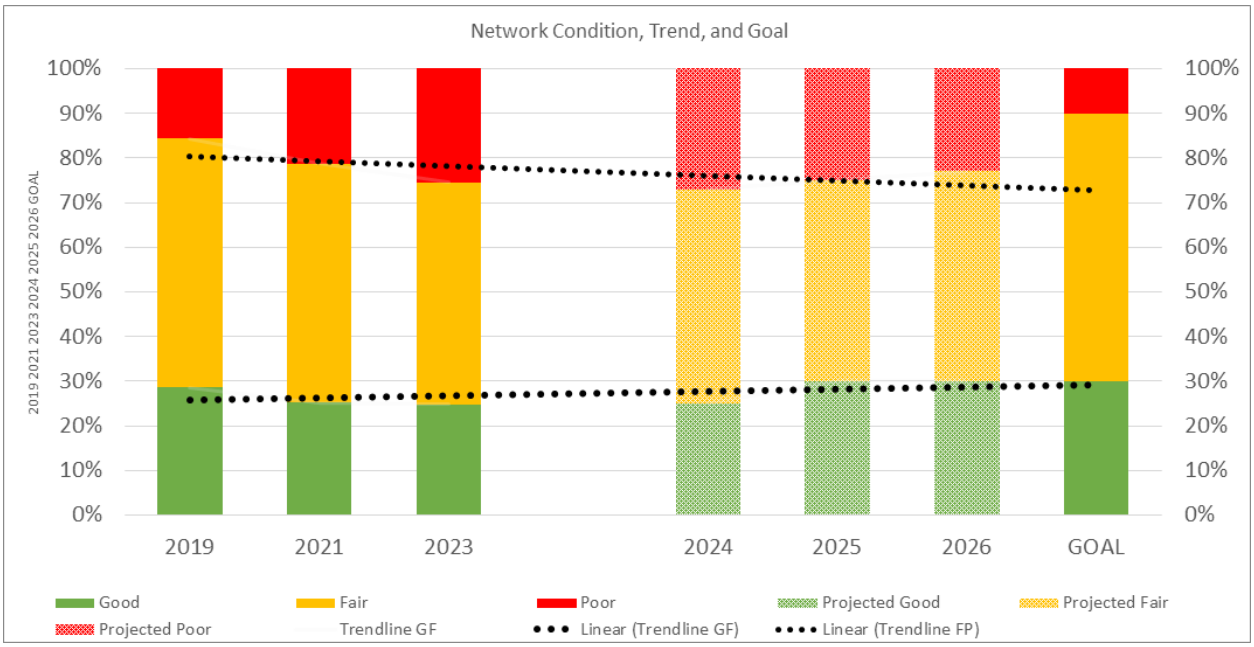

Figure 3: County primary network condition, goals, and trend

Unpaved Roads

The condition of unpaved roads can be rapidly changing, which makes it difficult to obtain a consistent surface condition rating over the course of weeks or even days. The TAMC adopted the Inventory Based Rating (IBR) System™ for rating unpaved roads. MCRC has not yet had the opportunity to use the IBR System™ for rating its unpaved roads on a consistent basis.

Modelled Trends, Gap Analysis, and Planned Projects

Table 1: Roadsoft Modelled Trends, Planned Projects, and Gap Analysis for 's Road Assets

Primary Network (287.06 miles)					
				Pavement Condition Forecast	
Treatment	Annual Miles of Treatment	Years of Life	Trigger-Reset	Annual Miles of Treatment	Trigger-Reset
Crack Seal	20	2	7–7	15-25	7–7
Seal Coat with Fog Seal	19	6	4,5,6–8	15-25	4,5,6–8
Overlay	8	10	4,5–9	5-15	4,5–9
Reconstruction	2	14	1, 2, 3–10	2-8	1, 2, 3–10
Ultra Thin	1.5	7	6–9	2-5	6–9
Microsurface	4	6	4,5,6–8	4-8	4,5,6–8
Local Network (575.88 miles)					
				Pavement Condition Forecast	
Treatment	Annual Miles of Treatment	Years of Life	Trigger-Reset	Annual Miles of Treatment	Trigger-Reset
Crack Seal	15	2	7–7	15-25	7–7
Seal Coat with Fog Seal	18	6	4,5,6–8	15-25	4,5,6–8
Overlay	8	10	4,5–9	5-15	4,5–9
Reconstruction	7	14	1, 2, 3–10	2-8	1, 2, 3–10
Ultra Thin	2	7	6–9	2-5	6–9

Modelled Trends & Gap Analysis

The Roadsoft network analysis of MCRC's planned projects from its currently-available budget does not allow MCRC to reach its pavement condition goals given the projects planned for the next three years.

MCRC is projected to have the budget to maintain many of its roads in the fair category and eliminate some of the "poor" roads. Due to natural wearing of asphalt and limited funds, it is difficult with MCRC budget to reach its goal in the "good" category.

MCRC utilizing the Roadsoft network condition model with paved county primary road network, a gap analysis was conducted. The results show that MCRC would need to slightly increase budget in year 2024 and significantly increase in 2026 to maintain rating goals. For detailed results see the Pavement Asset Management Plan attached in section A.

Unpaved Road Condition Trends

The majority of Midland County unpaved roads are not rated but they are regularly graded. Conditions often vary on unpaved roads due to weather patterns and existing road elements such as drainage and road

cover. Conditions also vary during different seasons. Wet seasons make it much more difficult for MCRC to maintain. MCRC does its best to maintain all unpaved roads within its jurisdiction.

Planned Projects

MCRC has paving projects planned for the next three years. These projects are identified in Figure 4.

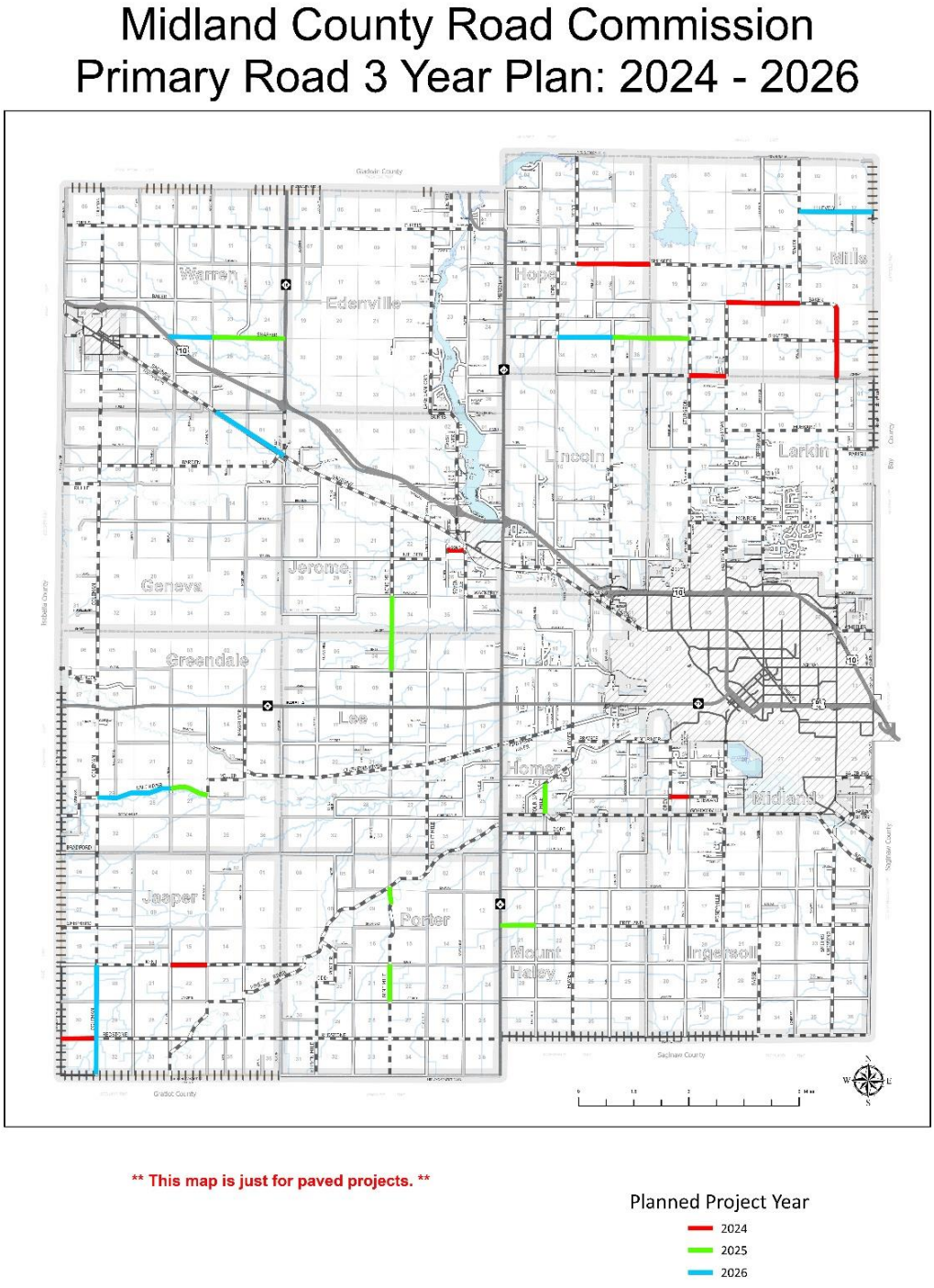

Figure 4 : Map illustrating planned paving projects for pavement asset

2. BRIDGE ASSETS

MCRC is responsible for 88 bridges that provide safe service to road users across the agency network. MCRC seeks to implement a cost-effective program of preventive maintenance to maximize the useful service life and safety of the local bridges under its jurisdiction.

Inventory of Assets

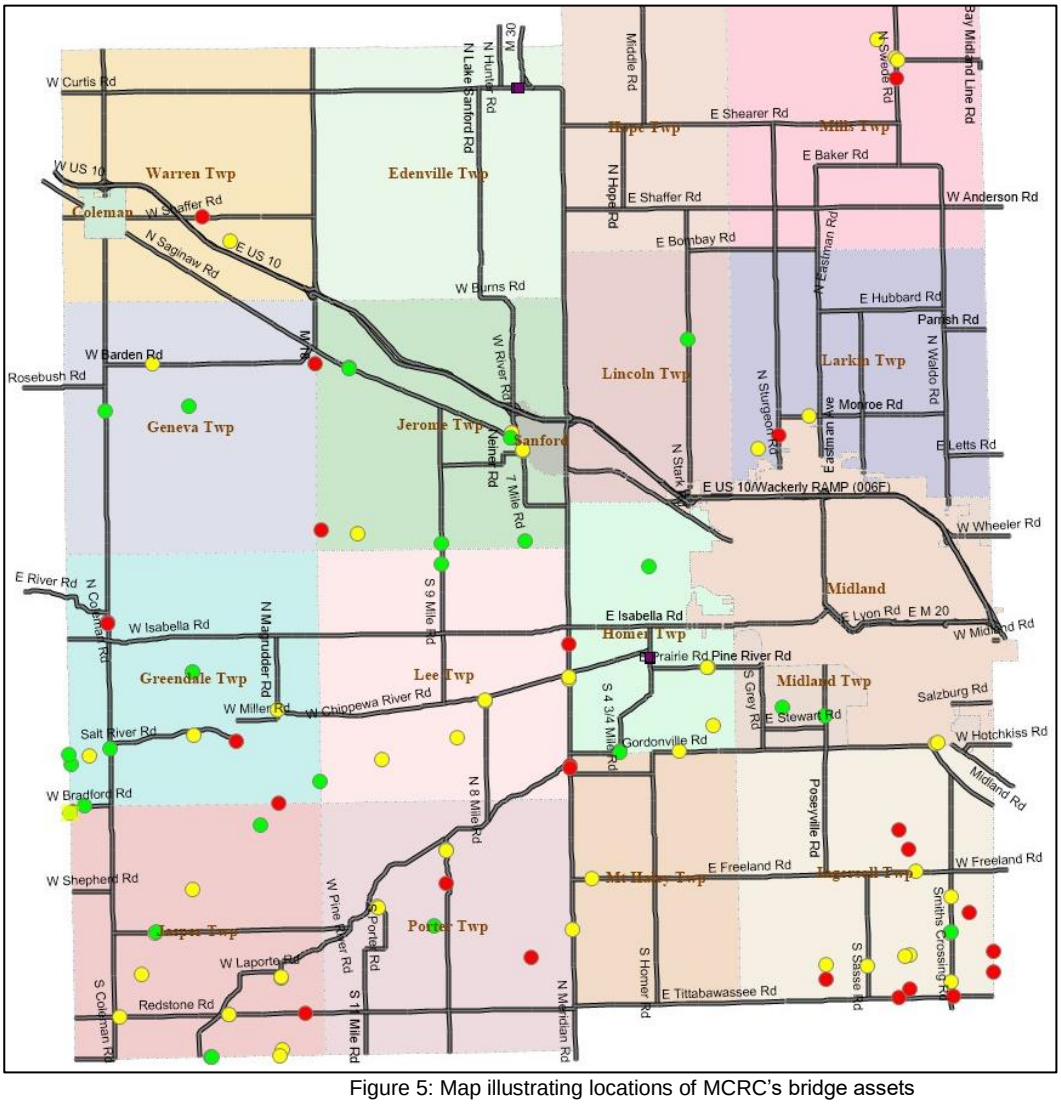

Figure 5: Map illustrating locations of MCRC's bridge assets

MCRC has 88 total bridges in its road and bridge network; these bridges connect various points of the road network, as illustrated in Figure 5. These bridge structures can be summarized by type, size, and condition, which are detailed in Table 2. More information about each of these structures can be found in MCRC's MiBRIDGE database or by contacting MCRC.

Table 2: Bridge Assets by Type: Inventory, Size, and Condition								
	Total Number of Bridges	Total Deck Area (sq ft)	Condition: Structurally Deficient, Posted, Closed			2023 Condition		
Bridge Type			Struct. Defic	Posted	Closed	Poor	Fair	Good
Concrete – Culvert	1	480	1	0	0	1	0	0
Concrete – Girder and floorbeam	2	4,502	0	2	0	0	2	0
Concrete – Slab	8	8,652	0	0	0	0	2	6
Concrete – Tee beam	2	2,055	1	1	0	1	1	0
Prestressed concrete – Box beam/girders—multiple	31	113,423	1	1	0	1	17	13
Prestressed concrete – Box beam/girders—single/spread	6	18,925	0	0	0	0	2	4
Prestressed concrete – Multistringer	5	50,352	1	0	0	1	3	1
Prestressed concrete – Slab	1	1,080	1	0	0	0	0	1
Steel – Box beam/girders – single/spread	1	1,965	0	0	0	0	0	1
Steel – Culvert	6	4,369	2	1	0	2	2	2
Steel – Girder and floorbeam	1	895	1	1	0	1	0	0
Steel – Multistringer	17	21,155	10	9	0	10	5	2
Steel – Truss—thru and pony	1	4,480	0	1	0	0	1	0
Timber – Culvert	1	540	0	0	0	0	1	0
Timber – Slab	5	4,874	1	2	0	1	2	2
Total SD/Posted/Closed			**18**	**18**	**0**			
Total	**88**	**237,747**	**18**	**18**	**0**	**18**	**38**	**32**
Percentage (%)			**20%**	**20%**	**0%**	**20%**	**43%**	**36%**

Condition, Goals, and Trend

Bridges in Michigan are given a good, fair, or poor rating based on the National Bridge Inspection Standards (NBIS) rating scale, which was created by the Federal Highway Administration to evaluate a bridge's deficiencies and to ensure the safety of road users. The current condition of MCRC's bridge network based on the NBIS is 32 (34%) structures rated good, 38 (43%) structures rated fair, and 18 (20%) structures rated poor (Table 2).

Bridges are designed to carry legal loads in terms of vehicles and traffic. Due to a decline in condition, a bridge may be "posted" with a restriction for what would be considered safe loads passing over the bridge. On occasion, posting a bridge may also restrict other load-capacity-related elements like speed and number of vehicles on the bridge, but this type of posting designates the bridge differently. MCRC

has 18 (20%) structures that are posted for load restriction (Table 2). Designating a bridge as “posted” has no influence on its condition rating. A “closed” bridge is one that is closed to all traffic. Closing a bridge is contingent upon its ability to carry a set minimum live load. MCRC has 0 structures that are closed (Table 2). The goal of the program is the preservation and safety of MCRC’s bridge network.

Figure 6 illustrates the baseline condition, projected trend, and goal that MCRC has for its good/fair and its structurally deficient bridges.

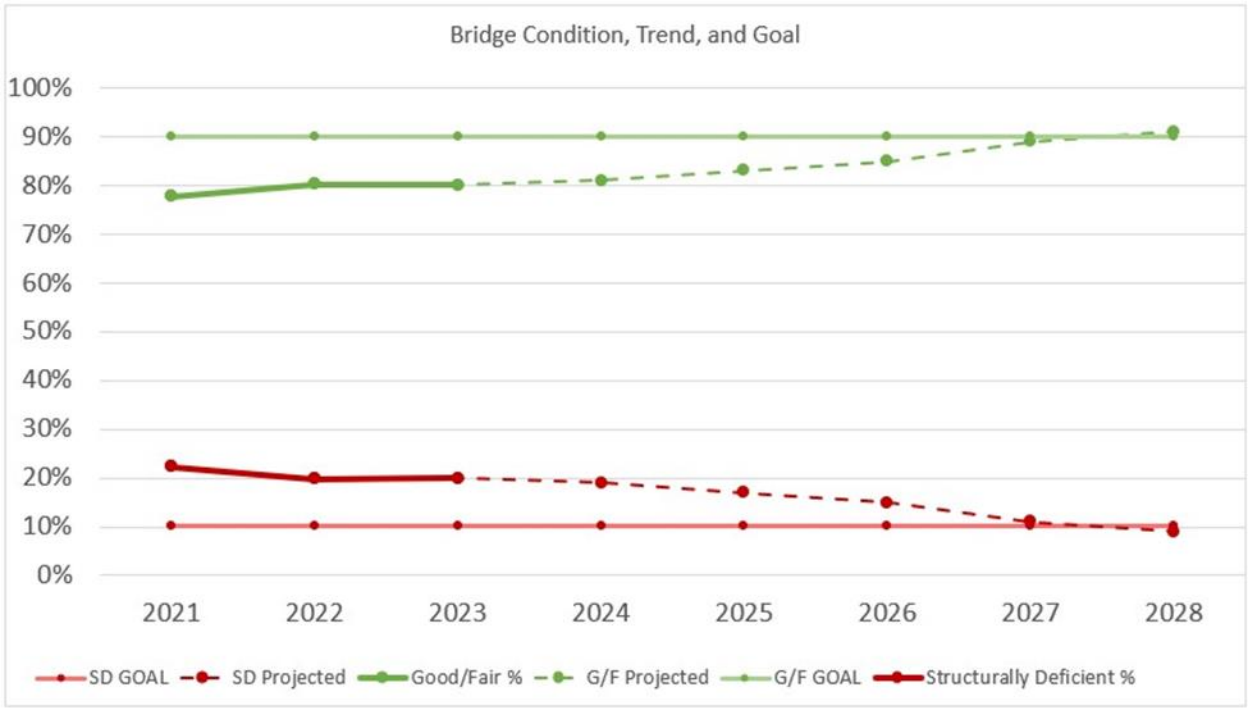

Figure 6: Condition, projected trend, and goal for MCRC’s good/fair and structurally deficient bridges

Programmed/Funded Projects, Gap Analysis, and Planned Projects

MCRC received $2,388,356 per year in funding for the years 2024-2026. Preventive maintenance is a more effective use of these funds than the costly alternative of major rehabilitation or replacement. Since MCRC recognizes that limited funds are available for improving the bridge network, it seeks to identify those bridges that will benefit from a planned maintenance program, and it plans to spend $1,260,300 average per year on preventive maintenance of bridges. MCRC plans to replace nine bridges at a cost of $5,900,000. By performing the aforementioned preventive maintenance and replacement of bridge structures, MCRC may or may not achieve its overall bridge network condition goals.

MCRC 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 or from past local agency projects*. The cost of items of varying complexity, such as maintenance of traffic, staged construction, scour counter-measures, and so forth, are computed on a bridge-by-bridge basis. The cost estimates are reviewed and updated annually.

Table 3 illustrates the programmed/funded projects that will be undertaken in order to achieve MCRC's goal. These programmed/funded projects are juxtaposed with priority projects that remain unfunded.

When MCRC compares its funding and its programmed/funded projects with all of its prioritized projects as shown in Table 3, MCRC believes it should be able to achieve some of its asset management goals for the period of this plan. For projects that it is unable to complete, MCRC 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.

Table 3: Planned Projects and Gap Analysis

Strategy	2024	2025	2026	2027	2028	GAP
Replacement						
6976	$260,000					
6975	$1,100,000					
6939		$1,760,000				
13923		$240,000				
13527		$240,000				
6993			$600,000			
6980			$380,000			
7008			$280,000			
6982			$290,000			
6972				$600,000		
6978				$350,000		
7000				$1,000,000		
6984					$350,000	
6968					$600,000	
6971					$300,000	
Subtotal	$1,360,000	$2,240,000	$1,550,000	$1,950,000	$1,250,000	$0
Rehabilitation						
6977		$150,000				
6935				$900,000		
Subtotal	$0	$150,000	$0	$900,000	$0	$0
Scheduled Maintenance						
Subtotal	$0	$0	$0	$0	$0	$0
Preventive Maintenance						
7004	$111,000					
6999	$195,000					
6947	$104,000					
6931	$122,000					
6927			$209,000			
6948			$318,000			
6989			$65,000			
6998			$256,000			
Subtotal	$532,000	$0	$848,000	$0	$0	$0
Other						
Subtotal	$0	$0	$0	$0	$0	$0

3. CULVERT ASSETS

MCRC exercises awareness of its culvert assets. MCRC seeks to implement a routine monitoring program of its culvert assets to prioritize safety of the roads under its jurisdiction. MCRC will strive to monitor at least 20% of its known culvert assets each year.

Inventory of Assets

At present, MCRC tracks inventory and condition data of its culvert assets. MCRC has inventoried 2,547 culverts, which is 100 percent of the estimated 2,547 culverts that MCRC owns. Of the 2,547 culverts, 174 of the culverts were not able to be rated due to existing site condition. Of MCRC's 2,373 tracked and rated culverts, MCRC has 1497 culverts considered good, 688 culverts considered fair, 188 culverts considered poor, and 0 culverts considered failed based on the culvert rating system that MCRC uses (see Appendix C *Culvert Asset Management Plan Supplement*).

More detail about these culvert assets can be found in MCRC's Roadsoft database or by contacting MCRC.

Goals

The goal of MCRC's asset management program is the preservation of its culvert network. MCRC is responsible for preserving 2,547 inventoried culverts as well as any un-inventoried culverts that underlie its entire road network.

Planned Projects

MCRC's policy is to replace or repair culvert assets concurrent with projects affecting road segments carried by the culverts. MCRC also includes culvert assets in scheduled maintenance projects affecting road segments carried by the culverts.

4. SIGNAL ASSETS

MCRC exercises awareness of its traffic sign and signal assets. MCRC contracts with City of Midland to maintain the traffic signals on county roads. MDOT owns and maintains the traffic signals located at the intersections where the county roads connect to the State Trunkline system.

Inventory of Assets

At present, MCRC tracks inventory data for traffic signals, overhead beacons, and LED signs. MCRC has inventoried 4 traffic signals, which is 100 percent of the traffic signals that MCRC owns. MCRC also tracks and owns overhead flashing beacons and LED signs which make up another 11 items in its inventory.

More detail about these traffic signal assets can be obtained by contacting MCRC.

Goals

The goal of MCRC's asset management program is the preservation of its traffic signals. MCRC is responsible for preserving 4 inventoried traffic signals, as well as 7 overhead beacons, and 4 LED solar signs.

Planned Projects

MCRC's policy is to evaluate traffic signal assets based on condition assessment. With so few signals in MCRC's inventory, they are updated or replaced on an as-needed basis. It also conducts replacements or repairs for those traffic signal assets reported as non-functional or as performing with reduced function. MCRC adheres to regular maintenance and servicing policies outlined in the *Michigan Manual of Uniform Traffic Control Devices (MMUTCD)*.

5. FINANCIAL RESOURCES

Public entities must balance the quality and extent of services they can provide with the tax resources provided by citizens and businesses, all while maximizing how efficiently funds are used. Therefore, MCRC will overview its general expenditures and financial resources currently devoted to transportation infrastructure maintenance. This financial information is not intended to be a full financial disclosure or a formal report. Full details of MCRC's financial status can be found by request submitted to our agency contact (listed in this plan).

Anticipated Revenues & Expenses

MCRC receives funding from the following sources:

- **State funds** – MCRC's principal source of transportation funding is received from the Michigan Transportation Fund (MTF). This fund is supported by vehicle registration fees and the state's per-gallon gas tax. Allocations from the MTF are distributed to state and local governmental units based on a legislated formula, which includes factors such as population, miles of certified roads, and vehicle registration fees for vehicles registered in the agency's jurisdiction. MCRC also receives revenue from the Michigan Department of Transportation to maintain (e.g. plow, patch, mow) the state trunklines within its jurisdictional boundary. Revenue from these maintenance contracts are received on a time and materials basis as resources are expended to maintain the State's roads. While these contracts do not allow for capital gain (profit) and only bring in revenue to cover the cost of the work, they do provide a benefit to MCRC by allowing an economy of scale that enables us to provide better service at a lower cost for MCRC's roads while allowing the same for the State of Michigan. Examples of state grants also include local bridge grants, economic development funds, and metro funds.

- **Federal and state grants for individual projects** – These are typically competitive funding applications that are targeted at a specific project type to accomplish a specific purpose. These may include safety enhancement projects, economic development projects, or other targeted funding. Examples of federal funds include Surface Transportation Program (STP) funds, C and D funds, bridge funds, MDOT payments to private contractors, and negotiated contracts.
- **Local government entities or private developer contributions to construction projects for specific improvements** – This category includes funding received to mitigate the impact of commercial developments as a condition of construction of a specific development project, and can also include funding from a special assessment district levied by another governmental unit. Examples of contributions from local units include city, village, and township contributions to the county; special assessments; county appropriations; bond and note proceeds; contributions from counties to cities and villages; city general fund transfers; city municipal street funds; capital improvement funds; and tax millages (see below).
- **Local tax millages** – Many local agencies in Michigan use local tax millages to supplement their road-funding budget. These taxes can provide for additional construction and maintenance for new or existing roads that are also funded using MTF or MDOT funds. MCRC has local tax millages in its road-funding budget. Midland County has two alternating road millages used to supplement its road-funding budget. The funding goes directly towards rebuilding and maintaining Midland County roads and bridges.
- **Interest** – Interest from invested funds.
- **Permit fees** – Generally, permit fees cover the cost of a permit application review.
- **Other** – Other revenues can be gained through salvage sales, property rentals, land and building sales, sundry refunds, equipment disposition or installation, private sources, and financing.
- **Charges for services** – Funds from partner agencies who contract with MCRC to construct or maintain its roads, or roads under joint or neighboring jurisdictions, including state trunkline maintenance and non-maintenance services and preservation.

MCRC is required to report transportation fund expenditures to the State of Michigan using a prescribed format with predefined expenditure categories. The definitions of these categories according to Public Act 51 of 1951 may differ from common pavement management nomenclature and practice. For the purposes of reporting under PA 51, the expenditure categories are:

- **Construction/Capacity Improvement Funds** – According to PA 51 of 1951, this financial classification of projects includes, "new construction of highways, roads, streets, or bridges, a project that increases the capacity of a highway facility to accommodate that part of traffic having neither an origin nor destination within the local area, widening of a lane width or more, or adding turn lanes of more than 1/2 mile in length."[1]

[1] Public Act 51 of 1951, 247.660c Definitions

- **Preservation and Structural Improvement Funds** – Preservation and structural improvements are "activit[ies] undertaken to preserve the integrity of the existing roadway system."[2] Preservation includes items such as a reconstruction of an existing road or bridge, or adding structure to an existing road.
- **Routine and Preventive Maintenance Funds** – Routine maintenance activities are "actions performed on a regular or controllable basis or in response to uncontrollable events upon a highway, road, street, or bridge".[3] Preventive maintenance activities are "planned strategy[ies] of cost-effective treatments to an existing roadway system and its appurtenances that preserve assets by retarding deterioration and maintaining functional condition without significantly increasing structural capacity".[4]
- **Winter Maintenance Funds** – Expenditures for snow and ice control.
- **Trunkline Maintenance Funds** – Expenditures spent under MCRC's maintenance agreement with MDOT for maintenance it performs on MDOT trunkline routes.
- **Administrative Funds** – There are specific items that can and cannot be included in administrative expenditures as specified in PA 51 of 1951. The law also states that the amount of MTF revenues that are spent on administrative expenditures is limited to 10 percent of the annual MTF funds that are received.
- **Other Funds** – Expenditures for equipment, capital outlay, debt principal payment, interest expense, contributions to adjacent governmental units, principal, interest and bank fees, and miscellaneous for cities and villages.

The Table (below) details the revenues and expenditures for MCRC.

Table 4: Annual Fiscal-Year Revenues & Expenditures per Fiscal Year

REVENUES			EXPENDITURES		
Item	**Estimated $**	**Percent of Total**	**Item**	**Estimated $**	**Percent of Total**
State funds	11,851,948	52.1%	Construction & capacity improvement (CCI)	0	0.0%
Federal funds	4,131,885	18.2%	Preservation & structural improvement (PSI)	9,500,000	46.6%
Contributions for local units	1,197,227	5.3%	Routine maintenance	5,653,600	27.7%
Interest, permits, and other	125,000	0.5%	Winter maintenance	1,146,400	5.6%
Charges for services	1,254,484	5.5%	Trunkline maintenance	1,254,484	6.2%
County Millage	4,200,000	18.4%	Administrative	760,000	3.7%
			Other	2,072,574	10.2%
TOTAL	22,760,544	100%	TOTAL	20,387,058	100%

Verify the information in this table. You can find your agency's information in the TAMC dashboard at https://www.mcgi.state.mi.us/mitrp/tamcDashboards.

[2] Public Act 51 of 1951, 247.660c Definitions
[3] Public Act 51 of 1951, 247.660c Definitions
[4] Public Act 51 of 1951, 247.660c Definitions

6. RISK OF FAILURE ANALYSIS

Transportation infrastructure is designed to be resilient. The system of interconnecting roads and bridges maintained by MCRC provides road users with multiple alternate options in the event of an unplanned disruption of one part of the system. There are, however, key links in the transportation system that may cause significant inconvenience to users if they are unexpectedly closed to traffic. Key transportation links include:

- **Geographic divides:** Areas where a geographic feature (river, lake, hilly terrain, or limited access road) limits crossing points of the feature; bridge failures, in particular, can create loss of access to entire regions of the state
- **Emergency alternate routes for high-volume roads and bridges:** Roads and bridges that are routinely used as alternate routes for high-volume assets are included in an emergency response plan
- **Limited access areas:** Roads and bridges that serve remote or limited access areas that result in long detours if closed
- **Main access to key commercial districts:** Areas with a large concentration of businesses or where large-size business will be significantly impacted if a road is unavailable
- Our road and bridge network includes the following critical assets: MCRC has posted weight restricted bridges. Of the 19 posted bridges, one bridge (6942) is on the critical routes in the county shown in Figure 7. MCRC has 12 scour critical bridges. Of these 12 scour critical bridges, one (6943) is on the critical routes. The county's 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.

- Figure 7 illustrates the key transportation links in MCRC's road and bridge network. The roads on this map vary from poor to good Paser scores but offer no threat of impassability to the general public under normal circumstances. In the event of a failure, the routes would be redirected to the nearest primary road. MCRC has established a primary corridor that offers many different connection points to key areas like the City of Midland.

2023 Midland County
Critical Transportation Links

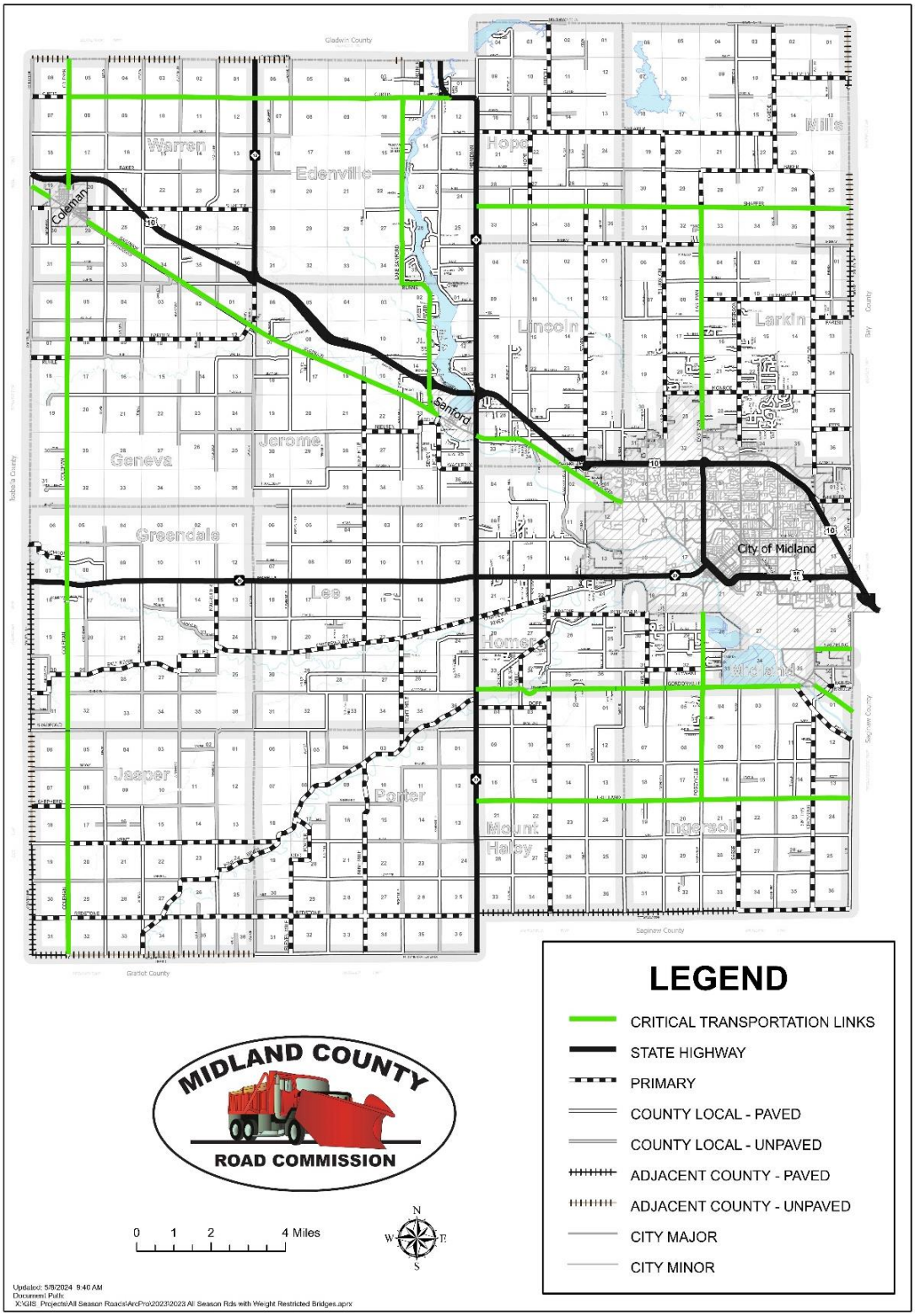

Figure 7: Key transportation links in MCRC's road and bridge network

7. COORDINATION WITH OTHER ENTITIES

An asset management plan provides significant value for infrastructure owners because it serves as a platform to engage other infrastructure owners using the same shared right of way space. MCRC communicates with both public and private infrastructure owners to coordinate work in the following ways:

COORDINATION WITH CITY OF MIDLAND

Items MCRC coordinates with the City of Midland on an as-needed basis

- Road improvement projects that interlink City roads with County roads

COORDINATION WITH CITY OF COLEMAN

Items MCRC coordinates with the City of Coleman on an as-needed basis

- Current and future road improvement projects that interlink City roads with County roads

COORDINATION WITH VILLAGE OF SANFORD

Items MCRC coordinates with the Village of Sanford on an as-needed basis

- Current and future road improvement projects that interlink Village roads with county roads
- Detour routes
- Bridge maintenance

COORDINATION WITH MICHIGAN DEPARTMENT OF TRANSPORATION (MDOT)

Items MCRC coordinates with MDOT on a regular basis.

- Current and future road improvement projects that interlink with county roads
- Scheduling of road improvement projects
- Detour routes
- Bridge maintenance and future bridge rehabs

COORDINATION WITH MIDLAND COUNTY DRAIN COMMISSION

Items MCRC coordinates with the drain commission on a regular basis are below:

- Replacement of county drain culverts that cross county roads
- Sizing of county drain culverts

COORDINATION WITH LOCAL TOWNSHIPS

MCRC coordinates with all of Midland County's 16 townships on a yearly basis. Items MCRC coordinates are below:

- Current and future road and drainage projects within the Township
- Maintenance strategies for current road assets
- Local match funding

COORDINATION WITH WATER DISTRICTS

MCRC coordinates with Midland County's water Districts and City of Midland water.

Items MCRC coordinates with the water districts on an as-needed basis are below:

- Planning road improvement projects in conjunction with water mains proposed under roadways
- Responding to water main breaks that affect the roadway.

In order to ensure coordination with the above listed stakeholders is of the best quality and interest of Midland County residents, MCRC coordinates with several private entities and the local Metropolitan Planning Organization (MPO) for different projects. The local MPO is known as Midland Area Transportation Study (MATS). MATS is a transportation policy-making body governed by a Policy Committee that includes elected and appointed officials within the MATS area and representatives from the Federal Highways Administration (FHWA) and MDOT.

Items MCRC coordinates with MATS on a twice per month basis are below:

- Planning and Programming funds for projects and operations

- Evaluate alternative transportation improvement options
- Maintaining Metropolitan Transportation Plan (MTP) and Long-Range Transportation Plan (LRTP)
- Develop a Transportation Improvement Plan (TIP)
- Discuss ways to involve the general public and other constituencies in the functions above

The private entities include design consultants and industry such as Dow Chemical.

Items MCRC coordinates with private entities on an as-needed basis

- Design of current and future road improvement projects
- Scheduling of road improvement projects
- Easement acquisition
- Bridge design
- Inspection and Staking of Construction Projects

Overall, MCRC takes advantage of coordinated infrastructure work to reduce cost and maximize value using the following policies:

Roads which are in poor condition that have a subsurface infrastructure project planned which will destroy more than half the lane with will be rehabilitated or reconstructed full width using transportation funds to repair the balance of the road width.

Subsurface infrastructure projects which will cause damage to pavements in good condition will be delayed as long as possible, or will consider methods that do not require pavement cuts.

Subsurface utility projects will be coordinated to allow all under pavement assets to be upgraded in the same project regardless of ownership.

8. PROOF OF ACCEPTANCE

PUBLIC ACT 325

CERTIFICATION OF TRANSPORTATION ASSET MANAGEMENT PLAN

Certification Year: 2024

Local Road-owning Agency Name: Midland County Road Commission

Beginning October 2019 and on a three-year cycle thereafter, certification must be made for compliance to Public Act 325. A local road-owning agency with 100 certified miles or more must certify that it has developed an asset management plan for the road, bridge, culvert, and traffic signal assets. Signing this form certifies that the hitherto referred agency meets with minimum requirements as outlined by Public Act 325 and agency-defined goals and objectives.

This form must be signed by the chairperson of the local road-owning agency or the county executive and chief financial officer of the local road-owning agency.

Signature		Signature	
Printed Name **Michael Atton**		Printed Name **Donna Lowe**	
Title **MCRC Board Chairman**	Date 9-26-24	Title **Finance Director**	Date 9-26-24

Due every three years based on agency submission schedule

Submittal Date: 9-30-2024

See attached council meeting minutes and/or resolution.

MIDLAND
COUNTY ROAD COMMISSION
2334 N. MERIDIAN ROAD
SANFORD, MI 48657

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Certification of the 2024 Transportation Asset Management Plan

The proposed 2024 Transportation Asset Management Plan was presented to the board for review and discussion.

Moved by Commissioner Cozat and supported by Commissioner Atton to offer the following resolution:

WHEREAS, Beginning October 2019 and on a three-year cycle thereafter, certification must be made for compliance to Public Act 325; and

WHEREAS, A local road-owning agency with 100 certified miles or more must certify that it has developed an asset management plan for the road, bridge, culvert, and traffic signal assets.

THEREFORE, BE IT RESOLVED, that the Board of County Road Commissioners, County of Midland, certifies the 2024 Transportation Asset Management Plan.

Roll Call.
Yeas: Commissioners Atton, Cozat
Nays: None

Resolution Adopted

I, Donna Lowe, Clerk-Secretary of the Board of County Road Commissioners, County of Midland, State of Michigan, do hereby certify that the above is a true copy of the portion of the proceeds as incorporated in the minutes of a regular meeting of the Midland County Road Commission held on September 26, 2024.

Donna Lowe

Donna Lowe, Clerk-Secretary

DATE: September 26, 2024

A. PAVEMENT ASSET MANAGEMENT PLAN

An attached pavement asset management plan follows.

Midland County Road Commission
2024 Pavement
Asset Management Plan

A plan describing the Midland County Road Commission's roadway assets and conditions.

Prepared by:
Travis Havercamp
Design Engineer
travis@midlandroads.com

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EXECUTIVE SUMMARY

As conduits for commerce and connections to vital services, roads are among the most important assets in any community along with other assets like bridges, culverts, traffic signs, traffic signals, and utilities that support and affect roads. The Midland County Road Commission's (MCRC) roads, other transportation assets, and support systems are also 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 roads, 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 network in an efficient and effective manner. This asset management plan is intended to report on how MCRC is meeting its obligations to maintain the public assets for which it is responsible.

This plan overviews MCRC's road assets and condition, and explains how MCRC works to maintain and improve the overall condition of those assets. These explanations can help answer the following questions:

- What kinds of road assets MCRC has in its jurisdiction, who owns them, and the different options for maintaining these assets.
- What tools and processes MCRC uses to track and manage road assets and funds.
- What condition MCRC's road assets are in compared to statewide averages.
- Why some road assets are in better condition than others and the path to maintaining and improving road asset conditions through proper planning and maintenance.
- How agency transportation assets are funded and where those funds come from.
- How funds are used and the costs incurred during MCRC's road assets' normal life cycle.
- What condition MCRC can expect its road 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 MCRC's road assets.

MCRC owns and/or manages 862.94 centerline miles of roads. This road network can be divided into the county primary network, the county local network, the unpaved road network, and the National Highway System (NHS) network based on the different factors these roads have that influence asset management decisions. A summary of MCRC historical and current network conditions, projected trends, and goals for county primary network can be seen in the figure, below:

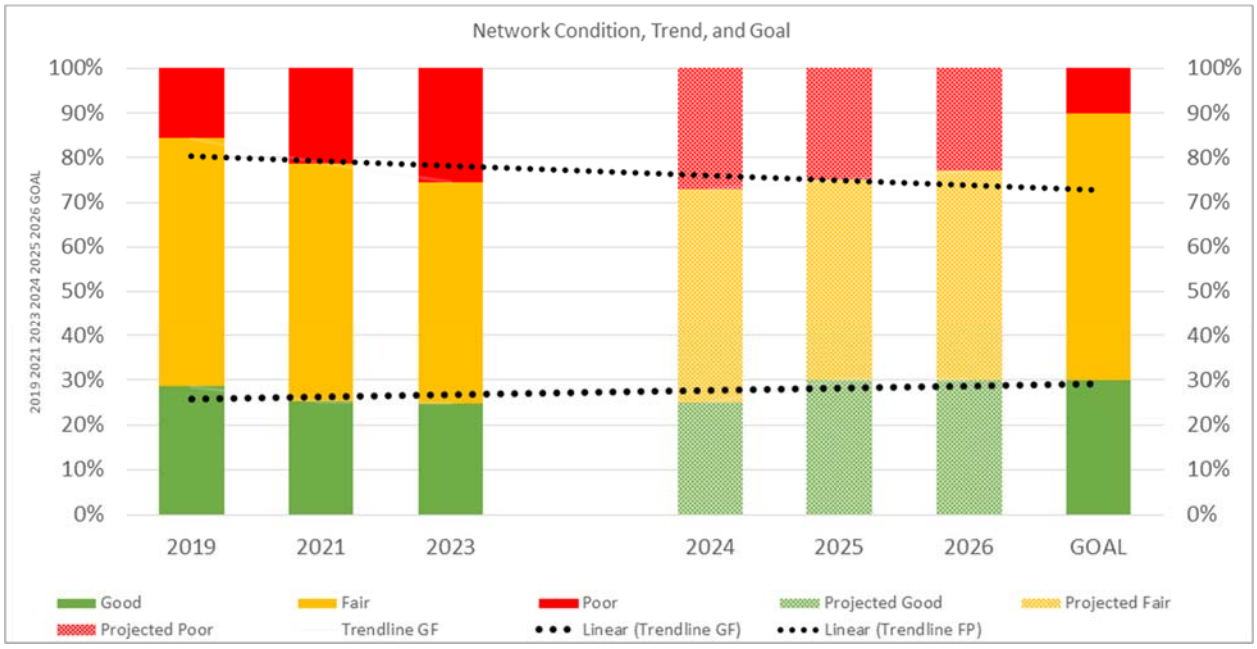


Figure 1: County Primary Network Condition, Trend, Goal

An asset management plan is required by Michigan Public Act 325 of 2018, and this document represents fulfillment of some of MCRC's obligations towards meeting these requirements. This asset management plan also helps demonstrate MCRC's responsible use of public funds by providing elected and appointed officials as well as the general public with inventory and condition information of MCRC's road assets, and gives taxpayers the information they need to make informed decisions about investing in its 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). MCRC 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 road network. Asset management also provides a transparent decision-making process that allows the public to understand the technical and financial challenges of managing road infrastructure with a limited budget.

The Midland County Road Commission (MCRC) has adopted an "asset management" business process to overcome the challenges presented by having limited financial, staffing, and other resources while needing to meet road users' expectations. MCRC is responsible for maintaining and operating over 862.94 centerline miles of roads.

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

Questions regarding the use or content of this plan should be directed to Travis Havercamp at 2334 N Meridian Rd, Sanford, MI 48657 or at 989-687-9060/russ@midlandroads.com. Key terms used in this plan are defined in MCRC'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 the asset classes themselves is a crucial starting point to understanding the rationale behind an asset management approach. The following primer provides an introduction to pavements.

Pavement Primer

Roads come in two basic forms—paved and unpaved. Paved roads have hard surfaces. These hard surfaces can be constructed from asphalt, concrete, composite (asphalt and concrete), sealcoat, and brick and block materials. On the other hand, unpaved roads have no hard surfaces. Examples of these surfaces are gravel and unimproved earth.

The decision to pave with a particular material as well as the decision to leave a road unpaved allows road-owning agencies to tailor a road to a particular purpose, environment, and budget. Thus, selecting a pavement type or leaving a road unpaved depends upon purpose, materials available, and budget. Each choice represents a trade-off between budget and costs for construction and maintenance.

Maintenance enables the road to fulfill its particular purpose. To achieve the maximum service for a pavement or an unpaved road, continual monitoring of a road's pavement condition is essential for choosing the right time to apply the right fix in the right place.

Here is a brief overview of the different types of pavements, how condition is assessed, and treatment options that can lengthen a road's service life.

Surfacing

Pavement type is influenced by several different factors, such as cost of construction, cost of maintenance, frequency of maintenance, and type of maintenance. These factors can have benefits affecting asset life and road user experience.

Paved Surfacing

Typical benefits and tradeoffs for hard surface types include:

- **Concrete pavement:** Concrete pavement, which is sometimes called a rigid pavement, is durable and lasts a long time when properly constructed and maintained. Concrete pavement can have longer service periods between maintenance activities, which can help reduce maintenance-related traffic disruptions. However, concrete pavements have a high initial cost and can be challenging to rehabilitate and maintain at the end of their service life. A typical concrete pavement design life will provide service for 30 years before major rehabilitation is necessary.
- **Hot-mix asphalt pavement (HMA):** HMA pavement, sometimes known as asphalt or flexible pavement, is currently less expensive to construct than concrete pavement (this is, in some part, due to the closer link between HMA material costs and oil prices that HMA pavements have in comparison with other pavement types). However, they require frequent maintenance activities to maximize their service life. A typical HMA pavement design life will provide service for 18 years before major rehabilitation is necessary. The vast majority of local-agency-owned pavements are HMA pavements.

- **Composite pavements:** Composite pavement is a combination of concrete and asphalt layers. Typically, composite pavements are old concrete pavements exhibiting ride-related issues that were overlaid by several inches of HMA in order to gain more service life from the pavement before it would need reconstruction. Converting a concrete pavement to a composite pavement is typically used as a "holding pattern" treatment to maintain the road in usable condition until reconstruction funds become available.
- **Sealcoat pavement:** Sealcoat pavement is a gravel road that have been sealed with a thin asphalt binder coating that has stone chips spread on top (not to be confused with a chip seal treatment over HMA pavement). This type of a pavement relies on the gravel layer to provide structure to support traffic, and the asphalt binder coating and stone chips shed water and eliminate the need for maintenance grading. Nonetheless, sealcoat pavement does require additional maintenance steps that asphalt and gravel do not require and does not last as long as HMA pavement, but it provides a low-cost alternative for lightly-trafficked areas and competes with asphalt for ride quality when properly constructed and maintained. Sealcoat pavement can provide service for ten or more years before the surface layer deteriorates and needs to be replaced.

Unpaved Surfacing

Typical benefits and tradeoffs for non-hard surfacing include:

- **Gravel:** Gravel is a low-cost, easy-to-maintain road surface made from layers of soil and aggregate (gravel). However, there are several potential drawbacks such as dust, mud, and ride smoothness when maintenance is delayed or traffic volume exceeds design expectations. Gravel roads require frequent low-cost maintenance activities. Gravel can be very cost effective for lower-volume, lower-speed roads. In the right conditions, a properly constructed and maintained gravel road can provide a service life comparable to an HMA pavement and can be significantly less expensive than the other pavement types.

Pavement Condition

Besides traffic congestion, pavement condition is what road users typically notice most about the quality of the roads that they regularly use—the better the pavement condition, the more satisfied users are with the service provided by the roadwork performed by road-owning agencies. Pavement condition is also a major factor in determining the most cost-effective treatment—that is, routine maintenance, capital preventive maintenance, or structural improvement—for a given section of pavement. As pavements age, they transition between "windows" of opportunity when a specific type of treatment can be applied to gain an increase in quality and extension of service life. Routine maintenance is day-to-day, regularly-scheduled, low-cost activity applied to "good" roads to prevent water or debris intrusion. Capital preventive maintenance (CPM) is a planned set of cost-effective treatments for "fair" roads that corrects pavement defects, slows further deterioration, and maintains the functional condition without increasing structural capacity. MCRC uses pavement condition and age to anticipate when a specific section of pavement will be a potential candidate for preventive maintenance. More detail on this topic is included in the *Pavement Treatment* section of this primer.

Pavement condition data is also important because it allows road owners to evaluate the benefits of preventive maintenance projects. This data helps road owners to identify the most cost-effective use of road construction and maintenance dollars. Further, historic pavement condition data can enable road owners to predict future road conditions based on budget constraints and to determine if a road network's condition will improve, stay the same, or degrade at the current or planned investment level. This analysis can help determine how much additional funding is necessary to meet a network's condition improvement goals.

Paved Road Condition Rating System

MCRC is committed to monitoring the condition of its road network and using pavement condition data to drive cost-effective decision-making and preservation of valuable road assets. MCRC uses the Pavement Surface Evaluation and Rating (PASER) system to assess its paved roads. PASER was developed by the University of Wisconsin Transportation Information Center to provide a simple, efficient, and consistent method for evaluating road condition through visual inspection. The widely-used PASER system has specific criteria for assessing asphalt, concrete, sealcoat, and brick and block pavements. Information regarding the PASER system and PASER manuals may be found on the TAMC website at: http://www.michigan.gov/tamc/0,7308,7-356-82158_82627---,00.html.

The TAMC has adopted the PASER system for measuring statewide pavement conditions in Michigan for asphalt, concrete, composite, sealcoat, and brick-and-block paved roads. Broad use of the PASER system means that data collected at MCRC is consistent with data collected statewide. PASER data is collected using trained inspectors in a slow-moving vehicle using GPS-enabled data collection software provided to road-owning agencies at no cost to them. The method does not require extensive training or specialized equipment, and data can be collected rapidly, which minimizes the expense for collecting and maintaining this data.

The PASER system rates surface condition using a 1-10 scale where 10 is a brand new road with no defects that can be treated with routine maintenance, 5 is a road with distresses but is structurally sound that can be treated with preventive maintenance, and 1 is a road with extensive surface and structural distresses that is in need of total reconstruction.

Roads with lower PASER scores generally require costlier treatments to restore their quality than roads with higher PASER scores. The cost effectiveness of treatments generally decreases the as the PASER number decreases. In other words, as a road deteriorates, it costs more dollars per mile to fix it, and the dollars spent are less efficient in increasing the road's service life. Nationwide experience and asset management principles tell us that a road that has deteriorated to a PASER 4 or less will cost more to improve and the dollars spent are less efficient. Understanding this cost principle helps to draw meaning from the current PASER condition assessment.

The TAMC has developed statewide definitions of road condition by creating three simplified condition categories—"good", "fair", and "poor"—that represent bin ranges of PASER scores having similar contexts with regard to maintenance and/or reconstruction. The definitions of these rating conditions are:

- "Good" roads, according to the TAMC, have PASER scores of 8, 9, or 10. Roads in this category have very few, if any, defects and only require minimal maintenance; they may be kept in this category longer using PPM. These roads may include those that have been recently seal coated or newly constructed. Figure 1 illustrates an example of a road in this category.
- "Fair" roads, according to the TAMC, have PASER scores of 5, 6, or 7. Roads in this category still show good structural support, but their surface is starting to deteriorate. Figure 1 illustrates two road examples in this category. CPM can be cost effective for maintaining the road's "fair" condition or even raising it to "good" condition before the structural integrity of the pavement has been severely impacted. CPM treatments can be likened to shingles on a roof of a house: while the shingles add no structural value, they protect the house from structural damage by maintaining the protective function of a roof covering.
- "Poor" roads, according to the TAMC, have PASER scores of 1, 2, 3, or 4. These roads exhibit evidence that the underlying structure is failing, such as alligator cracking and rutting. These roads must be rehabilitated with treatments like a heavy overlay, crush and shape, or total reconstruction. Figure 2 illustrates a road in this category.

Figure 2: *Top image, right*– PASER 8 road that is considered "good" by the TAMC exhibit only minor defects. *Second image, right*– PASER 5 road that is considered "fair" by the TAMC. Exhibiting structural soundness but could benefit from CPM. *Third image, right*– PASER 6 road that is considered "fair" by the TAMC. *Bottom image, right*– PASER 2 road that is considered "poor" by the TAMC exhibiting significant structural distress.

The TAMC's good, fair, and poor categories are based solely on the definitions, above. Therefore, caution should be exercised when comparing other condition

assessments with these categories because other condition assessments may have “good”, “fair”, or “poor” designations similar to the TAMC condition categories but may not share the same definition. Often, other condition assessment systems define the “good”, “fair”, and “poor” categories differently, thus rendering the data of little use for cross-system comparison. The TAMC’s definitions provide a statewide standard for all of Michigan’s road-owning agencies to use for comparison purposes.

PASER data is collected 100 percent every year on all federal-aid-eligible roads in Michigan. The TAMC dictates and funds the required training and the format for this collection, and it shares the data regionally and statewide. In addition, MCRC collects 100 percent of its paved non-federal-aid-eligible network using its own staff and resources approximately every 3 years.

MCRC performs routine maintenance to local gravel roads in the county and works with Townships to improve their gravel roads when deemed necessary. However, currently, MCRC does rate any of the county’s gravel roads.

Pavement Treatments

Selection of repair treatments for roads aims to balance costs, benefits, and road life expectancy. All pavements are damaged by water, traffic weight, freeze/thaw cycles, and sunlight. Each of the following treatments and strategies—reconstruction, structural improvements, capital preventive maintenance, and others used by MCRC—counters at least one of these pavement-damaging forces.

Reconstruction

Pavement reconstruction treats failing or failed pavements by completely removing the old pavement and base and constructing an entirely new road (Figure 3). Every pavement must eventually be reconstructed, and it is usually done as a last resort after more cost-effective treatments are done, or if the road requires significant changes to road geometry, base, or buried utilities. Compared to the other treatments, which are all improvements of the existing road, reconstruction is the most extensive rehabilitation of the roadway and therefore, also the most expensive per mile and most disruptive to regular traffic patterns. Reconstructed pavement will subsequently require one or more of the previous maintenance treatments to maximize service life and performance. A reconstructed road lasts approximately 15 years and costs $250,000 per lane mile. The following descriptions outline the main reconstruction treatments used by MCRC.

Figure 3: Examples of reconstruction treatments—(left) reconstructing a road and (right) road prepared for full-depth repair.

Crush and Shape

During a crush and shape treatment, the existing pavement and base are pulverized and then the road surface is reshaped to correct imperfections in the road's profile (Figure 4). An additional layer of gravel is often added along with a new wearing surface such as an HMA overlay or chip seal. Additional gravel and an HMA overlay give an increase in the pavements structural capacity. This treatment is usually done on rural roads with severe structural distress; Adding gravel and a wearing surface makes it more prohibitive for urban roads if the curb and gutter is not raised up. Crush and shape treatments last approximately 14 years and cost $250,000 per mile.

Ditching (for Unpaved Roads)

Water needs to drain away from any roadway to delay softening of the pavement structure, and proper drainage is critical for unpaved roads where there is no hard surface on top to stop water infiltration into the road surface and base. To improve drainage, new ditches are dug, or old ones are cleaned out. Unpaved roads typically need to be re-ditched every 15 years at a cost of $40,000 per lane mile.

Gravel Overlay (for Unpaved Roads)

Unpaved roads will exhibit gravel loss over time due to traffic, wind, and rain. Gravel on an unpaved road provides a wear surface and contributes to the structure of the entire road. Unpaved roads typically need to be overlaid with four inches of new gravel every 15 years at a cost of $65,000 per mile.

Structural Improvement

Roads requiring structural improvements exhibit alligator cracking and rutting and rated poor in the TAMC scale. Road rutting is evidence that the underlying structure is beginning to fail and it must be either rehabilitated with a structural treatment. Examples of structural improvement treatments include HMA overlay with or without milling, and crush and shape (Figure 4). The following descriptions outline the main structural improvement treatments used by MCRC.

Figure 4: Examples of structural improvement treatments—(from left) HMA overlay on an unmilled pavement, milling asphalt pavement, and pulverization of a road during a crush-and-shape project.

Hot-mix Asphalt (HMA) Overlay with/without Milling

An HMA overlay is a layer of new asphalt (liquid asphalt and stones) placed on an existing pavement (Figure 4). Depending on the overlay thickness, this treatment can add significant structural strength. This treatment also creates a new wearing surface for traffic and seals the pavement from water, debris, and sunlight damage. An HMA overlay lasts approximately five to ten years and costs $100,000 to $120,000 per mile. The top layer of severely damaged pavement can be removed by the milling, a technique that helps prevent structural problems from being quickly reflected up to the new surface. Milling is also done to keep roads at the same height of curb and gutter that is not being raised or reinstalled in the project. Milling adds $20,000 per mile to the HMA overlay cost.

Capital Preventive Maintenance

Capital preventive maintenance (CPM) addresses pavement problems of fair-rated roads before the structural integrity of the pavement has been severely impacted. CPM is a planned set of cost-effective treatments applied to an existing roadway that slows further deterioration and that maintains or improves the functional condition of the system without significantly increasing the structural capacity. Examples of such treatments include crack seal, fog seal, chip seal, slurry seal, and microsurface (Figure 5). The purpose of the following CPM treatments is to protect the pavement structure, slow the rate of deterioration, and/or correct pavement surface deficiencies. The following descriptions outline the main CPM treatments used by MCRC.

Figure 5: Examples of capital preventive maintenance treatments—(from left) crack seal, fog seal, chip seal, and slurry seal/microsurface.

Crack Seal

Water that infiltrates the pavement surface softens the pavement structure and allows traffic loads to cause more damage to the pavement than in normal dry conditions. Crack sealing helps prevent water infiltration by sealing cracks in the pavement with asphalt sealant (Figure 5). MCRC seals pavement cracks early in the life of the pavement to keep it functioning as strong as it can and for as long as it can. Crack sealing lasts approximately two years and costs $3,500 per mile. Even though it does not last very long compared to other treatments, it does not cost very much compared to other treatments. This makes it a very cost effective treatment when MCRC looks at what crack filling costs per year of the treatment's life.

Fog Seal

Fog sealing sprays a liquid asphalt coating onto the entire pavement surface to fill hairline cracks and prevent damage from sunlight (Figure 5). Fog seals are best for good to very good pavements and last approximately two years at a cost of $5,000 per lane mile.

Chip Seal

A chip seal, also known as a sealcoat, is a two-part treatment that starts with liquid asphalt sprayed onto the old pavement surface followed by a single layer of small stone chips spread onto the wet liquid asphalt layer (Figure 5). The liquid asphalt seals the pavement from water and debris and holds the stone chips in place, providing a new wearing surface for traffic that can correct friction problems and helping to prevent further surface deterioration. Chip seals are best applied to pavements that are not exhibiting problems with strength, and their purpose is to help preserve that strength. These treatments last approximately five to eight years and cost $25,000 per mile.

Slurry Seal/Microsurface

A slurry seal or microsurface's purpose is to protect existing pavement from being damaged by water and sunlight. The primary ingredients are liquid asphalt (slurry seal) or modified liquid asphalt (microsurface), small stones, water and portland cement applied in a very thin (less than a half an inch) layer (Figure 5). The main difference between a slurry seal and a microsurface is the modified liquid asphalt used in microsurfacing provides different curing and durability properties, which allows microsurfacing to be used for filling pavement ruts. Since the application is very thin, these treatments do not add any strength to the pavement and only serves to protect the pavement's existing strength by sealing the pavement from sunlight and water damage. These treatments work best when applied before cracks are too wide and too numerous. A slurry seal treatment lasts approximately four years and costs $40,000 per mile, while a microsurface treatment tends to last for seven years and costs $50,000 per mile.

Partial-Depth Concrete Repair

A partial-depth concrete repair involves removing spalled (i.e., fragmented) or delaminated (i.e., separated into layers) areas of concrete pavement, usually near joints and cracks and replacing with new concrete (Figure 6). This is done to provide a new wearing surface in isolated areas, to slow down water infiltration, and to help delay further freeze/thaw damage. This repair lasts approximately five years and typically costs $20,000 per mile.

Maintenance Grading (for Unpaved Roads)

Maintenance grading involves regrading an unpaved road to remove isolated potholes, washboarding, and ruts then restoring the compacted crust layer (Figure 6). Crust on an unpaved road is a very tightly compacted surface that sheds water with ease but takes time to be created, so destroying a crusted surface with maintenance grading requires a plan to restore the crust. Maintenance grading often needs to be performed three to five times per year and each grading costs $500 per mile.

Dust Control (for Unpaved Roads)

Dust control typically involves spraying chloride or other chemicals on a gravel surface to reduce dust loss, aggregate loss, and maintenance (Figure 6). This is a relatively short-term fix that helps create a crusted surface. Chlorides work by attracting moisture from the air and existing gravel. This fix is not effective if the surface is too dry or heavy rain is imminent, so timing is very important. Dust control is done two to four times per year and each application costs $500 per mile.

Figure 6: Examples of capital preventive maintenance treatments, cont'd—(from left) concrete road prepared for partial-depth repair, gravel road undergoing maintenance grading, and gravel road receiving dust control application (dust control photo courtesy of Weld County, Colorado, weldgov.com

Innovative Treatments

Innovative treatments are those newer, unique, non-standard treatments that provide ways of treating pavements using established engineering principles in new and cost-effective ways. MCRC strives to be innovative with its pavement treatments by looking for ways to prevent pavement damage and save taxpayer dollars.

Geogrid Reinforced Road Base

A common occurrence on MCRC roads is road distresses due to a poor underlying road base. Rather than the more timely and expensive option of a complete road reconstruction, the geogrid reinforced base treatment is an alternative cost-effective option. The purpose of this treatment is to add stability to the existing base, which will help support asphalt and create a moisture barrier. This treatment costs approximately $25,000 per mile for the geogrid base. The treatment was applied for the first time this year and we hope to gain favorable results. There have been success stories with the same treatments from other locations throughout the United States.

Recycled Plastic Pavement

MCRC partnered with Dow Chemical and Larkin Township to pilot the use of recycled plastic bags and food-grade foam as a new additive for road paving projects in Summer of 2019. MCRC paved four different roads with the recycled material at thicknesses ranging from 1 inch to 2 inch. MCRC is the first in the United States to pave a public asphalt road composed of plastics. The new road segments have been monitored over the past 4 years and fair comparable to other traditional paving projects done at the same time with minor defects.

Asphalt Recycle Center

In the Spring of 2019, MCRC established an Asphalt Recycling Center for Midland County. This is an innovative and environmentally friendly way to reclaim asphalt pavement (RAP) and use it for hot patch road repairs. This is a huge benefit to MCRC especially during seasons when asphalt plants are closed. MCRC still has the ability to install a hot patch repair, which is much longer lasting than the traditional cold patch. This addition has proven to improve MCRC road maintenance.

Scrap Tire Asphalt Paving

In the Summer 2019, MCRC had a project on Eastman Rd that developed new or increased uses for scrap tires. MCRC applied for and received a DEQ Scrap Tire Market Development Grant. The project used the equivalent of 111,760 passenger tires to create a widened road subbase and strengthen the asphalt road surface. The new road segment has been monitored over the past 4 years and appears slightly worse due to resurfacing cracks as compared to other traditional paving projects done at the same time. However, it is one of the more heavily traveled roads in the county.

Maintenance

Maintenance is the most cost-effective strategy for managing road infrastructure and prevents good and fair roads from reaching the poor category, which require costly rehabilitation and reconstruction treatments to create a year of service life. It is most effective to spend money on routine maintenance and CPM treatments, first; then, when all maintenance project candidates are treated, reconstruction and rehabilitation can be performed as money is available. This strategy is called a “mix-of-fixes” approach to managing pavements.

1. PAVEMENT ASSETS

Building a mile of new road can cost over $1 million due to the large volume of materials and equipment that are necessary. The high cost of constructing road assets underlines the critical nature of properly managing and maintaining the investments made in this vital infrastructure. The specific needs of every mile of road within an agency's overall road network is a complex assessment, especially when considering rapidly changing conditions and the varying requisites of road users; understanding each road-mile's needs is an essential duty of the road-owning agency.

In Michigan, many different governmental units (or agencies) own and maintain roads, so it can be difficult for the public to understand who is responsible for items such as planning and funding construction projects, [patching] repairs, traffic control, safety, and winter maintenance for any given road. MDOT is responsible for state trunkline roads, which are typically named with "M", "I", or "US" designations regardless of their geographic location in Michigan. Cities and villages are typically responsible for all public roads within their geographic boundary with the exception of the previously mentioned state trunkline roads managed by MDOT. County road commissions (or departments) are typically responsible for all public roads within the county's geographic boundary, with the exception of those managed by cities, villages, and MDOT.

In cases where non-trunkline roads fall along jurisdictional borders, local and intergovernmental agreements dictate ownership and maintenance responsibility. Quite frequently, roads owned by one agency may be maintained by another agency because of geographic features that make it more cost effective for a neighboring agency to maintain the road instead of the actual road owner. Other times, road-owning agencies may mutually agree to coordinate maintenance activities in order to create economies of scale and take advantage of those efficiencies.

The MCRC is responsible for a total of 862.94 centerline miles of public roads, as shown in Figure 7.

Current Paved Road PASER Ratings

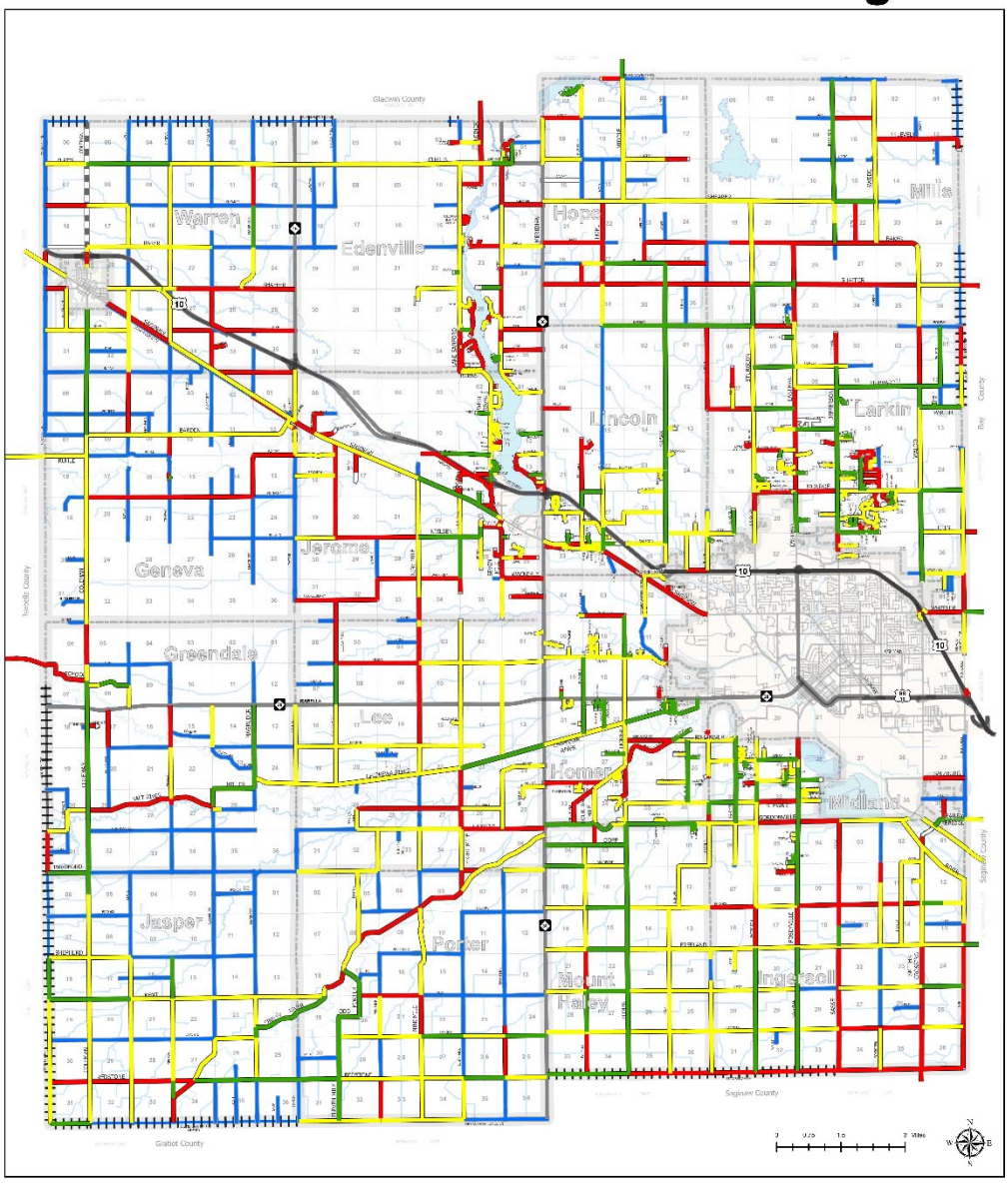


Figure 7: Map showing location of MCRC's paved roads (i.e., those managed by MCRC) and their current condition for paved roads with green for good (i.e., PASER 10, 9, 8), yellow for fair (i.e., PASER 7, 6, 5), and red for poor (i.e., PASER 4, 3, 2, 1), as well as the location of MCRC's unpaved roads in blue

Inventory

Michigan Public Act 51 of 1951 (PA 51), which defines how funds from the Michigan Transportation Fund (MTF) are distributed to and spent by road-owning agencies, classifies roads owned by MCRC as either county primary or county local roads. State statute prioritizes expenditures on the county primary road network.

Of the 862.94 centerline miles of public roads owned and/or managed by MCRC, approximately 82% of all County Primary roads are classified as federal aid eligible, which allows them to receive federal funding for their maintenance and construction. Only 1% of County Local roads are considered federal aid eligible, which means state and local funds must be used to manage these roads.

Figure 8 illustrates the percentage of roads owned by MCRC that are classified as county primary and county local roads. Figure 9 illustrates this breakdown of these road networks by township boundary within MCRC's jurisdiction.

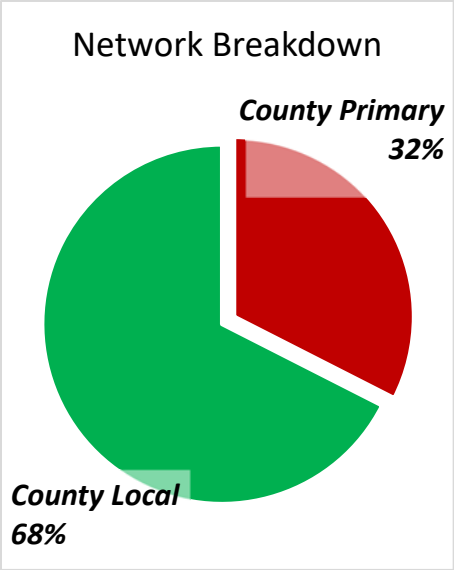


Figure 8: Percentage of county primary and county local roads for MCRC.

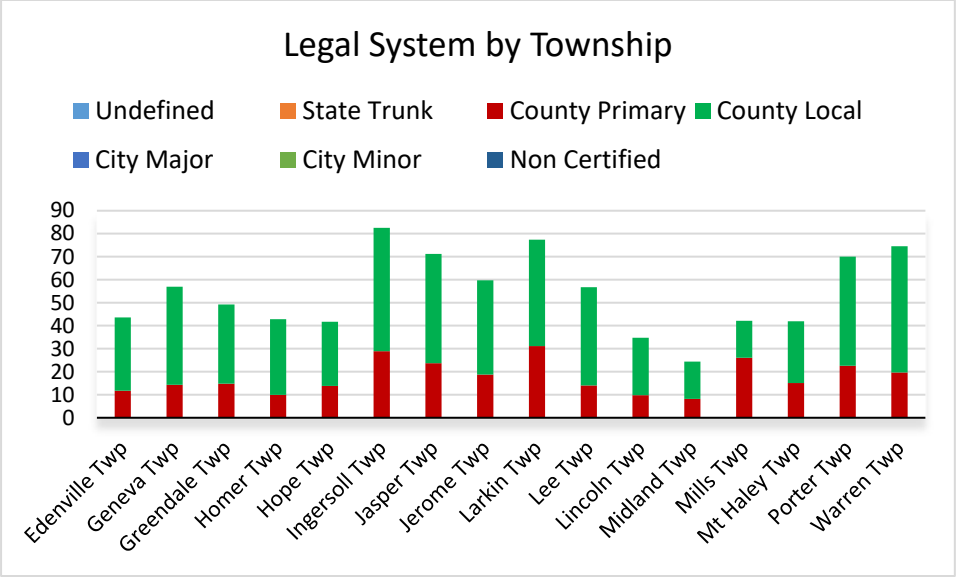


Figure 9: County primary and county local roads by Township for MCRC's jurisdiction.

MCRC manages 1.163 miles of roads that are part of the National Highway System (NHS)—in other words, those roads that are critical to the nation's economy, defense, and mobility—and monitors and maintains their condition. The NHS is subject to special rules and regulations and has its own performance metrics dictated by the FHWA. While most NHS roads in Michigan are managed by MDOT, MCRC manages a percentage of those roads located in its jurisdiction, as shown in Figure 10.

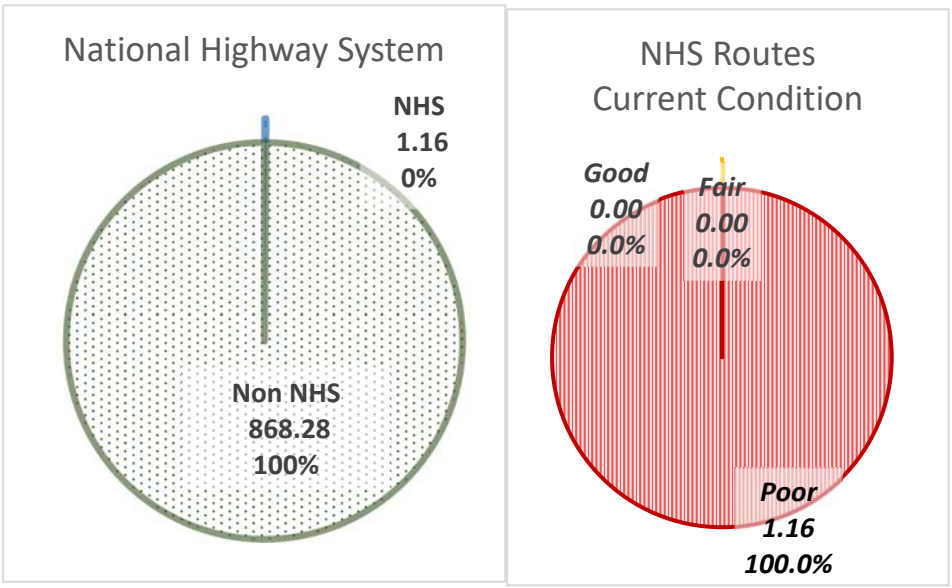


Figure 10: Miles of roads managed by MCRC that are part of the National Highway System and condition.

MCRC also owns and manages 196.601 miles of unpaved roads.

Types

MCRC has multiple types of pavements in its jurisdiction, including: asphalt, concrete, and undefined; it also has unpaved roads (i.e., gravel and/or earth). Factors influencing pavement type include cost of construction, cost of maintenance, frequency of maintenance, type of maintenance, asset life, and road user experience. More information on pavement types is available in the Introduction's Pavement Primer.

Figure 11 illustrates the percentage of various pavement types that MCRC has in its network. Figure 12 shows the pavement type by Township boundary for MCRC's jurisdiction.

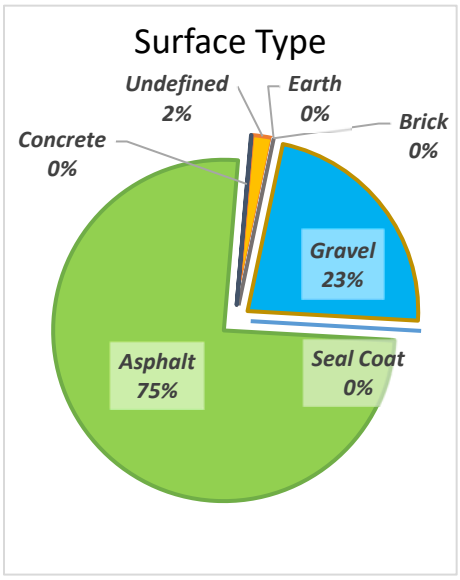


Figure 11: Pavement type by percentage maintained by MCRC Undefined pavements have not been inventoried in MCRC's asset management system to date but will be included as data becomes available.

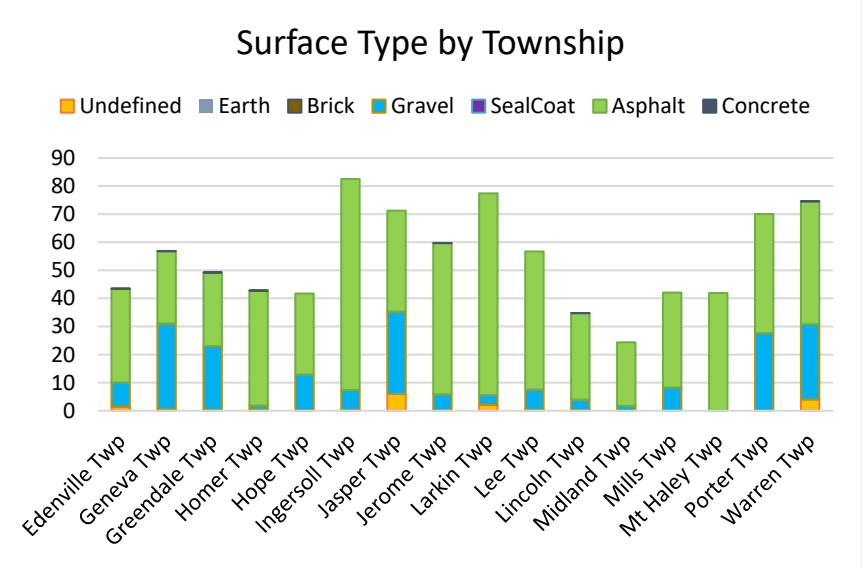


Figure 12: Pavement type by township within MCRC's jurisdiction. Undefined pavements have not been inventoried in MCRC's asset management system to date, but will be included as data becomes available.

Locations

Locations and sizes of each asset can be found in MCRC's Roadsoft database. For more detail, please refer to the agency contact listed in the *Introduction* of this pavement asset management plan.

Condition

The road characteristic that road users most readily notice is pavement condition. Pavement condition is a major factor in determining the most cost-effective treatment—that is, routine maintenance, capital preventive maintenance, or structural improvement—for a given section of pavement. MCRC uses pavement condition and age to anticipate when a specific section of pavement will be a potential candidate for preventive maintenance. Pavement condition data enables MCRC to evaluate the benefits of preventive maintenance projects and to identify the most cost-effective use of road construction and maintenance dollars. Historic pavement condition data can be used to predict future road conditions based on budget constraints and to determine if a road network's condition will improve, stay the same, or degrade at the current or planned investment level. This analysis helps to determine how much additional funding is necessary to meet a network's condition improvement goals. More detail on this topic is included in the Introduction's *Pavement Primer*.

Paved Roads

MCRC is committed to monitoring the condition of its road network and using pavement condition data to drive cost-effective decision-making and preservation of valuable road assets. MCRC uses the Pavement Surface Evaluation and Rating (PASER) system, which has been adopted by the TAMC for measuring statewide pavement conditions, to assess its paved roads. The PASER system provides a

simple, efficient, and consistent method for evaluating road condition through visual inspection. More information regarding the PASER system can be found in the Introduction's Pavement Primer.

MCRC collects 100 percent of its PASER data every year on all federal-aid-eligible roads in Michigan. In addition, going forward MCRC plans to collect 100 percent of its paved non-federal-aid-eligible network using its own staff and resources every 3 years.

MCRC's 2023 paved county primary road network has 27 percent of roads in the TAMC good condition category, 46 percent in fair, and 27 percent in poor (Figure 13A). The paved county local road network has 38 percent in good, 27 percent in fair, and 35 percent in poor (Figure 13B).

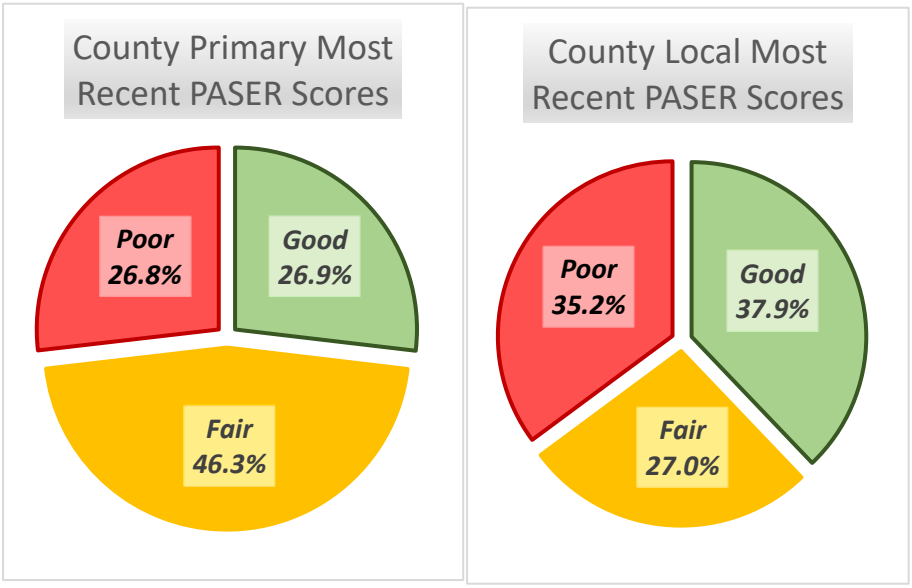


Figure 13: (A) Left: MCRC paved county primary road network conditions by percentage of good, fair, or poor, and (B) Right: paved county local road network conditions by percentage of good, fair, or poor

In comparison, the statewide paved county primary road network has 21 percent of roads in the TAMC good condition category, 40 percent in fair, and 39 percent in poor (Figure 14A). The statewide paved county local road network has 16 percent in good, 30 percent in fair, and 54 percent in poor (Figure 14B). Comparing Figure 13A and Figure 14A shows that MCRC's paved county primary road network is rated better than to similarly-classified roads in the rest of the state, while Figure 13B and Figure 14B show that MCRC's paved county local road network is better than similarly-classified roads in the rest of the state. Other road condition graphs can be viewed on the TAMC pavement condition dashboard at: http://www.mcgi.state.mi.us/mitrp/Data/PaserDashboard.aspx.

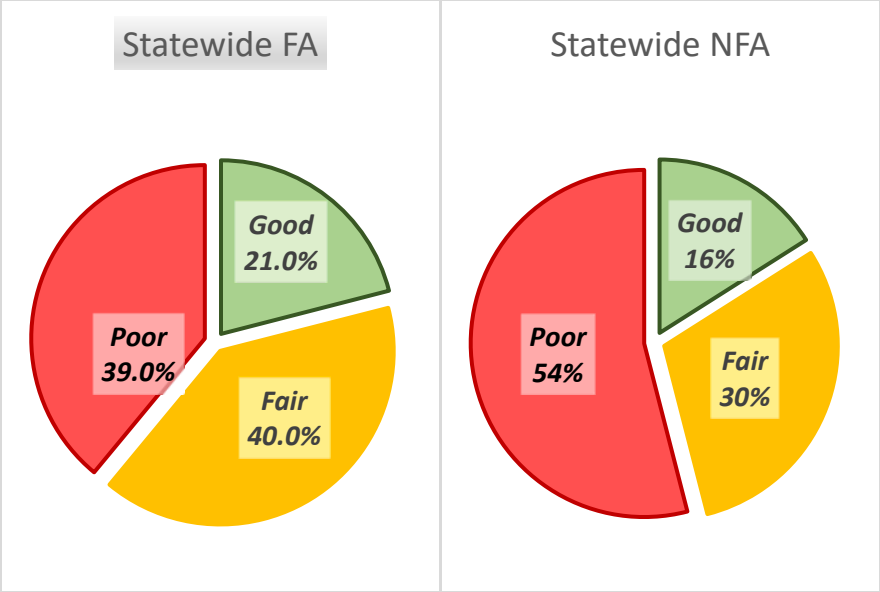


Figure 14: (A) Left: Statewide paved county primary road network conditions by percentage of good, fair, or poor, and (B) Right: paved county local road network conditions by percentage of good, fair, or poor

MCRC network conditions appear to be in a slightly better position than statewide paved county primaries. There are several potential reasons for this. The good percentage could be elevated due to recent chip seals which were likely fair ratings before. MCRC currently has two alternating road mileages that help provide funding for roads. MCRC staff has also been innovative in finding specialty grants to help boost funding for roads. Staff are proactive in keeping up with maintenance and choosing the best projects for the condition of the road. On the local side, road ratings are likely skewed due to the inability to rate those roads in recent years. However, they do provide good representation. MCRC was able to rate half of its Township roads this year. MCRC staff provides the same recommendations for road improvements to local Townships as it does for the primary roads. The main reason for the rating differences is funding and the larger quantity of local roads to primary roads.

Figure 15 and Figure 16 show the number of miles for MCRC's roads with PASER scores expressed in TAMC definition categories for the paved county primary road network (Figure 15) and the paved county local road network (Figure 16). MCRC considers road miles on the transition line between good and fair (PASER 8) and the transition line between fair and poor (PASER 5) as representing parts of the road network where there is a risk of losing the opportunity to apply less expensive treatments that gain significant improvements in service life.

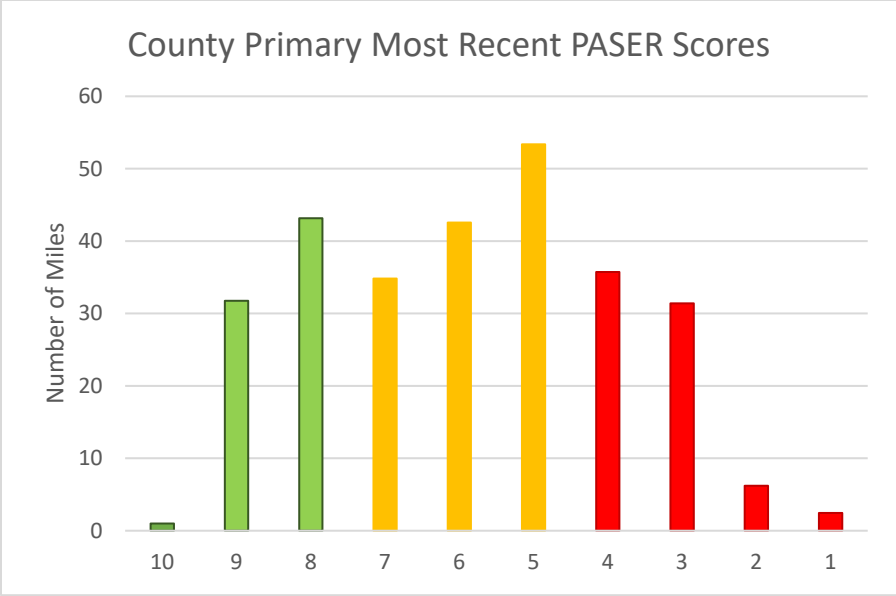


Figure 15: MCRC paved county primary road network conditions. Bar graph colors correspond to good/fair/poor TAMC designations.

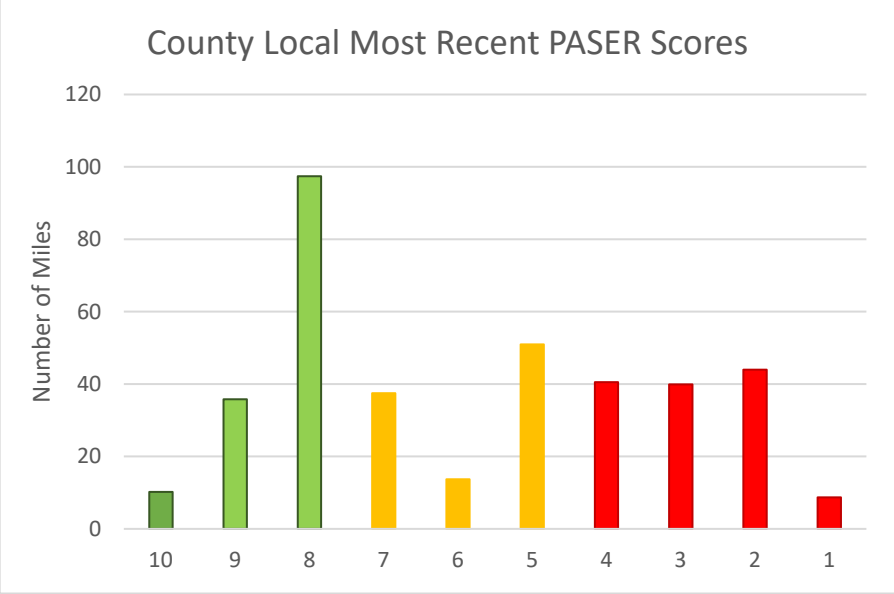


Figure 16: MCRC paved county local network condition by PASER rating. Bar graph colors correspond to good/fair/poor TAMC designations.

Figure 17 illustrates MCRC's entire paved road network divided by township into the TAMC good/fair/poor designations. Edenville, Greendale, Hope, Ingersoll, Larkin, Lee, Midland, Mills, and Warron townships were all rated in 2023.

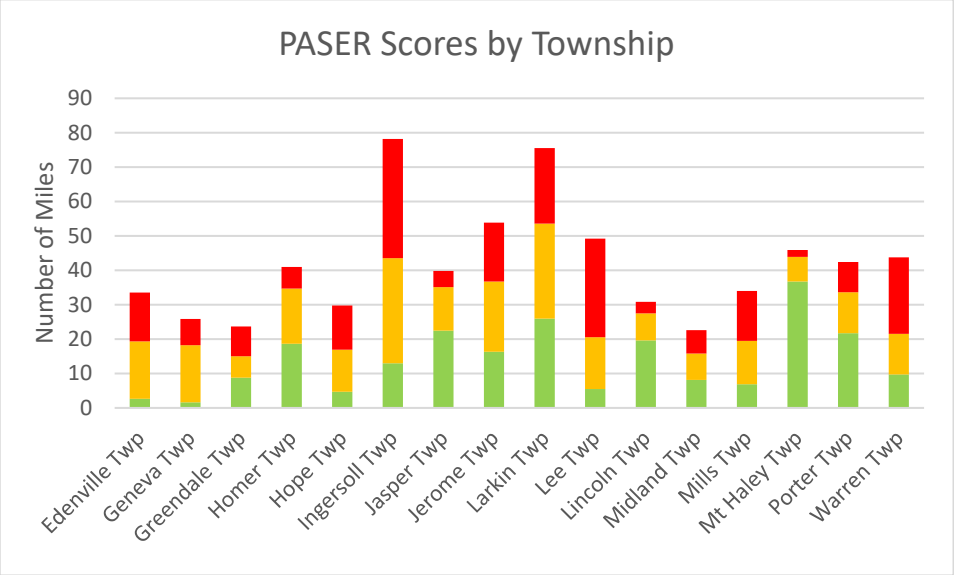
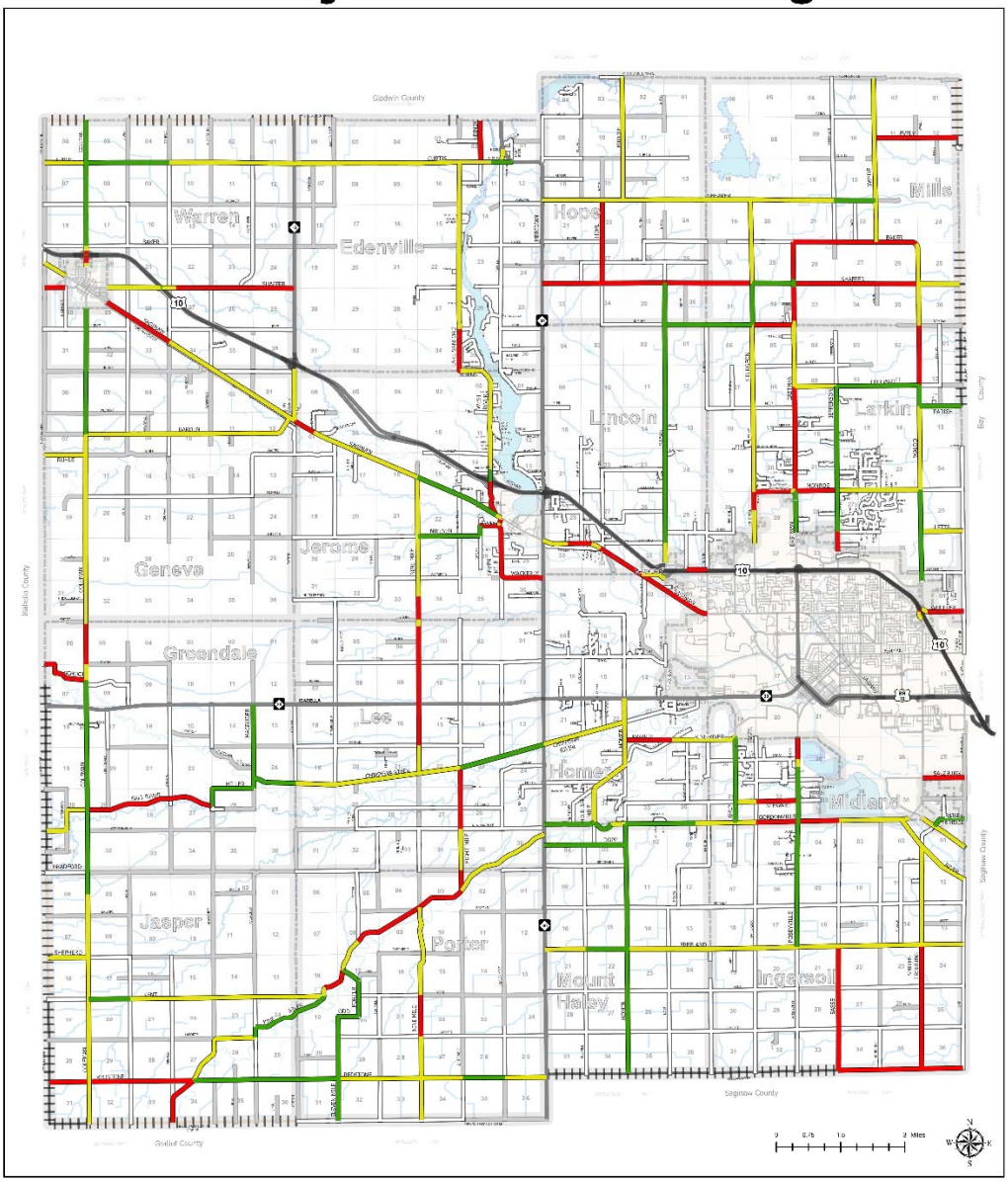


Figure 17: Number of miles of paved road in each township divided in categories of good (PASER 10, 9, 8), fair (PASER 7, 6, 5), and poor (PASER 4, 3, 2, 1).

Figure 18 provides a map illustrating the geographic location of primary paved roads and their respective PASER condition. An online version of the most recent PASER data is located at https://www.mcgi.state.mi.us/tamcMap/.

Primary Road PASER Ratings



Midland County Road Commission
2334 North Meridian Road
Sanford, Michigan 48657
Office: 989-687-9060 Fax: 989-687-9121

Figure 18: Map of the current paved road condition in good (PASER 10, 9, 8) shown in green, fair (PASER 7, 6, 5) shown in yellow, and poor (PASER 4, 3, 2, 1) shown in red. Only Roads owned by MCRC are shown.

The PASER rating distribution above shows that MCRC is falling a little short of its ultimate goal. However, they are progressing in the right direction and the map does not show projects that were completed in late summer and fall since PASER ratings were taken mid-summer. MCRC believes it is meeting all its user needs. The map shows a good distribution of quality roads in all four quadrants.

Historically, the overall quality of MCRC's paved county primary roads have been staying the same, as can be observed in Figure 19. The charts shows that in 3 year cycles, good roads increase slightly and so do poor roads. After the 4th year the poor roads begin to decrease with good roads remaining steady. PASER Scores were not recorded in the year 2020 due to the COVID pandemic.

Comparing MCRC's paved county primary road condition trends illustrated in Figure 19 with overall statewide condition trends for similarly-classified roads, which are illustrated in Figure 20, shows a similar trend locally as in the rest of the state with MCRC roads being slightly better than the state average.

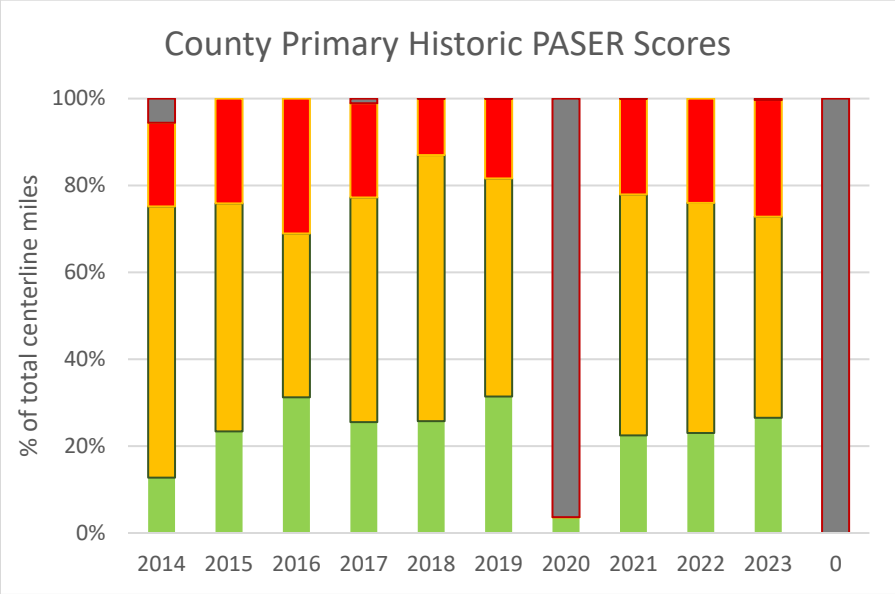


Figure 19: Historical MCRC paved county primary road network condition trend

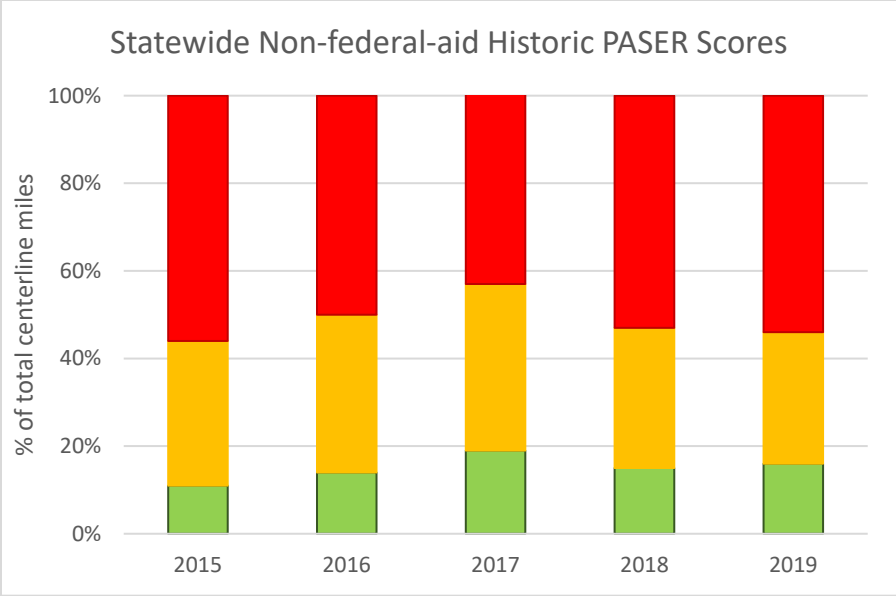


Figure 20: Historical statewide county primary road network condition trend

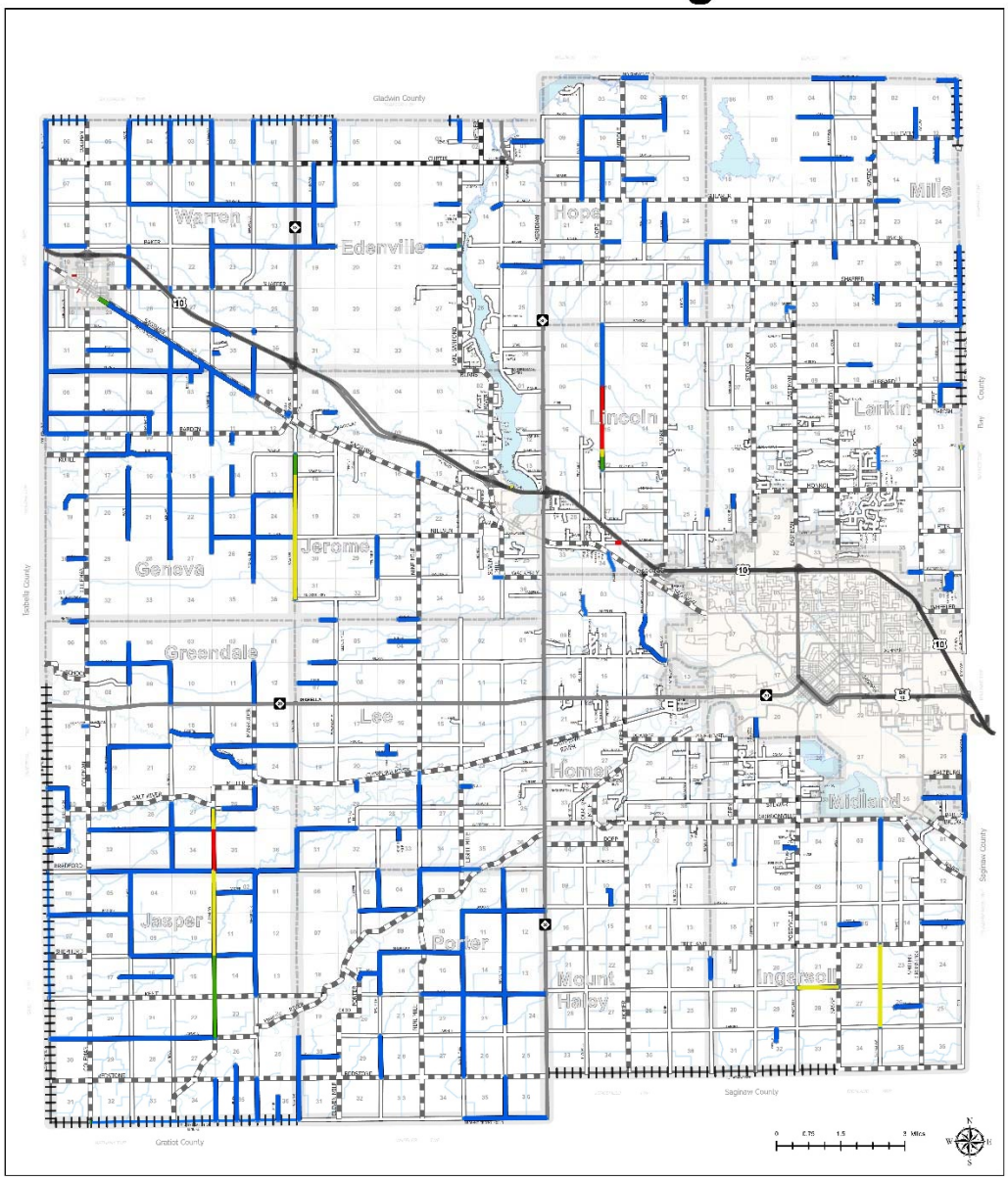
Historically, the overall quality of MCRC's paved county local roads is undefined due to lack of PASER ratings. In 2023 MCRC completed 9 of its 16 townships for PASER rating on paved roads. Going forward MCRC plans to rate all townships at a minimum once every 3 years.

Unpaved Roads

The condition of unpaved roads can be rapidly changing, which makes it difficult to obtain a consistent surface condition rating over the course of weeks or even days. The TAMC adopted the Inventory Based Rating (IBR) System™ for rating unpaved roads. MCRC has not yet had the opportunity to use the IBR System™ for rating its unpaved roads on a consistent basis. More information regarding the IBR System™ can be found in Introduction's Pavement Primer.

Figure 21 below maps the geographic location of unpaved roads in Midland County.

Gravel Road Ratings



ROAD LEGEND

- STATE HIGHWAY
- PRIMARY
- COUNTY LOCAL - PAVED
- COUNTY LOCAL - UNPAVED
- ADJACENT COUNTY - PAVED
- ADJACENT COUNTY - UNPAVED
- CITY MAJOR
- CITY MINOR

IBR RATING

- GOOD
- FAIR
- POOR
- UNRATED

MIDLAND COUNTY ROAD COMMISSION

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Figure 21: Map of the current IBR structural adequacy good (greater than 7") shown in green, fair (4" to 7") shown in orange, and poor (less than 4") shown in red. Unrated shown in blue. Only unpaved roads owned by MCRC are shown.

MCRC unpaved roads vary in condition depending on how much of a priority they are to the Townships. Each year MCRC drives the unpaved roads with the Township supervisors, and they come up with a maintenance plan. Many of the gravel roads have and will be improved if and when the Township is able to contribute the funds to do so. MCRC also regularly brines and grades all certified unpaved roads in the county.

Goals

Goals help set expectations for how pavement conditions will change in the future. Pavement condition changes are influenced by water infiltration, soil conditions, sunlight exposure, traffic loading, and repair work performed. MCRC is not able to control any of these factors fully due to seasonal weather changes, traffic pattern changes, and its limited budget. Despite the uncontrollable variables, it is still important to set realistic network condition goals that efficiently use budget resources to build and maintain roads meeting taxpayer expectations. An assessment of the progress toward these goals is provided in the *1. Pavement Assets*: *Gap Analysis* section of this plan.

Goals for Paved County Primary Roads

The overall goal for MCRC's paved county primary road network is to maintain or improve road conditions network-wide from 2023 levels. The baseline condition for this goal is illustrated in Figure 22.

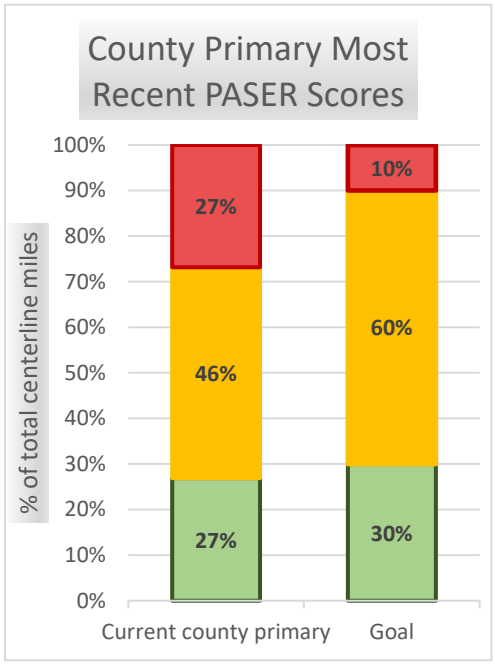


Figure 22: MCRC's 2023 county primary road network condition by percentage of good/fair/poor

MCRC's network-level pavement condition strategy for paved county primary roads is:

1. Prevent its good and fair (PASER 10 - 5) paved county primary from becoming poor (PASER 4 - 1).
2. Move 17 percent of paved county primary roads out of the poor category.
3. Improve 3 percent of paved county primary roads to the good category.

Goals for Paved County Local Roads

The overall goal for MCRC's paved county local road network is to continue to work with Townships to maintain or improve road conditions network-wide from 2023 levels. The baseline condition for this goal is illustrated in Figure 23. It is important to note that the figure includes only half of the Township ratings in the County.

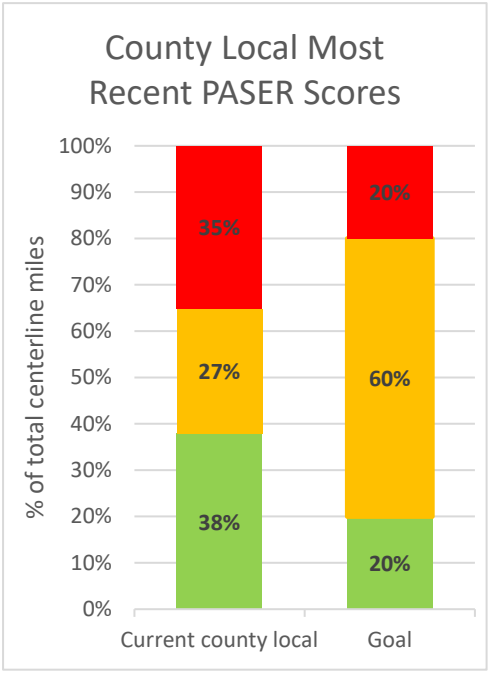


Figure 23: MCRC 2023 paved county local road network condition by percentage of good/fair/poor

MCRC's network-level pavement condition strategy for paved county local roads is:

1. Prevent its good and fair (PASER 10 - 5) paved county local roads from becoming poor (PASER 4 - 1).
2. Move 15 percent of paved county local roads out of the poor category.

Goals for Unpaved Roads

The overall goal for MCRC's unpaved road network is to maintain or improve road conditions network-wide from 2023 levels.

Our year-round unpaved roads will be maintained at their current structural adequacy assessments and current drainage adequacy assessments for roads where these two IBR elements are assessed as good or fair. Currently, an unknown percent of MCRC's year-round unpaved roads have good or fair structural adequacy and unknown percent have good or fair drainage adequacy. Year-round unpaved roads that have either or both of these two categories assessed as poor will be strategically upgraded as funding is available to address, first, drainage issues and, then, structural issues. Surface widths will be addressed on an as-needed basis to provide service or to address safety issues. Seasonal roads will be addressed to provide passability and safety but do not have a goal associated with them.

Modelled Trends

Roads age and deteriorate just like any other asset. All pavements are damaged by water, traffic weight, freeze/thaw cycles, sunlight, and traffic weight. To offset natural deterioration and normal wear-and-tear on the road, MCRC must complete treatment projects that either protect and/or add life to its pavements. The year-end condition of the whole network depends upon changes or preservation of individual road section condition that preservation treatments have affected.

MCRC uses many types of repair treatments for its roads, each selected to balance costs, benefits, and road life expectancy. When agency trends are modelled, any gap between goals and accomplishable work becomes evident. Financial resources influence how much work can be accomplished across the network within agency budget and what treatments and strategies can be afforded; a full discussion of MCRC's financial resources can be found in the *5. Financial Resources* section.

Treatments and strategies that counter pavement-damaging forces include reconstruction, structural improvement, capital preventive maintenance, innovative treatments, and maintenance. For a complete discussion on the pavement treatment tools, refer to the *1. Introduction*'s *Pavement Primer*.

Correlating with each PASER score are specific types of treatments best performed either to protect the pavement (CPM) or to add strength back into the pavement (structural improvement) (Table 1). MDOT provides guidance regarding when a specific pavement may be a candidate for a particular treatment. These identified PASER scores "trigger" the timing of projects appropriately to direct the right pavement fix at the right time, thereby providing the best chance for a successful project. The information provided in Table 1 is a guide for identifying potential projects; however, this table should not be the sole criteria for pavement treatment selection. Other information such as future development, traffic volume, utility projects, and budget play a role in project selection. This table should not be a substitute for engineering judgement. Township leaders also play a role in which projects they would like to prioritize first.

Table 1: Service Life Extension (in Years) for Pavement Types Gained by Fix Type[1]

Fix Type	Life Extension (in years)*			PASER
	Flexible	Composite	Rigid	
HMA crack treatment	1-3	1-3	N/A	6-7
Overband crack filling	1-2	1-2	N/A	6-7
One course non-structural HMA overlay	5-7	4-7	N/A	4-5****
Mill and one course non-structural HMA overlay	5-7	4-7	N/A	3-5
Single course chip seal	3-6	N/A	N/A	5-7†
Double chip seal	4-7	3-6	N/A	5-7†
Single course microsurface	3-5	**	N/A	5-6
Multiple course microsurface	4-6	**	N/A	4-6****
Ultra-thin HMA overlay	3-6	3-6	N/A	4-6****
Paver placed surface seal	4-6	**	N/A	5-7
Full-depth concrete repair	N/A	N/A	3-10	4-5***
Concrete joint resealing	N/A	N/A	1-3	5-8
Concrete spall repair	N/A	N/A	1-3	5-7
Concrete crack sealing	N/A	N/A	1-3	4-7
Diamond grinding	N/A	N/A	3-5	4-6
Dowel bar retrofit	N/A	N/A	2-3	3-5***
Longitudinal HMA wedge/scratch coat with surface treatment	3-7	N/A	N/A	3-5****
Flexible patching	**	**	N/A	N/A
Mastic joint repair	1-3	1-3	N/A	4-7
Cape seal	4-7	4-7	N/A	4-7
Flexible interlayer “A”	4-7	4-7	N/A	4-7
Flexible interlayer “B” (SAMI)	4-7	4-7	N/A	3-7
Flexible interlayer “C”	4-7	4-7	N/A	3-7
Fiber reinforced flexible membrane	4-7	4-7	N/A	3-7
Fog seal	**	**	N/A	7-10
GSB 88	**	**	N/A	7-10
Mastic surface treatment	**	**	N/A	7-10
Scrub seal	**	**	N/A	4-8

* The time range is the expected life extending benefit given to the pavement, not the anticipated longevity of the treatment.

** Data is not available to quantify the life extension.

*** The concrete slabs must be in fair to good condition.

**** Can be used on a pavement with a PASER equal to 3 when the sole reason for rating is rutting or severe raveling of the surface asphalt layer.

† For PASER 4 or less providing structural soundness exists and that additional pre-treatment will be required for example, wedging, bar seals, spot double chip seals, injection spray patching or other pre-treatments.

[1] Part of Appendix D-1 from *MDOT Local Agency Programs Guidelines for Geometrics on Local Agency Projects* 2017 Edition Approved Preventive Maintenance Treatments

Roadsoft Pavement Condition Forecast to Forecast Future Trends

MCRC uses Roadsoft, an asset management software suite, to manage road- and bridge-related infrastructure. Roadsoft is developed by Michigan Technological University and is available for Michigan local agencies at no cost to them. Roadsoft uses pavement condition data to drive network-level deterioration models that forecast future road conditions based on planned construction and maintenance work. A screenshot of Roadsoft's pavement condition model and the associated output is shown in Figure 24.

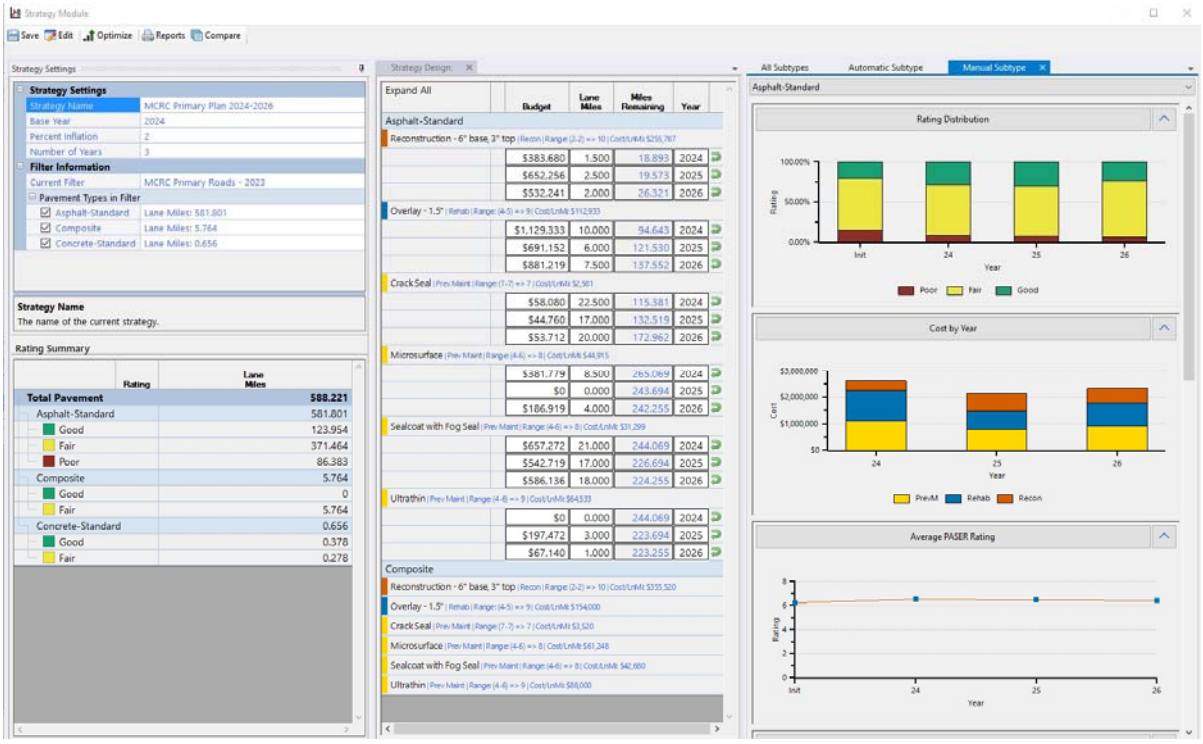


Figure 24: Pavement condition forecast model in the software program Roadsoft.

Paved County Primary Roads

Table 2 illustrates the network-level model inputs for Roadsoft on the paved county primary road network. Other pavement types in this network were neglected due to their small numbers relative to HMA pavements. The treatments outlined in Table 2 are the average treatment volume of planned projects scheduled to be completed in 2024-2026. See Appendix A of this plan for details on 2024 planned projects. Full model inputs and outputs are included in Appendix B.

Table 2: Roadsoft Modelled Trends, Planned Projects, and Gap Analysis for 's Road Assets—Modelled Trends: Roadsoft Annual Work Program for the Paved County Primary Road Network Forecast

Treatment Name	Annual Miles of Treatment	Years of Life	Trigger-Reset
Crack Seal	20	2	7–7
Seal Coat with Fog Seal	19	6	4,5,6–8
Overlay	8	10	4,5–9
Reconstruction	2	14	1,2, 3–10
Ultra Thin	1.5	7	6–9
Microsurface	4	6	4,5,6–8

Results from the Roadsoft network condition model for the county primary roads are shown in Figure 25. The Roadsoft network analysis of MCRC's planned projects from its currently-available budget does not allow MCRC to reach its pavement condition goals given the projects planned for the next three years.

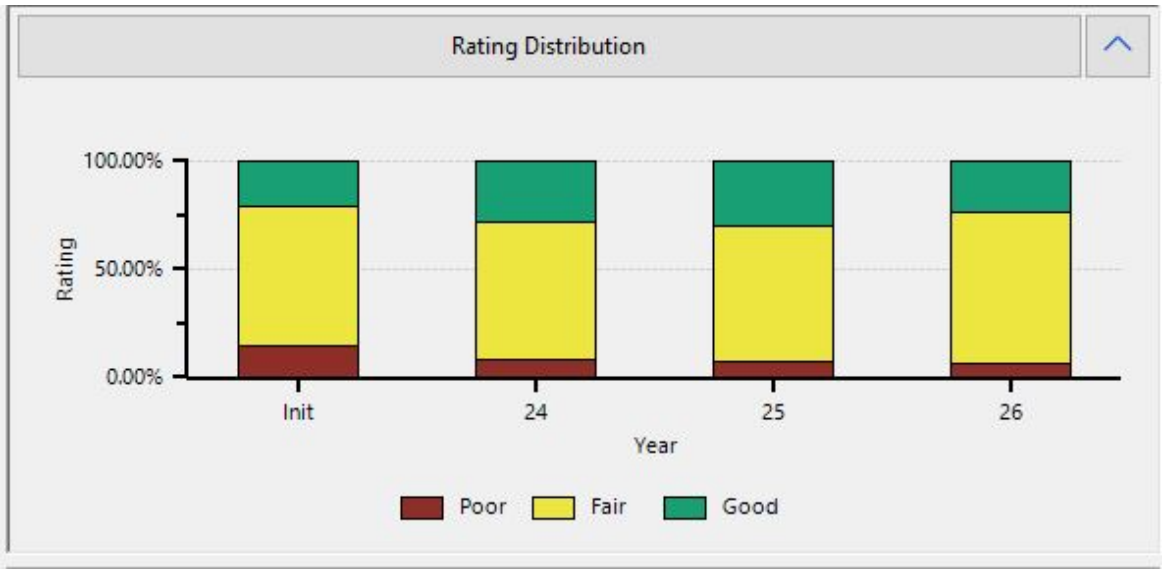


Figure 25: Forecast good/fair/poor changes to MCRC network condition from planned projects on the county primary road network.

The figure above shows that MCRC roads will progress towards the agency goals over the next 3 years but come up slightly short in the good category. MCRC will have the budget to maintain many of its roads in the fair category and eliminate some of the "poor" roads. Due to natural wearing of asphalt and limited funds, it is difficult with MCRC budget to reach its goal in the "good" category.

Paved County Local Road

A screenshot of Roadsoft's pavement condition model and the associated output is shown in Figure 26.

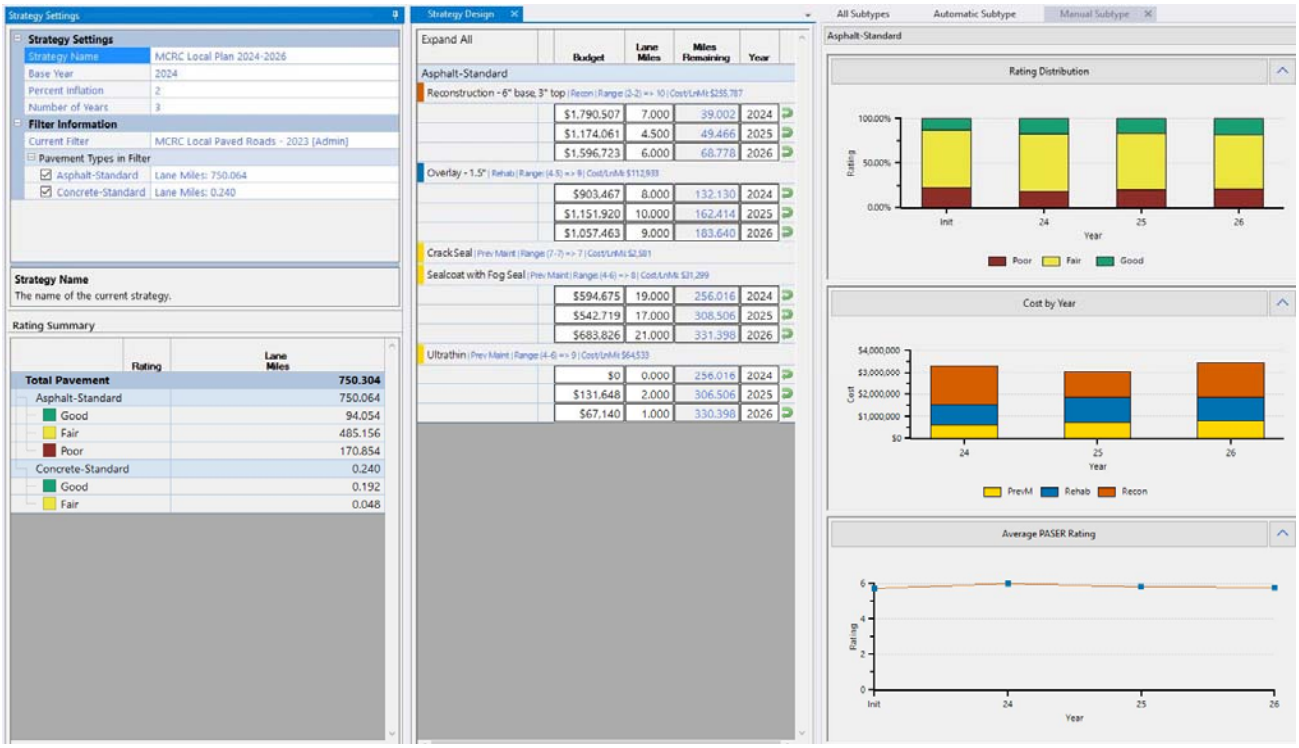


Figure 26: Pavement condition forecast model in the software program Roadsoft.

Table 3 illustrates the network-level model inputs for Roadsoft on the paved county local road network. Other pavement types in this network were neglected due to their small numbers relative to HMA pavements. The treatments outlined in Table 3 are the average treatment volume of planned projects scheduled to be completed in 2024-2026. Full model inputs and outputs are included in Appendix C.

Table 3: Roadsoft Modelled Trends, Planned Projects, and Gap Analysis for 's Road Assets—Modelled Trends: Roadsoft Annual Work Program for the Paved County Local Road Network Forecast

Treatment Name	Annual Miles of Treatment	Years of Life	Trigger-Reset
Crack Seal	15	2	7–7
Seal Coat with Fog Seal	18	6	4,5,6–8
Overlay	8	10	4,5–9
Reconstruction	7	14	1,2, 3–10
Ultra Thin	2	7	6–9

Results from the Roadsoft network condition model for the paved county local roads are shown in Figure 27. The Roadsoft network analysis of MCRC's planned projects from its currently available budget appears to allow MCRC to reach its pavement condition goal given the projects planned for the next three years. However, the full rating system for local roads has not been complete.

Figure 27: Forecast good/fair/poor changes to MCRC network condition from planned projects on the paved county local road network.

The conditions trends shown above forecast local roads growing in the good category while only slightly decreasing in the poor rating. This makes sense because Townships often put more money towards full reconstruction with many of their roads needing structural improvement. Doing so, they are not able to maintain many of their fair roads because of limited budgets and high expensive of full reconstruction.

Unpaved Road Condition Trends

The majority of Midland County unpaved roads are not rated but they are regularly graded. Conditions often vary on unpaved roads due to weather patterns and existing road elements such as drainage and road cover. Conditions also vary during different seasons. Wet seasons make it much more difficult for MCRC to maintain. MCRC does its best to maintain all unpaved roads within its jurisdiction.

Planned Projects

MCRC plans construction and maintenance projects several years in advance. A multi-year planning threshold is required due to the time necessary to plan, design, and finance construction and maintenance projects on the paved county primary road network. This includes planning and programming requirements from state and federal agencies that must be met prior to starting a project and can include studies on environmental and archeological impacts, review of construction and design documents and plans, documentation of rights-of-way ownership, planning and permitting for storm water discharges, and other regulatory and administrative requirements.

Per PA 499 of 2002 (later amended by PA 199 of 2007), road projects for the upcoming three years are required to be reported annually to the TAMC. Planned projects represent the best estimate of future

activity; however, changes in design, funding, and permitting may require MCRC to alter initial plans. Project planning information is used to predict the future condition of the road networks that MCRC maintains. The *1. Pavement Assets*: *Modelled Trends* section of this plan provides a detailed analysis of the impact of the proposed projects on their respective road networks.

For 2024-2026 MCRC plans to do the following projects:

Paved County Primary Projects

MCRC is currently planning the construction and maintenance projects listed in Appendix A for the paved county primary road network in year 2024. The locations of these projects are shown in Figure 28 along with projected paving projects till year 2026 in Figure 29.

Midland County Road Commission
Primary Road Plan for 2024

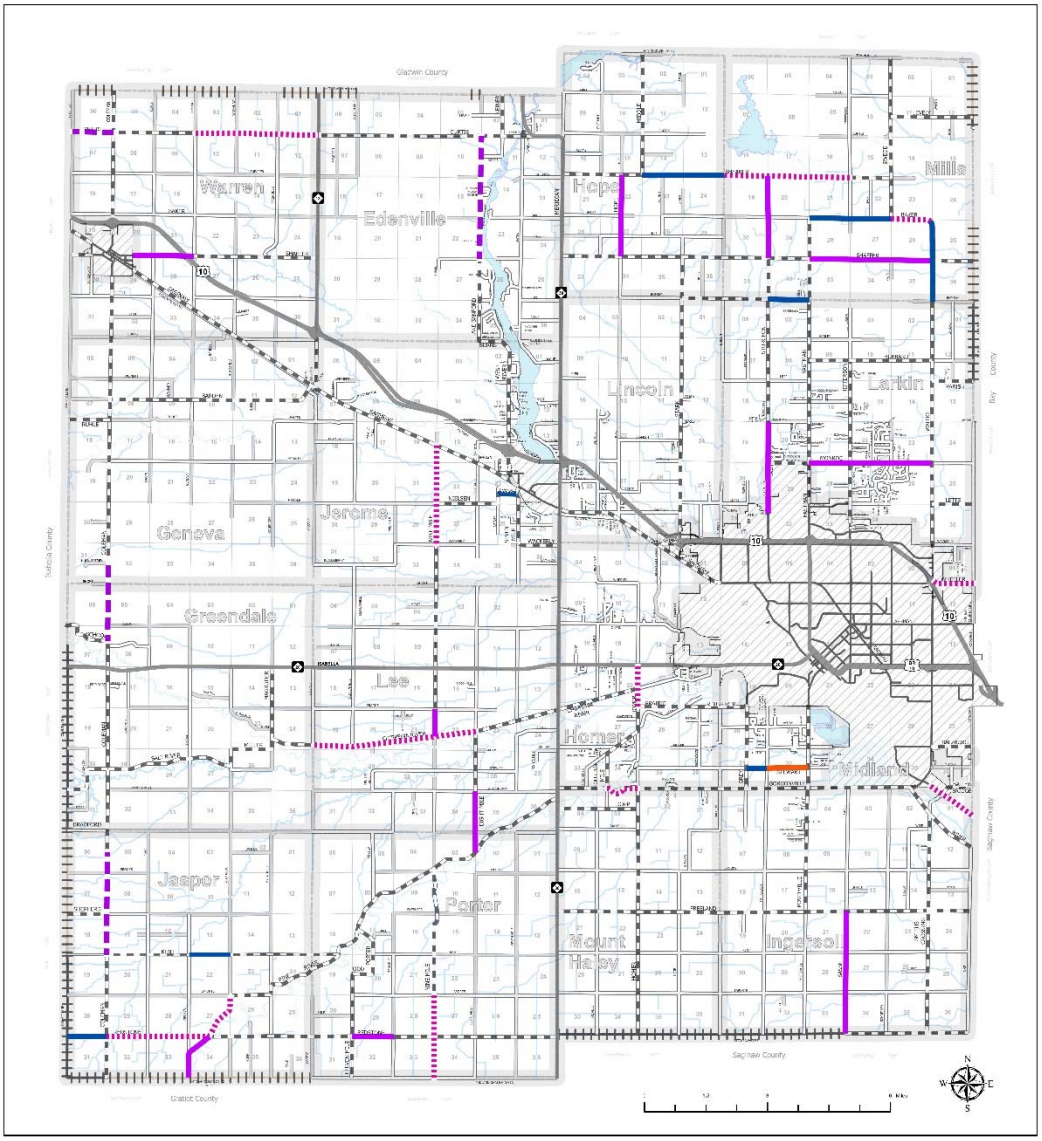


Figure 28: Map showing Primary Road Plan for 2024

Midland County Road Commission
Primary Road 3 Year Plan: 2024 - 2026

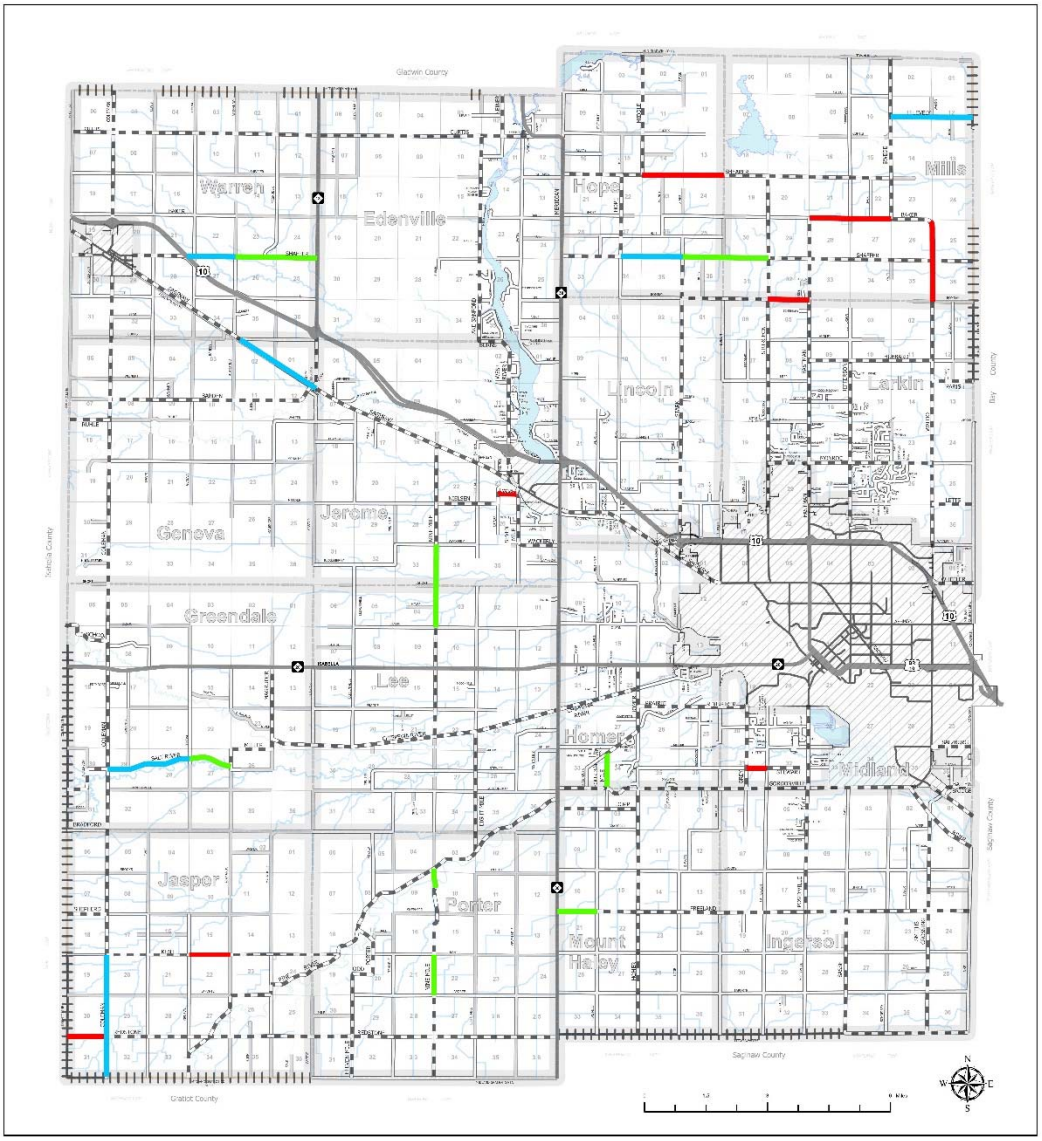


Figure 29: Map showing paved county primary road projects planned for 2024-2026. “Red” 2024, “Green” 2025, “Blue” 2026

Paved County Local Projects

MCRC in coordination with Midland County Townships have projected the construction and maintenance for projects shown below in Figure 30.

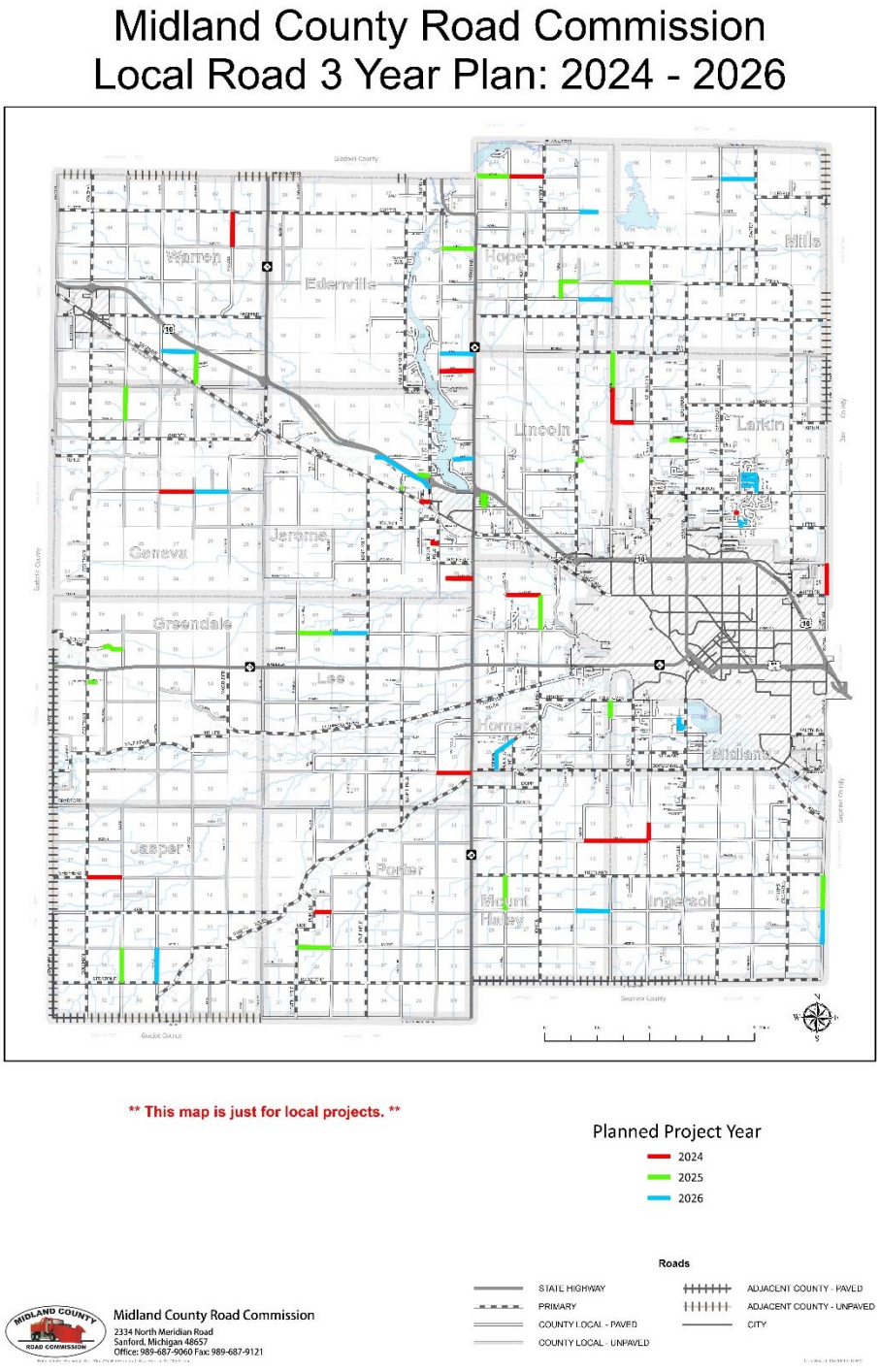


Figure 30: Map showing paved county primary road projects planned for 2024-2026. “Red” 2024, “Green” 2025, “Blue” 2026

Unpaved Road Projects

MCRC in coordination with Midland County Townships have projected the construction and maintenance for gravel projects shown below in Figure 31.

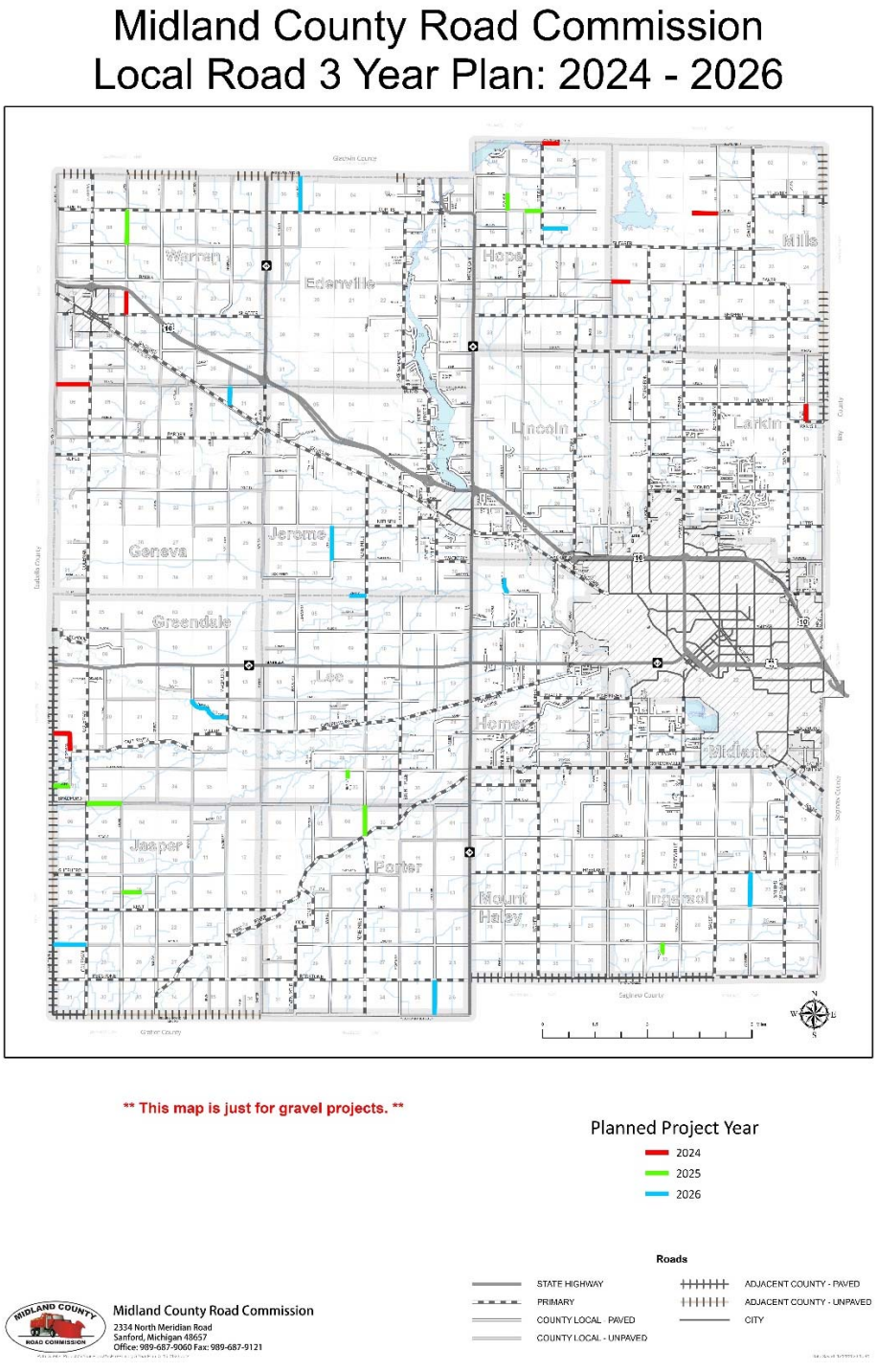


Figure 31: Map showing unpaved road projects planned for 2024-2026

Gap Analysis

The current funding levels that MCRC receives are not sufficient to meet the goals for the paved county primary road network, the paved county local road network, and the unpaved road network. The *1. Pavement Assets*: *Goals* section of this plan provides further detail about the goals and the *1. Pavement Assets*: *Modelled Trends* section provides further detail on the shortfall given the current budget. However, MCRC believes that the overall condition of this network can be maintained or improved with additional funding for construction and maintenance. An alternate strategy may be used to overcome the current shortfall and meet the goals on the paved county primary road network, the paved county local road network, and the unpaved road network:

Roadsoft Pavement Condition Forecast for the Paved County Primary Network

MCRC used Roadsoft to forecast the necessary additional construction and maintenance work for meeting agency goals on the paved county primary and county local road networks. Table 4 illustrates the network-level model inputs used for this simulation. Cost and Rating Distribution reports are included in Appendix D.

Table 4: Roadsoft Modelled Trends, Planned Projects, and Gap Analysis for 's Road Assets—Pavement Condition Forecast and Additional Work Gap Analysis: Roadsoft Annual Work Program for Paved County Primary Road Network Forecast

Pavement Condition Forecast

Treatment Name	Annual Miles of Treatment	Years of Life	Trigger-Reset
Crack Seal	20	2	7–7
Seal Coat with Fog Seal	19	6	4,5,6–8
Overlay	8	10	4,5–9
Reconstruction	2	14	1,2, 3–10
Ultra Thin	1.5	7	6–9
Microsurface	4	6	4,5,6–8

Additional Work Necessary to Overcome Deficit

Treatment	Annual Miles of Treatment	Years of Life	Trigger-Reset
Seal Coat with Fog Seal	5	6	4,5,6–8
Overlay	5	10	4,5–9
Ultra Thin	3	7	6–9

Utilizing the Roadsoft network condition model with paved county primary road network, a gap analysis was conducted given the inputs in Table 4. The results show that MCRC would need to slightly increase budget in year 2024 and significantly increase in 2026 to maintain rating goals. However, the results do show that MCRC would meet its goal for 2025 and be within 2% for 2024 using its current model trend. The following year (2026) has a large drop off in the number of roads in the “good” category which means there will be more roads that need preventive maintenance.

2. FINANCIAL RESOURCES

Public entities must balance the quality and extent of services they can provide with the tax resources provided by citizens and businesses, all while maximizing how efficiently funds are used. MCRC will overview its general expenditures and financial resources currently devoted to pavement maintenance and construction. This financial information is not intended to be a full financial disclosure or a formal report. Michigan agencies are required to submit an Act 51 Report to the Michigan Department of Transportation each year; this is a full financial report that outlines revenues and expenditures. This report can be obtained by request submitted to our agency contact (listed in this plan).

MCRC has a total budget for pavement asset management of $4,525,000.

County Primary Network

MCRC has historically spent around $3,680,000 annually on pavement-related projects. Over the next three years, MCRC plans to spend $12,000,000 on county primary-network projects consisting of, but not limited to, reconstruction, overlay, culvert replacement, drainage and preventive maintenance. Spending on projects depends on revenue from Michigan Transportation Fund (MTF), millages, and federal/state programs.

County Local Network

MCRC has historically spent $3,100,000 annually on pavement-related projects. Over the next three years, MCRC plans to spend $10,500,000 on county local-network projects consisting of, but not limited to, reconstruction, overlay, culvert replacement, and preventive maintenance. Spending on projects depends on revenue from Michigan Transportation Fund (MTF), millages and township contributions. Many local agencies in Michigan use local tax millages to supplement their road-funding budget. These taxes can provide for additional construction and maintenance for new or existing roads that are also funded using MTF or MDOT funds. MCRC has local tax millages in its road-funding budget. The county has two alternating road millages used to supplement their road-funding budget.

3. RISK OF FAILURE ANALYSIS

Transportation infrastructure is designed to be resilient. The system of interconnecting roads and bridges maintained by MCRC provides road users with multiple alternate options in the event of an unplanned disruption of one part of the system. There are, however, key links in the transportation system that may cause significant inconvenience to users if they are unexpectedly closed to traffic. Figure 32 illustrates the key transportation links in MCRC's road network, including those that meet the following types of situations:

- **Geographic divides:** Areas where a geographic feature (river, lake, mountain or limited access road) limits crossing points of the feature
- **Emergency alternate routes for high-volume roads:** Roads which are routinely used as alternate routes for high volume roads or roads that are included in an emergency response plan
- **Limited access areas:** Roads that serve remote or limited access areas that result in long detours if closed
- **Main access to key commercial districts:** Areas where large number or large size business will be significantly impacted if a road is unavailable.

Our road network includes the following critical assets: Saginaw Road, Eastman Road, Gordonville Road and Poseyville Rd. These roads are direct connections to the City of Midland where the majority of large businesses are located such as Dow Chemical and the Mid Michigan hospital. Coleman road is also an important asset that connects the City of Coleman to Oil City and goes N/S through the whole county. Lake Sanford/West River Rd is a key N/S road that runs along the Tittabawassee River. Finally, Freeland Road and Schaffer Rd are key E/W roads in the southeast and northeast portions of the county (see Figure 32).

2023 Midland County
Critical Transportation Links

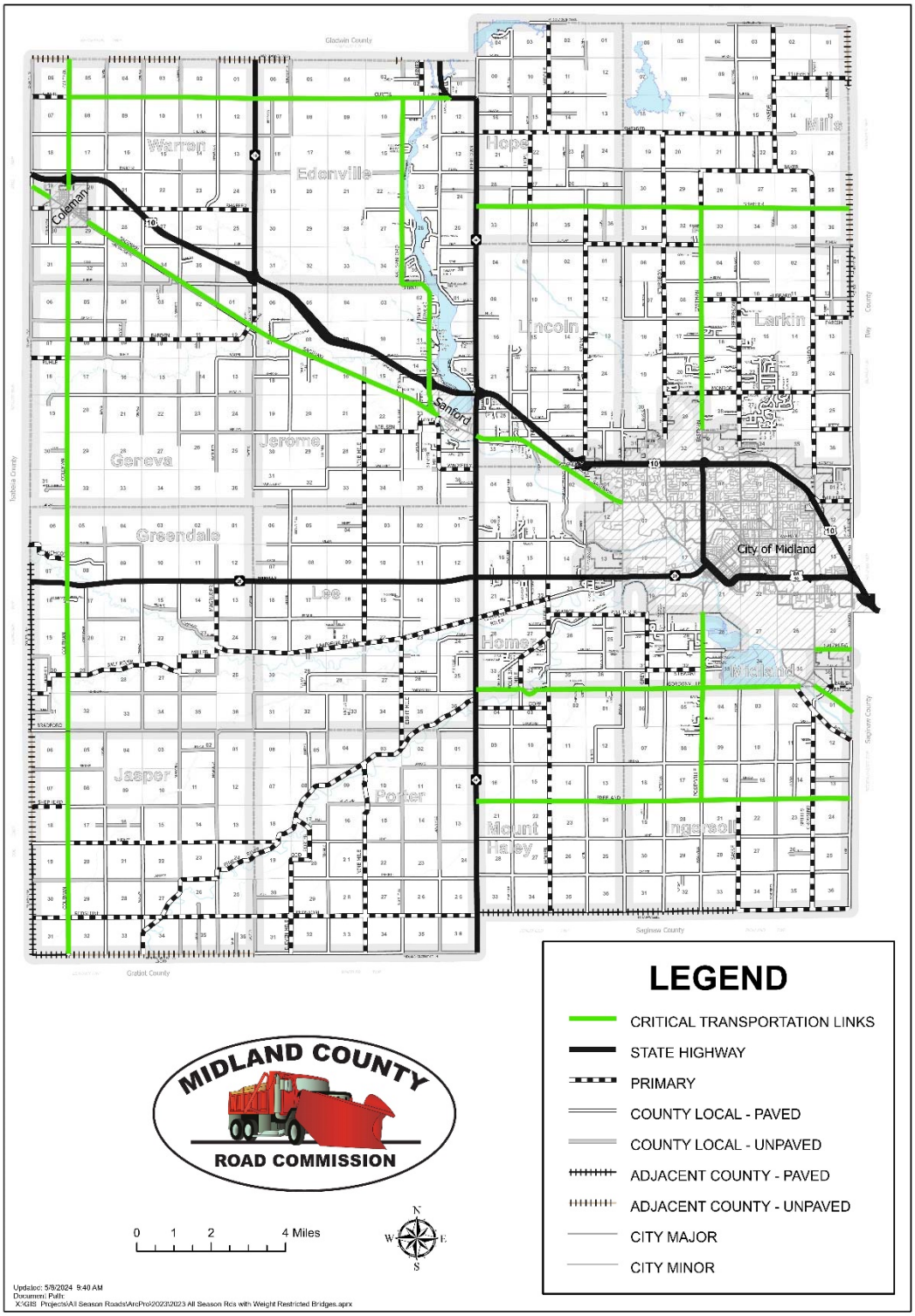


Figure 32: Key transportation links in MCRC's road network

4. COORDINATION WITH OTHER ENTITIES

An asset management plan provides significant value for infrastructure owners because it serves as a platform to engage other infrastructure owners using the same shared right of way space. MCRC communicates with both public and private infrastructure owners to coordinate work in the following ways:

COORDINATION WITH CITY OF MIDLAND

Items MCRC coordinates with the City of Midland on an as-needed basis

- Road improvement projects that interlink City roads with County roads

COORDINATION WITH CITY OF COLEMAN

Items MCRC coordinates with the City of Coleman on an as-needed basis

- Current and future road improvement projects that interlink City roads with County roads

COORDINATION WITH VILLAGE OF SANFORD

Items MCRC coordinates with the Village of Sanford on an as-needed basis

- Current and future road improvement projects that interlink Village roads with county roads
- Detour routes
- Bridge maintenance

COORDINATION WITH MICHIGAN DEPARTMENT OF TRANSPORATION (MDOT)

Items MCRC coordinates with MDOT on an regular basis.

- Current and future road improvement projects that interlink with county roads
- Scheduling of road improvement projects
- Detour routes
- Bridge maintenance and future bridge rehabs

COORDINATION WITH MIDLAND COUNTY DRAIN COMMISSION

Items MCRC coordinates with the drain commission on a regular basis are below:

- Replacement of county drain culverts that cross county roads
- Sizing of county drain culverts

COORDINATION WITH LOCAL TOWNSHIPS

MCRC coordinates with all of Midland County's 16 townships on a yearly basis. Items MCRC coordinates are below:

- Current and future road and drainage projects within the Township
- Maintenance strategies for current road assets
- Local match funding

COORDINATION WITH WATER DISTRICTS

MCRC coordinates with Midland County's water Districts and City of Midland water.

Items MCRC coordinates with the water districts on a as-needed basis are below:

- Planning road improvement projects in conjunction with water mains proposed under roadways
- Responding to water main breaks that effect the roadway.

In order to ensure coordination with the above listed stakeholders is of the best quality and interest of Midland County residents, MCRC coordinates with several private entities and the local Metropolitan Planning Organization (MPO) for different projects. The local MPO is known as Midland Area Transportation Study (MATS). MATS is a transportation policy-making body governed by a Policy Committee that includes elected and appointed officials within the MATS area and representatives from the Federal Highways Administration (FHWA) and MDOT.

Items MCRC coordinates with MATS on a twice per month basis are below:

- Planning and Programming funds for projects and operations
- Evaluate alternative transportation improvement options

- Maintaining Metropolitan Transportation Plan (MTP) and Long Range Transportation Plan (LRTP)
- Develop a Transportation Improvement Plan (TIP)
- Discuss ways to involve the general public and other constituencies in the functions above

The private entities include design consultants and industry such as Dow Chemical.

Items MCRC coordinates with private entities on an as-needed basis

- Design of current and future road improvement projects
- Scheduling of road improvement projects
- Easement acquisition
- Bridge design
- Inspection and Staking of Construction Projects

Overall, MCRC takes advantage of coordinated infrastructure work to reduce cost and maximize value using the following policies:

- Roads which are in poor condition that have a subsurface infrastructure project planned which will destroy more than half the lane with will be rehabilitated or reconstructed full width using transportation funds to repair the balance of the road width.
- Subsurface infrastructure projects which will cause damage to pavements in good condition will be delayed as long as possible, or will consider methods that do not require pavement cuts.
- Subsurface utility projects will be coordinated to allow all under pavement assets to be upgraded in the same project regardless of ownership.

APPENDIX A: PRIMARY PROJECT LIST 2024

Road Name	Location	Miles
Fed/State Aid Projects		
Eastman Road 2023 Urban	Monroe to Mier	2
Saginaw Rd 2024 Urban	Pinesboro to Dublin	3.84
Poseyville Rd Flood Repair	Ashby to City Limits	0.5
Bridge PM Package	Various	
2024 Rural	Various	
Kent Rd Bridge	over Jo Drain	0.5
Bailey Bridge at Smiths Crossing	over Tittabawassee River	0.5
Future Project PE		
Monroe Road Urban	Sturgeon to Eastman	
Shaffer Rd Bridge	at Bluff Creek	
County Projects		
Brooks Rd	Over Jo Drain	0.1
Stewart Rd	Over Bullock Cr	0.1
Primary Program		
Primary Recon	Co wide Primarys	1.5
Primary Overlay	Co wide Primarys	10
Primary Microsurface	Co wide Primarys	8.5
Primary Chip Seal	Co wide Primarys	21
Primary Crack Seal	Co wide Primarys	22.5
Misc Countywide		
Bridge Maintenance	various	
Pavement Marking		
Brush Spray		
Guardrail	co wide	
Special pavement markings	co wide	
Larger culverts	co wide	

APPENDIX B: ROADSOFT PRIMARY ROADS NETWORK MODEL TRENDS REPORT 2024-2026

Strategy Comprehensive Report

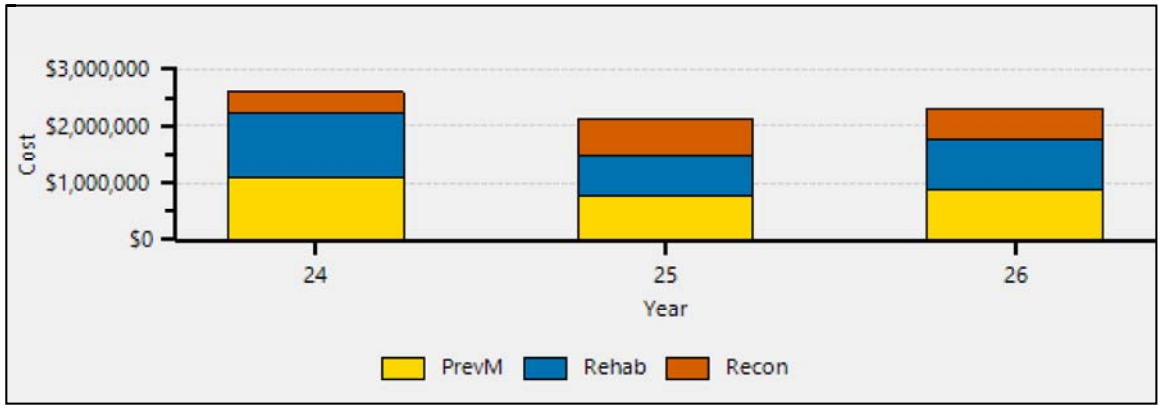
MCRC Primary Plan 2024-2026

Base Year	2024
Percent Inflation	2
Number of Years	3
Optimized	No
Current Filter	MCRC Primary Roads - 2023

Subtype	Treatment	Trigger	Reset	Cost/Ln Mile	Budget	Lane Miles	Year
Asphalt-Standard	RC (SI) Reconstruction - 6" base, 3" top	2 - 2	10	$255,786.67			
					$383,680	1.500	2024
					$652,256	2.500	2025
					$532,241	2.000	2026
	RH (SI) Overlay - 1.5"	4 - 5	9	$112,933.33			
					$1,129,333	10.000	2024
					$691,152	6.000	2025
					$881,219	7.500	2026
	PM (CPM) Crack Seal	7 - 7	7	$2,581.33			
					$58,080	22.500	2024
					$44,760	17.000	2025
					$53,712	20.000	2026
	PM (CPM) Microsurface	4 - 6	8	$44,915.20			
					$381,779	8.500	2024
					$0	0.000	2025
					$186,919	4.000	2026
	PM (CPM) Sealcoat with Fog Seal	4 - 6	8	$31,298.67			
					$657,272	21.000	2024
					$542,719	17.000	2025
					$586,136	18.000	2026
	PM (CPM) Ultrathin	4 - 6	9	$64,533.33			
					$0	0.000	2024
					$197,472	3.000	2025
					$67,140	1.000	2026

Cost Distribution

Strategy Comprehensive Report

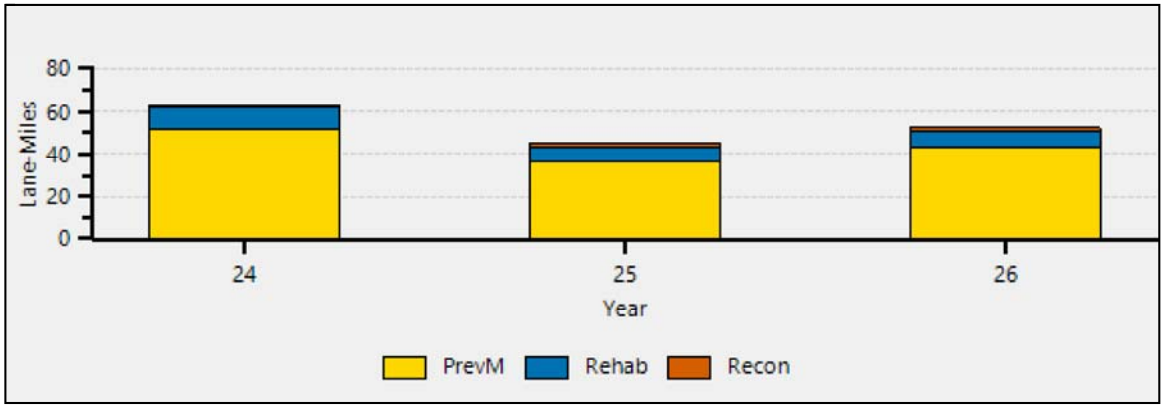


MCRC Primary Plan 2024-2026

Maintenance Type	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Prev Maint	$1,097,131	$784,951	$893,908							
Rehab	$1,129,333	$691,152	$881,219							
Recon	$383,680	$652,256	$532,241							
Total	$2,610,144	$2,128,359	$2,307,368							

Strategy Comprehensive Report

Maintenance Performed

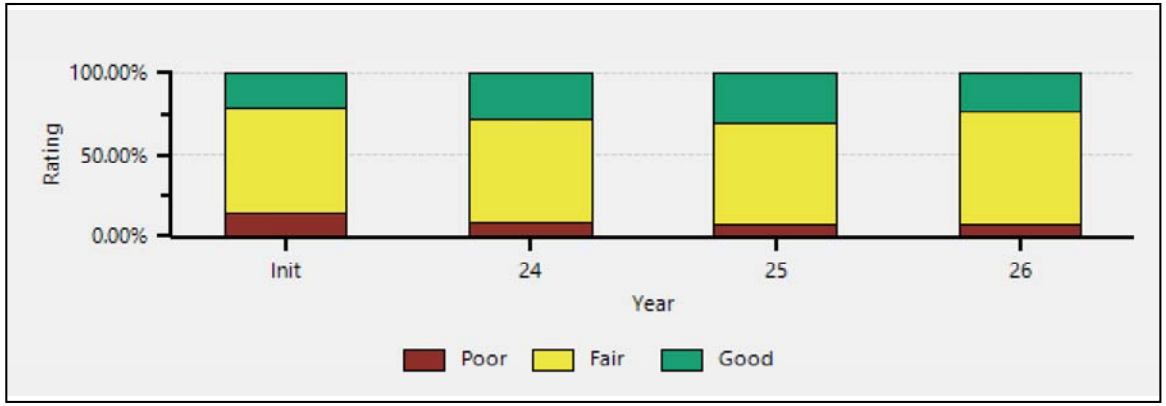


MCRC Primary Plan 2024-2026

Maintenance Type in Lane Miles	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Prev Maint	52.000	37.000	43.000							
Rehab	10.000	6.000	7.500							
Recon	1.500	2.500	2.000							
Total	63.500	45.500	52.500							

Strategy Comprehensive Report

Rating Distribution



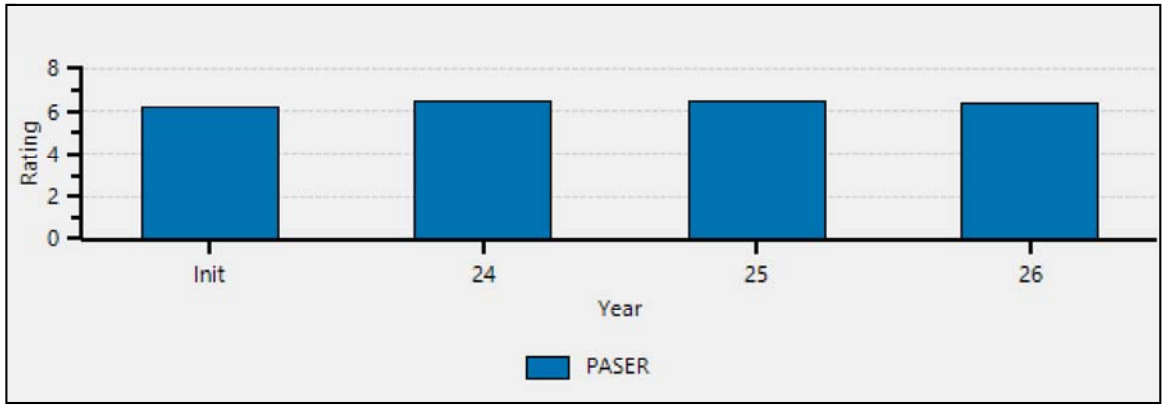
MCRC Primary Plan 2024-2026

Initial Values

Lane Miles	%	Rating	2024		2025		2026		2027	2028	2029	2030	2031	2032	2033
124.332	21.1	Good	165.331	28.1	176.569	30.0	135.564	23.1							
377.506	64.2	Fair	377.506	64.2	367.282	62.4	410.064	69.7							
86.383	14.7	Poor	45.383	7.7	44.370	7.5	42.592	7.2							
588.221	100.0	Total													

Strategy Comprehensive Report

PASER Distribution



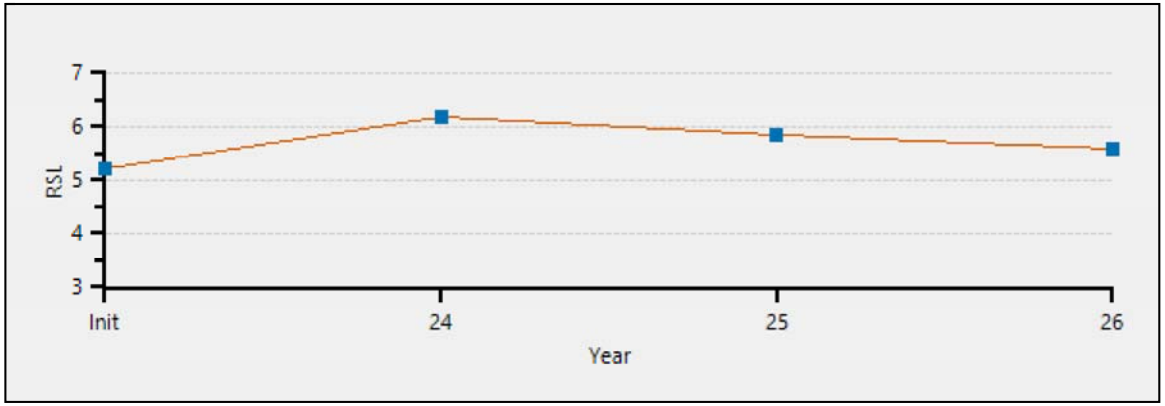
MCRC Primary Plan 2024-2026

Initial Value

Lane Miles	PASER	2024	2025	2026
0.038	10	1.538	2.538	2.038
24.458	9	34.458	10.500	11.000
99.836	8	129.335	163.531	122.526
140.093	7	140.093	151.731	195.174
179.204	6	179.204	122.164	108.703
58.209	5	58.209	93.387	106.187
49.986	4	10.486	11.973	12.195
15.866	3	15.866	11.686	2.938
20.393	2	18.893	19.573	26.321
0.138	1	0.138	1.138	1.138
6.213	Average	6.519	6.483	6.393

Strategy Comprehensive Report

RSL Distribution



MCRC Primary Plan 2024-2026

Initial Value

Lane Miles	RSL	2024	2025	2026
0.038	**22**	0.038	0.000	0.000
0.000	**21**	0.000	0.038	0.000
0.000	**20**	0.000	0.000	0.038
0.000	**19**	0.000	0.000	0.000
0.000	**18**	0.000	0.000	0.000
0.060	**17**	0.060	0.000	0.000
0.196	**16**	0.196	0.060	0.000
0.084	**15**	0.084	0.196	0.060
0.000	**14**	1.500	2.584	2.196
24.398	**13**	34.398	10.500	11.084
34.122	**12**	43.955	40.065	17.833
58.004	**11**	67.837	49.622	47.398
7.430	**10**	17.263	73.504	56.955
18.480	**9**	24.105	21.513	78.504
61.927	**8**	67.552	28.355	26.513
40.946	**7**	42.811	71.802	33.355
19.018	**6**	5.903	30.061	56.802
73.017	**5**	73.017	5.903	30.061
43.522	**4**	43.522	73.017	5.903
62.387	**3**	62.387	43.522	73.017
30.722	**2**	30.722	62.387	43.522
27.487	**1**	27.487	30.722	62.387
24.452	**0**	10.486	11.973	8.643
15.878	**-1**	0.000	0.000	3.552
9.656	**-2**	0.000	0.000	0.000

Strategy Comprehensive Report

2.938	**-3**	2.938	0.000	0.000
8.748	**-4**	8.748	2.938	0.000
4.180	**-5**	4.180	8.748	2.938
11.347	**-6**	11.347	4.180	8.748
2.014	**-7**	2.014	11.347	4.180
2.784	**-8**	2.784	2.014	11.347
1.748	**-9**	1.748	2.032	2.014
2.500	**-10**	1.000	0.000	0.032
0.138	**-11**	0.138	1.000	0.000
0.000	**-12**	0.000	0.138	1.000
0.000	**-13**	0.000	0.000	0.138
5.230	Average	6.175	5.853	5.600

APPENDIX C: ROADSOFT LOCAL ROADS NETWORK MODEL TRENDS REPORT 2024-2026

Strategy Comprehensive Report

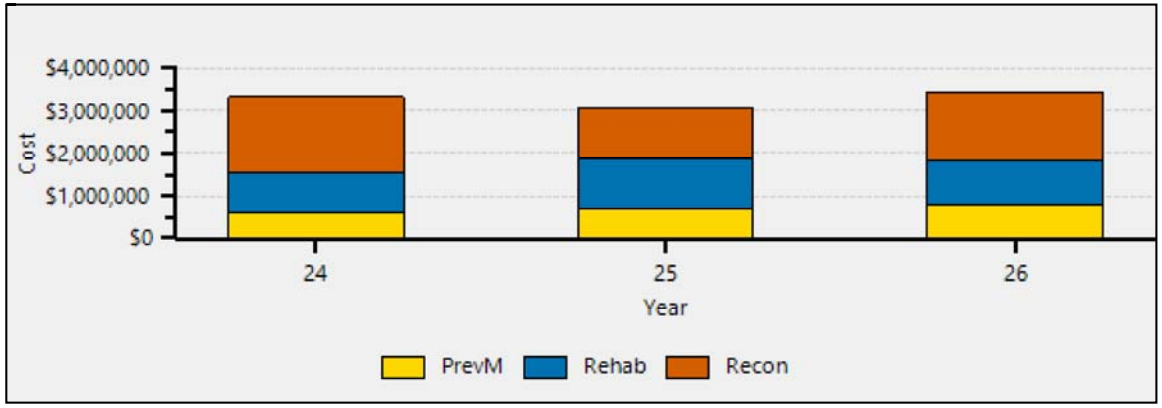
MCRC Local Plan 2024-2026

Base Year	2024
Percent Inflation	2
Number of Years	3
Optimized	No
Current Filter	MCRC Local Paved Roads - 2023 [Admin]

Subtype	Treatment	Trigger	Reset	Cost/Ln Mile	Budget	Lane Miles	Year
Asphalt-Standard	RC (SI) Reconstruction - 6" base, 3" top	2 - 2	10	$255,786.67			
					$1,790,507	7.000	2024
					$1,174,061	4.500	2025
					$1,596,723	6.000	2026
	RH (SI) Overlay - 1.5"	4 - 5	9	$112,933.33			
					$903,467	8.000	2024
					$1,151,920	10.000	2025
					$1,057,463	9.000	2026
	PM (CPM) Crack Seal	7 - 7	7	$2,581.33			
					$36,139	14.000	2024
					$42,127	16.000	2025
					$45,655	17.000	2026
	PM (CPM) Sealcoat with Fog Seal	4 - 6	8	$31,298.67			
					$594,675	19.000	2024
					$542,719	17.000	2025
					$683,826	21.000	2026
	PM (CPM) Ultrathin	4 - 6	9	$64,533.33			
					$0	0.000	2024
					$131,648	2.000	2025
					$67,140	1.000	2026

Cost Distribution

Strategy Comprehensive Report

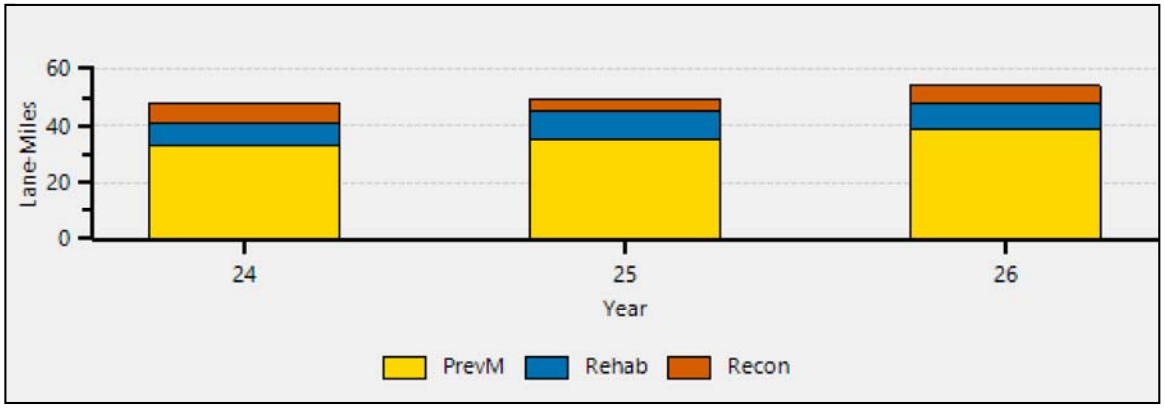


MCRC Local Plan 2024-2026

Maintenance Type	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Prev Maint	$630,813	$716,494	$796,622							
Rehab	$903,467	$1,151,920	$1,057,463							
Recon	$1,790,507	$1,174,061	$1,596,723							
Total	$3,324,787	$3,042,475	$3,450,808							

Strategy Comprehensive Report

Maintenance Performed

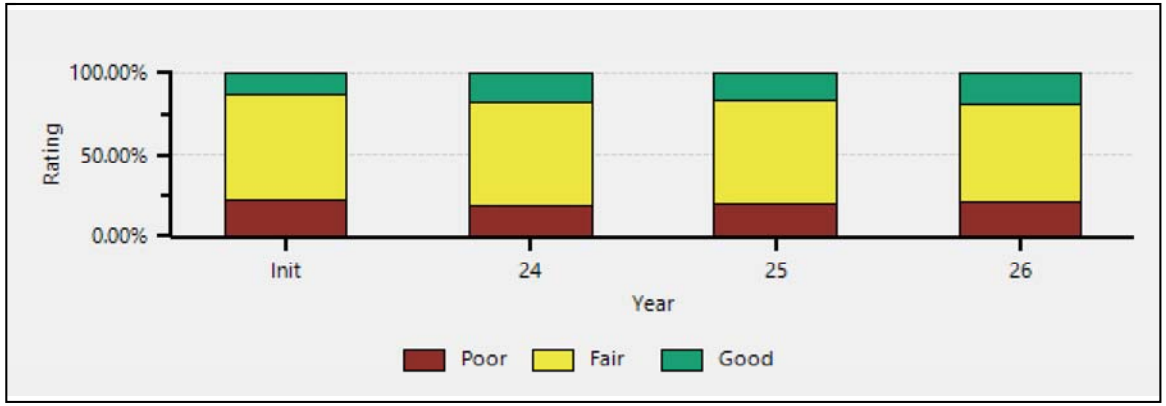


MCRC Local Plan 2024-2026

Maintenance Type in Lane Miles	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Prev Maint	33.000	35.000	39.000							
Rehab	8.000	10.000	9.000							
Recon	7.000	4.500	6.000							
Total	48.000	49.500	54.000							

Strategy Comprehensive Report

Rating Distribution



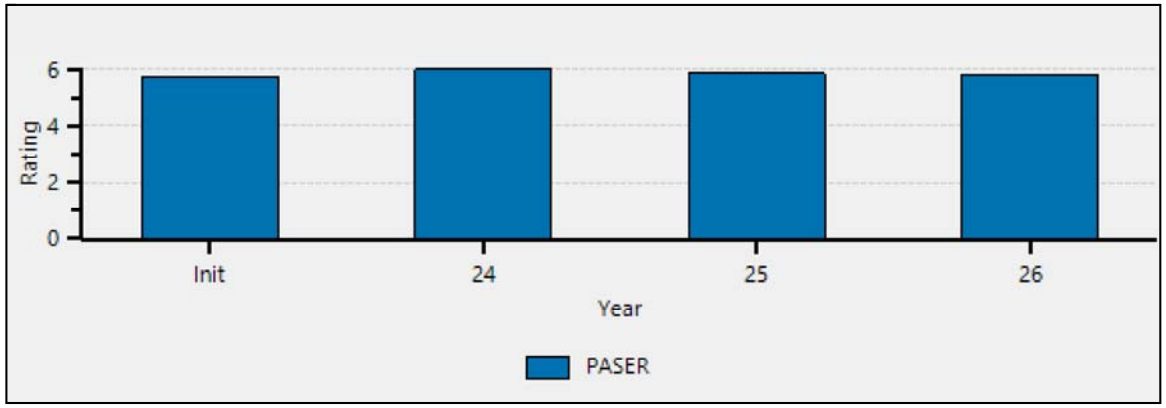
MCRC Local Plan 2024-2026

Initial Values

Lane Miles	%	Rating	2024		2025		2026		2027	2028	2029	2030	2031	2032	2033
94.246	12.6	Good	128.245	17.1	121.967	16.3	139.351	18.6							
485.204	64.7	Fair	485.204	64.7	478.783	63.8	452.781	60.4							
170.854	22.8	Poor	136.854	18.2	149.554	19.9	158.172	21.1							
750.304	100.0	Total													

Strategy Comprehensive Report

PASER Distribution



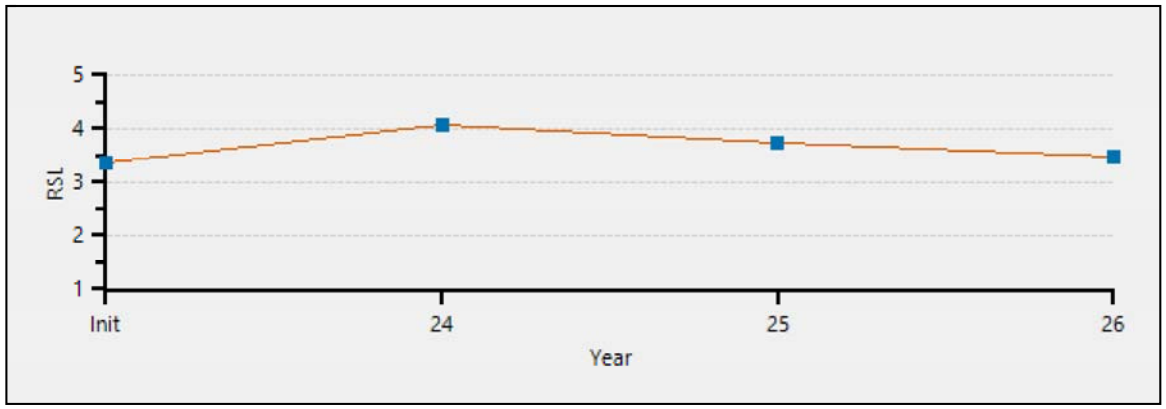
MCRC Local Plan 2024-2026

Initial Value

Lane Miles	PASER	2024	2025	2026
12.408	10	19.408	4.500	6.000
5.988	9	13.988	31.408	14.500
75.850	8	94.849	86.059	118.851
250.500	7	250.500	210.789	175.513
142.886	6	142.886	163.092	168.758
91.818	5	91.818	104.902	108.510
48.312	4	21.312	38.512	53.130
49.128	3	49.128	31.702	6.390
46.002	2	39.002	49.466	68.778
27.412	1	27.412	29.874	29.874
5.751	Average	5.980	5.828	5.763

Strategy Comprehensive Report

RSL Distribution



MCRC Local Plan 2024-2026

Initial Value

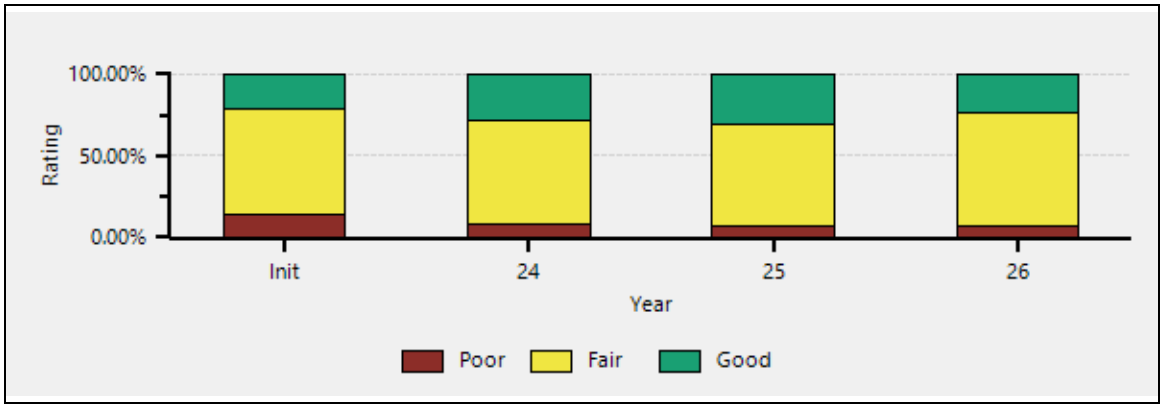
Lane Miles	RSL	2024	2025	2026
0.192	**15**	0.192	0.000	0.000
12.408	**14**	19.408	4.692	6.000
5.988	**13**	13.988	31.408	14.692
34.644	**12**	40.977	19.655	38.408
7.616	**11**	13.949	46.644	26.655
33.446	**10**	39.779	19.616	53.644
46.956	**9**	50.456	43.779	23.866
50.114	**8**	53.614	54.456	48.029
63.392	**7**	66.892	57.614	58.706
89.990	**6**	79.490	54.892	44.864
34.376	**5**	34.376	79.490	54.892
49.226	**4**	49.226	34.376	79.490
59.284	**3**	59.284	49.226	34.376
45.618	**2**	45.618	59.284	49.226
46.200	**1**	46.200	45.618	59.284
27.948	**0**	21.312	38.512	45.618
10.130	**-1**	0.000	0.000	7.512
10.234	**-2**	0.000	0.000	0.000
6.390	**-3**	6.390	0.000	0.000
25.312	**-4**	25.312	6.390	0.000
17.426	**-5**	17.426	25.312	6.390
14.258	**-6**	14.258	17.426	25.312
14.154	**-7**	14.154	14.258	17.426
7.308	**-8**	7.308	14.154	14.258
0.820	**-9**	0.820	3.628	11.782

Strategy Comprehensive Report

9.462	**-10**	2.462	0.000	0.000
2.086	**-11**	2.086	2.462	0.000
4.002	**-12**	4.002	2.086	2.462
5.768	**-13**	5.768	4.002	2.086
0.000	**-14**	0.000	5.768	4.002
0.094	**-15**	0.094	0.000	5.768
0.000	**-16**	0.000	0.094	0.000
7.458	**-17**	7.458	0.000	0.094
0.568	**-18**	0.568	7.458	0.000
0.000	**-19**	0.000	0.568	7.458
0.548	**-20**	0.548	0.000	0.568
0.000	**-21**	0.000	0.548	0.000
0.000	**-22**	0.000	0.000	0.548
5.392	**-23**	5.392	0.000	0.000
0.000	**-24**	0.000	5.392	0.000
0.000	**-25**	0.000	0.000	5.392
0.000	**-26**	0.000	0.000	0.000
0.000	**-27**	0.000	0.000	0.000
0.000	**-28**	0.000	0.000	0.000
0.000	**-29**	0.000	0.000	0.000
0.000	**-30**	0.000	0.000	0.000
0.000	**-31**	0.000	0.000	0.000
1.496	**-32**	1.496	0.000	0.000
0.000	**-33**	0.000	1.496	0.000
0.000	**-34**	0.000	0.000	1.496
3.371	Average	4.081	3.737	3.483

APPENDIX D: ROADSOFT PRIMARY ROADS MODEL TRENDS VS GAP ANAYLSIS REPORT 2024-2026

Rating Distribution Report

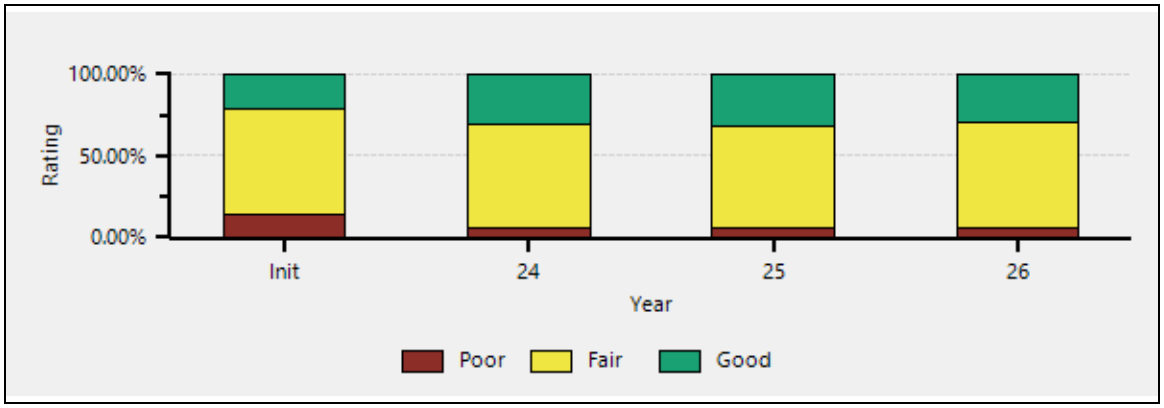


MCRC Primary Plan 2024-2026

Initial Values

Lane Miles	%	Rating	2024		2025		2026		2027	2028	2029	2030	2031	2032	2033
124.332	21.1	Good	165.331	28.1	176.569	30.0	135.564	23.1							
377.506	64.2	Fair	377.506	64.2	367.282	62.4	410.064	69.7							
86.383	14.7	Poor	45.383	7.7	44.370	7.5	42.592	7.2							
588.221	100.0	Total													

Rating Distribution Report

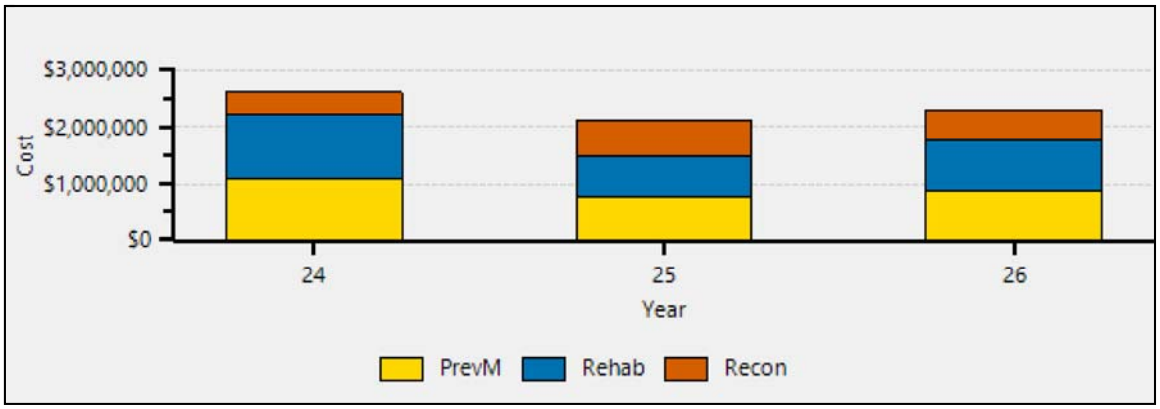


MCRC Primary Plan 2024-2026 Gap Analysis 2

Initial Values

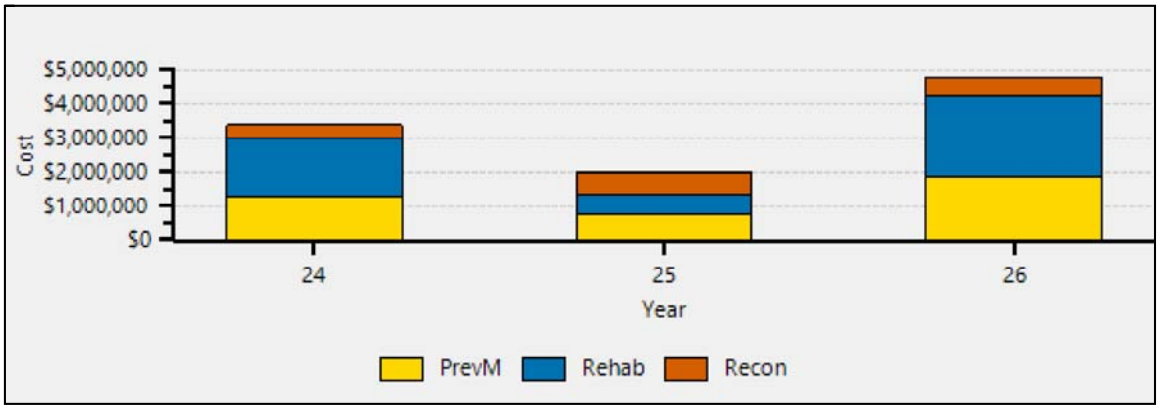
Lane Miles	%	Rating	2024		2025		2026	
124.332	21.1	Good	177.330	30.2	185.235	31.5	175.397	29.8
377.506	64.2	Fair	375.992	63.9	367.036	62.4	378.873	64.4
86.383	14.7	Poor	34.897	5.9	35.949	6.1	33.949	5.8
588.221	100.0	Total						

Cost Distribution Report



MCRC Primary Plan 2024-2026

Maintenance Type	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Prev Maint	$1,097,131	$784,951	$893,908							
Rehab	$1,129,333	$691,152	$881,219							
Recon	$383,680	$652,256	$532,241							
Total	$2,610,144	$2,128,359	$2,307,368							



MCRC Primary Plan 2024-2026 Gap Analysis 2

Maintenance Type	2024	2025	2026
Prev Maint	$1,316,222	$784,951	$1,888,930
Rehab	$1,694,000	$575,960	$2,349,917
Recon	$383,680	$652,256	$532,241
Total	$3,393,902	$2,013,167	$4,771,088

APPENDIX E: MEETING MINUTES VERIFYING PLAN ACCEPTANCE BY GOVERNING BODY

MIDLAND
COUNTY ROAD COMMISSION
2334 N. MERIDIAN ROAD
SANFORD, MI 48657

Phone (989) 687-9060
Fax (989) 687-9121
www.midlandroads.com

Certification of the 2024 Transportation Asset Management Plan

The proposed 2024 Transportation Asset Management Plan was presented to the board for review and discussion.

Moved by Commissioner Cozat and supported by Commissioner Atton to offer the following resolution:

WHEREAS, Beginning October 2019 and on a three-year cycle thereafter, certification must be made for compliance to Public Act 325; and

WHEREAS, A local road-owning agency with 100 certified miles or more must certify that it has developed an asset management plan for the road, bridge, culvert, and traffic signal assets.

THEREFORE, BE IT RESOLVED, that the Board of County Road Commissioners, County of Midland, certifies the 2024 Transportation Asset Management Plan.

Roll Call.
Yeas: Commissioners Atton, Cozat
Nays: None

Resolution Adopted

I, Donna Lowe, Clerk-Secretary of the Board of County Road Commissioners, County of Midland, State of Michigan, do hereby certify that the above is a true copy of the portion of the proceeds as incorporated in the minutes of a regular meeting of the Midland County Road Commission held on September 26, 2024.

Donna Lowe

Donna Lowe, Clerk-Secretary

DATE: September 26, 2024

B. BRIDGE ASSET MANAGEMENT PLAN

An attached bridge asset management plan follows.

Midland County Road Commission
2024 Bridge
Asset Management Plan

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

Prepared by:
Jonathan Myers, PE
Managing Director
989-687-9060

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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 Midland County Road Commission's (MCRC) 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 MCRC is meeting its obligations to maintain the bridges for which it is responsible.

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

- What kinds of bridge assets MCRC has in its jurisdiction and the different options for maintaining these assets.
- What tools and processes MCRC uses to track and manage bridge assets and funds.
- What condition MCRC'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 MCRC's bridge assets' normal life cycle.
- What condition MCRC 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 MCRC's bridge assets.

MCRC owns and/or manages 88 bridges.

An asset management plan is required by Michigan Public Act 325 of 2018, and this document represents fulfillment of some of MCRC's obligations towards meeting these requirements. This asset management plan also helps demonstrate MCRC's responsible use of public funds by providing elected and appointed officials as well as the general public with inventory and condition information of MCRC'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 Midland 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 Midland 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 Midland County Road Commission (MCRC) 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. MCRC is responsible for maintaining and operating 88 bridges.

This 2024 plan outlines how MCRC 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 Russell Inman at 2334 N. Meridian Road, Sanford, MI 48657or at russ@midlandroads.com. A copy of this plan can be accessed on our website at http://midlandroads.com.

Key terms used in this plan are defined in MCRC'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.

Figure 1: Girder bridge

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).

Figure 2: Slab bridge

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.

Figure 3: Truss bridge

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, pre-stressed concrete, or timber. Some historical bridges or bridge components in Michigan may be constructed from stone or masonry.

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).

Table 1: Summary of the NBI Rating Scale

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.

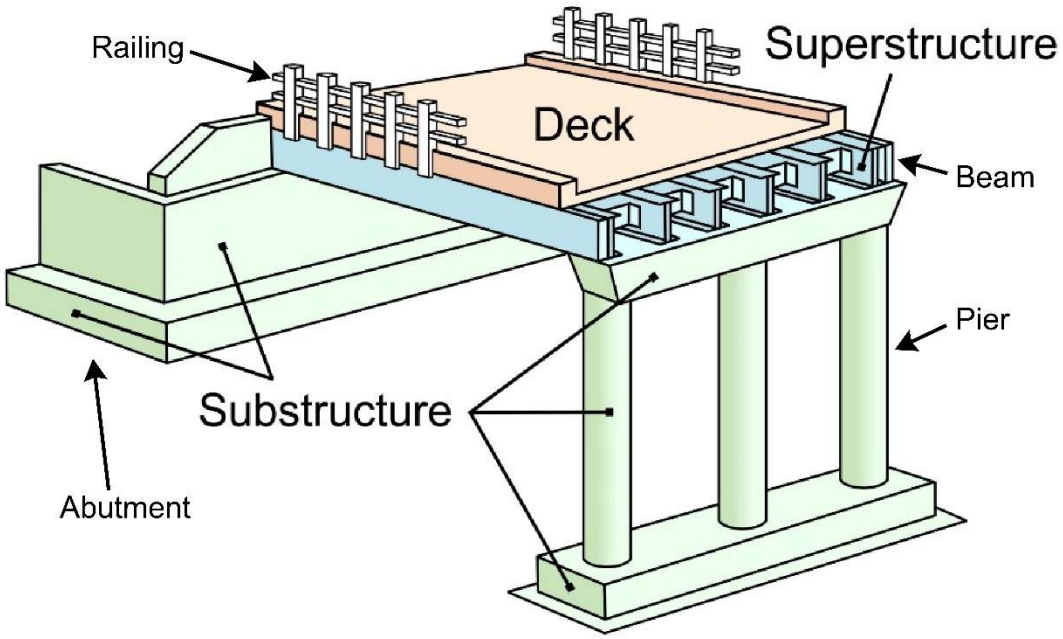

Figure 6: Diagram of basic elements of a bridge

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

MCRC 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 MCRC'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, MCRC'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, MCRC 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, MCRC 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 MCRC'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, MCRC specifically aims to have to have 90% or more of the agency's local bridges in fair to good condition and to have less than 10% classify as structurally deficient over its five-year plan.

Thus, MCRC'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

MCRC is responsible for 88 bridges. Table 2 summarizes MCRC'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 condition data and maintenance actions are taken from the inspector's summary report (see Appendix 2).

Types

Of the MCRC's 88 structures, 13 are concrete bridges, 26 are steel bridges, 43 are pre-stressed concrete bridges, and 6 are timber bridges.

Locations and Sizes

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

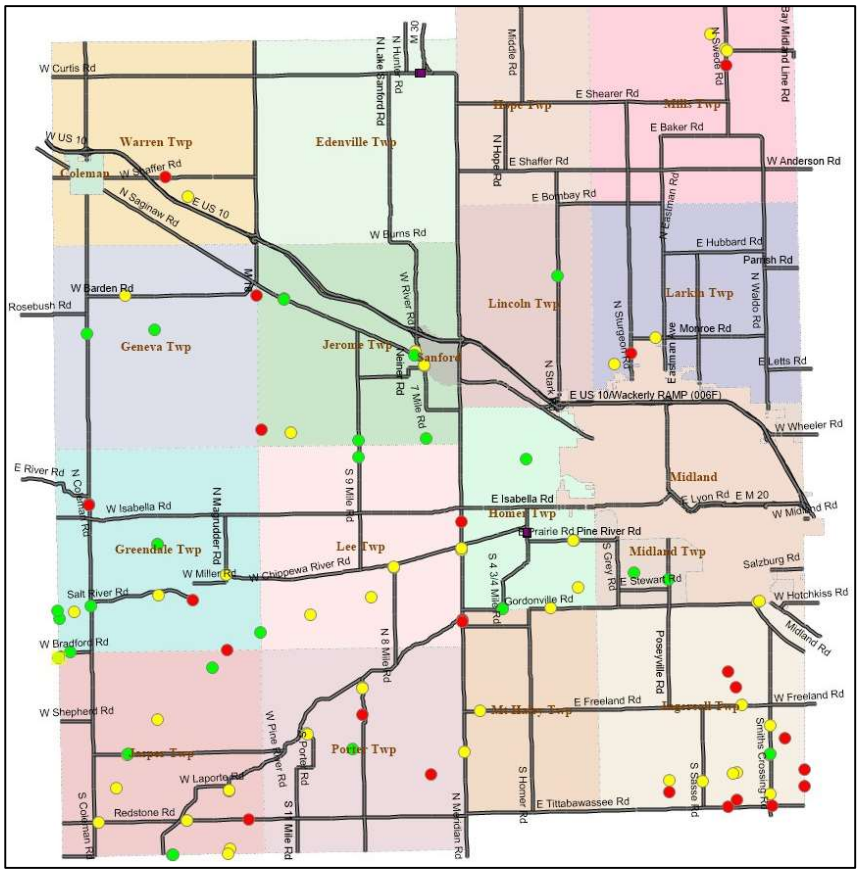

Figure 7: Map illustrating locations MCRC's of bridge assets

Condition

MCRC 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 MCRC's bridge network is 32 (36%) are good, 38 (43%) are fair, and 18 (20%) are poor or lower.

Another layer of classification of MCRC's bridge inventory classifies 18 (20%) bridges as structurally deficient, 18 (20%) bridges as posted, and 0 (0%) 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			2023 Condition		
			Struct. Defic	Posted	Closed	Poor	Fair	Good
Concrete – Culvert	1	480	1	0	0	1	0	0
Concrete – Girder and floorbeam	2	4,502	0	2	0	0	2	0
Concrete – Slab	8	8,652	0	0	0	0	2	6
Concrete – Tee beam	2	2,055	1	1	0	1	1	0
Prestressed concrete – Box beam/girders—multiple	31	113,423	1	1	0	1	17	13
Prestressed concrete – Box beam/girders—single/spread	6	18,925	0	0	0	0	2	4
Prestressed concrete – Multistringer	5	50,352	1	0	0	1	3	1
Prestressed concrete – Slab	1	1,080	1	0	0	0	0	1
Steel – Box beam/girders – single/spread	1	1,965	0	0	0	0	0	1
Steel – Culvert	6	4,369	2	1	0	2	2	2
Steel – Girder and floorbeam	1	895	1	1	0	1	0	0
Steel – Multistringer	17	21,155	10	9	0	10	5	2
Steel – Truss—thru and pony	1	4,480	0	1	0	0	1	0
Timber – Culvert	1	540	0	0	0	0	1	0
Timber – Slab	5	4,874	1	2	0	1	2	2
Total SD/Posted/Closed			**18**	**18**	**0**			
Total	**88**	**237,747**	**18**	**18**	**0**	**18**	**38**	**32**
Percentage (%)			**20%**	**20%**	**0%**	**20%**	**43%**	**36%**

Statewide, MDOT's statistics for local agency bridges show that 14% are poor and 86% are good/fair, indicating that the MCRC has a greater percentage of poor bridges compared to the statewide average for local agencies. Correspondingly, MCRC has 80% of its bridges in fair/good condition versus the statewide average of 86% for local agency bridges. Statewide, 13% of local agency bridge deck area classifies as structurally deficient compared to 21% of MCRC's bridge deck area.

Goals

The goal of MCRC'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 90% of its bridges rated fair/good and having less than 10% classify as structurally deficient within 10 years. These goals are juxtaposed with the historic and current condition and the projected trend in Figure 8.

Several metrics will be used to assess the effectiveness of this asset management program. MCRC 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.

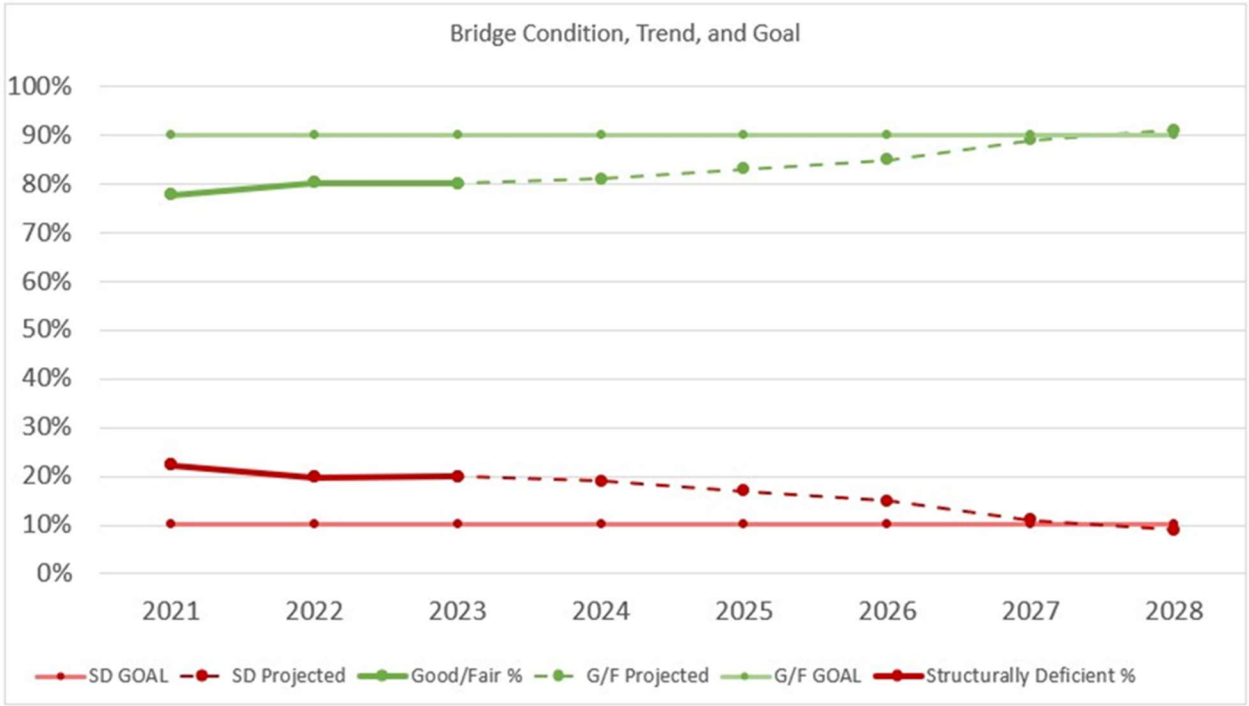

Figure 8: Progress tracking graph indicating MCRC's historic and current bridge conditions, projected trends, and goals.

Based on past inspection records and condition ratings, MCRC 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

MCRC'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, MCRC prioritizes bridges for projects by evaluating five factors and weighting them as follows: condition –30%, load capacity – 25%, traffic –10%, safety –25%, and detour –10%. 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.

MCRC 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 MCRC's bridges in Appendix 3. MCRC 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 MCRC's specific bridge network.

Table 3: Summary of Preservation Criteria

Preservation Action	Bridge Selection Criteria	Expected Service Life
Replacement		
Total Replacement	• 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	• 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	• 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)	• 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]	40 years [1*]

Table 3: Summary of Preservation Criteria		
Preservation Action	**Bridge Selection Criteria**	**Expected Service Life**
	• 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	
Steel Beam Repair	• More than 25% section loss in an area of the beam that affects load carrying capacity [1] • *OR* To correct impact damage that impairs beam strength [1]	40 years [1*]
Prestressed Concrete Beam Repair	• More than 5% spalling at ends of prestressed I-beams [1] • *OR* Impact damage that impairs beam strength or exposes prestressing strands [1]	40 years [1*]
Substructure Concrete Patching and Repair	• NBI rating of 5 or 4 for abutments or piers, and surface has less than 30% area spalled and delaminated [1] [2] • *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 for substructure patching [1]	
Abutment Repair/Replacement	• NBI rating of 4 or less for the abutment [1] [2] • *OR* Has open vertical cracks, signs of differential settlement, or active movement	
Railing/Barrier Replacement	• 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] • *OR* Pontis rating is 4 for railing [1] [5] • *OR* Safety improvement is needed [1]	
Culvert Repair/Replacement	• NBI rating of 4 or less for culvert or drainage outlet structure • *OR* Has open vertical cracks, signs of deformation, movement, or differential settlement	
Preventive Maintenance		
Shallow Concrete Deck Overlay	• 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] • *OR* In response to inspector's work recommendation [1]	12 years
Deep Concrete Deck Overlay	• 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] • *OR* In response to inspector's work recommendation [1]	25 years
HMA Overlay with Waterproofing Membrane	• 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] • *OR* 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	• 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.	3 years

Table 3: Summary of Preservation Criteria		
Preservation Action	**Bridge Selection Criteria**	**Expected Service Life**
	Temporary holdover to improve ride quality for a bridge in the five-year plan for rehab/replacement. [1] [2]	
Concrete Deck Patching	• 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] • *OR* In response to inspector's work recommendation [1]	5 years
Steel Bearing Repair/Replacement	• NBI rating of 5 or more for superstructure and deck, and NBI rating 4 or less for bearing [2]	
Deck Joint Replacement	• 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	• 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	• 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	• 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	• See Zone or Spot Painting	
Channel Improvements	• Removal of vegetation, debris, or sediment from channel and banks to improve channel flow • *OR* in response to inspector's work recommendation	
Scour Countermeasures	• 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	• 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:
	  ○ 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	• Guard rail missing or damaged [2*] • *OR* Safety improvement is needed [2*]	

Table 3: Summary of Preservation Criteria		
Preservation Action	**Bridge Selection Criteria**	**Expected Service Life**
Scheduled Maintenance		
Superstructure Washing	• 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] • *OR* Prior to a detailed replacement [1] • *OR* In response to inspector's work recommendation [1]	2 years
Drainage System Clean-Out/Repair	• 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	• 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	• 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	• To protect surface when erosion threatens the stability of side slopes of channel banks	
Vegetation Control	• 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	• 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	• 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	• 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	• 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	• Repair minor delaminations and spalling that cover less than 30% of the concrete substructure [1]	

Table 3: Summary of Preservation Criteria		
Preservation Action	**Bridge Selection Criteria**	**Expected Service Life**
	• *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] • *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	• HMA surface is in poor condition • *OR* In response to inspector's work recommendation	
Seal HMA Cracks/Joints	• 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	• NBI rating of 4 or less for substructure for timber members • *OR* To repair extensive rot, checking, or insect infestation	
Miscellaneous Repair	• Uncategorized repairs in response to inspector's work recommendation	
This table was produced by TransSystems and includes information from the following sources: [1] MDOT, *Project Scoping Manual*, MDOT, 2019. [2] MDOT, *MDOT NBI Rating Guidelines*, MDOT, 2017. [3] MDOT, *Bridge Deck Preservation Matrix - Decks with Uncoated "Black" Rebar*, MDOT, 2017. [4] MDOT, *Bridge Deck Preservation Matrix - Decks with Epoxy Coated Rebar*, 2017. [5] MDOT, *Pontis Bridge Inspection Manual*, MDOT, 2009. * From source with interpretation added.		

In terms of management and preservation actions, MCRC's asset management program uses a "mix of fixes" strategy that is made up of replacement, rehabilitation, and preventive 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.

MCRC'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 Midland County Road Commission's annual applications.

To achieve its goals, a primary objective of MCRC's asset management program is improvement of eight bridges rated poor (4 or lower) to a rating of fair (5) or higher within a five-year time period through management and/or preservation activities. The primary work activities that will be used to meet this improvement objective include replacement and rehabilitation.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, MCRC'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

MCRC received $2,388,356 per year in funding for the years 2024-2026. To achieve its goals, MCRC plans to spend $1,260,300 average per year on preventive maintenance of bridges. MCRC plans to replace nine bridges at a cost of $5,900,000. By performing the aforementioned preventive maintenance and replacement of bridge structures, MCRC may or may not meet its overall bridge network condition goals.

MCRC 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* or from past local agency projects. The cost of items of varying complexity, such as maintenance of traffic, staged construction, scour counter-measures, 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

MCRC 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	2024	2025	2026	2027	2028	GAP
Replacement						
6976	$260,000					
6975	$1,100,000					
6939		$1,760,000				
13923		$240,000				
13527		$240,000				
6993			$600,000			
6980			$380,000			
7008			$280,000			
6982			$290,000			
6972				$600,000		
6978				$350,000		
7000				$1,000,000		
6984					$350,000	
6968					$600,000	
6971					$300,000	
Subtotal	$1,360,000	$2,240,000	$1,550,000	$1,950,000	$1,250,000	$0
Rehabilitation						
6977		$150,000				
6935				$900,000		
Subtotal	$0	$150,000	$0	$900,000	$0	$0
Scheduled Maintenance						
Subtotal	$0	$0	$0	$0	$0	$0
Preventive Maintenance						
7004	$111,000					
6999	$195,000					
6947	$104,000					
6931	$122,000					
6927			$209,000			
6948			$318,000			

6989			$65,000			
6998			$256,000			
Subtotal	$532,000	$0	$848,000	$0	$0	$0
Other						
Subtotal	$0	$0	$0	$0	$0	$0

Gap Analysis

When MCRC compares its funding and its programmed/funded projects with all of its prioritized projects as shown in Table 4, MCRC believes it should be able to achieve some of its asset management goals for the period of this plan. For projects that it is unable to complete, MCRC 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

MCRC has programmed projects and/or has been granted MDOT local-aid funding for the purpose(s) of rehabilitation and preventive maintenance for the following bridge(s): 6927, 6931, 6939, 6947, 6948, 6989, 6998, 6999, and 7004. This funding is intended for use in the following funding year(s): 2024-2026.

MCRC applied for MDOT local-aid funding in 2024 for the purpose(s) of replacement for the following bridge(s): 7000. This funding would be intended for use in the following funding year(s): 2027

MCRC plans to prepare and submit applications for MDOT local-aid funding for the purpose(s) of replacement of bridges in 2028 & 2029.

Any projects submitted to the local aid program that are not selected for funding will be added to the agency's program.

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

MCRC 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.

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

MCRC administers the biennial inspection of its bridges in accordance with NBIS and MDOT requirements. The inspection reports document the condition of MCRC'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 MCRC'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. MCRC 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**
6927	3
6935	3
6939	3
6971	3
6972	3
6976	3
6980	3
6982	3
6993	3

MCRC has posted or closed bridges that are critical to accessing entire areas or individual properties within its jurisdiction. These bridges are listed in Table 6.

Table 6: Posted or Close Bridges that are Critical Links

Posted/Closed Bridges that are Critical Links		
Bridge Structure Number	**P/K**	**Comments**
6939	P	
6942	P	

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

Midland County Road Commission Bridge Inspection Report
Summary of Additional Inspections Recommendations

Structure Number	Facility Carried	Features Intersected	Inspection Frequency
6934	GORDONVILLE ROAD	TITTAWABASSEE RIVER	12
6935	PINE RIVER ROAD	PINE RIVER	12
6939	SHAFFER ROAD	BLUFF CREEK	12
6971	WOODCOCK ROAD	BULLOCK CREEK	12
6972	TITTABAWASSEE ROAD	WEEKS DRAIN	12
6973	TITTABAWASSEE ROAD	WHITMORE DRAIN	12
6975	KENT ROAD	JO DRAIN	12
6976	BROOKS ROAD	JO DRAIN	12
6977	POSEYVILLE ROAD	FLEMMING DRAIN	12
6978	POSEYVILLE ROAD	WRIGHT DRAIN	12
6980	SCHREIBER ROAD	WEEKS DRAIN	12
6982	SCHREIBER ROAD	JO DRAIN	12
6984	ORR ROAD	JO DRAIN	12
6993	MAGRUDDER ROAD	LITTLE SALT CREEK	12
7000	STEWART ROAD	LITTLE SALT CREEK	12
13527	HUCKLEBERRY RD	N BR CARROL CREEK	12
13923	SAIKO ROAD	HERNER DRAIN	12
6969	DICKENSON ROAD	ONION CREEK	16
12729	7 MILE ROAD	CARROLL CREEK	16
6940	CURTIS ROAD	TITTABAWASSEE RIVER	19
14614	GREY RD	BULLOCK CREEK	19

Appendix 2

Midland County Road Commission Bridge Inspection Report
Executive Summary and General Recommendations

Appendix 2

Structure #	BRKEY	Facility Carried	Features Intersected	Region	Detailed Inspection	Detailed Inspection Notes	Bridge Replacement	Bridge Replacement Notes	Scour Repair	Scour Repair Notes	Other Contract	Other Contract Work Notes
6927	56200002000B010	REDSTONE ROAD	PINE RIVER	Bay					High	Place additional riprap around pier footing.		
6928	56200002000B020	REDSTONE ROAD	BUSH CREEK	Bay							Low	Clean off debris/vegetation growth from edges of deck surface.
6929	56200004000B010	LAPORTE ROAD	FLEMMING DRAIN	Bay								
6930	56200005000B010	KENT ROAD	LITTLE SALT CREEK	Bay								
6931	56200007000B010	FREELAND ROAD	BULLOCK CREEK	Bay								
6932	56200008000B010	FREELAND ROAD	JO DRAIN	Bay					Medium	Place riprap along both abutment footings		
6933	56200014000B010	GORDONVILLE ROAD	BULLOCK CREEK	Bay								
6934	56200015000B010	GORDONVILLE ROAD	TITTAWABASSEE RIVER	Bay	Medium	Watch deck cracking at pier 1 and 4.						
6935	56200021000B010	PINE RIVER ROAD	PINE RIVER	Bay								
6936	56200027000B010	BARDEN ROAD	HOWARD DRAIN	Bay							Low	Clear vegetation growth at the base of both railings.
6937	56200028000B010	N SAGINAW ROAD	BIG SALT RIVER	Bay								
6938	56200028000B020	N SAGINAW ROAD	BIG SALT RIVER	Bay					High	Add sufficient riprap to piers.		
6939	56200036000B010	SHAFFER ROAD	BLUFF CREEK	Bay			High	Program for bridge replacement.	High	Place riprap along east abutment.		
6940	56200042000B010	CURTIS ROAD	TITTABAWASSEE RIVER	Bay								
6941	56200047000B010	LEVELY ROAD	HERNER DRAIN	Bay								
6942	56200049000B010	COLEMAN ROAD	SALTRIVER	Bay								
6943	56200050000B010	COLEMAN ROAD	CHIPPEWA RIVER	Bay								
6944	56200051000B010	COLEMAN ROAD	BIG SALT RIVER	Bay								
6945	56200053000B010	MAGRUDDER ROAD	CHIPPEWA RIVER	Bay								
6946	56200054000B010	PORTER ROAD	PINE RIVER	Bay					Low	Add riprap around pier.		
6947	56200055000B010	9 MILE ROAD	PINE RIVER	Bay	Medium	Investigate cause of cracking in abutments and pier						
6948	56200056000B070	8 MILE ROAD	CHIPPEWA RIVER	Bay								
6954	56200060000B020	7 MILE ROAD	BIG SALT RIVER	Bay								
6955	56200064000B010	HOMER ROAD	CHIPPEWA RIVER	Bay								
6956	56200065000B010	STARK ROAD	STURGEON CREEK	Bay								
6957	56200067000B010	POSEYVILLE ROAD	BULLOCK CREEK	Bay	Medium	Monitor deflection in north barrel splice.					Medium	Reseal area in north barrel around west end sewer tap.
6958	56200070000B010	SASSE ROAD	FLEMMING DRAIN	Bay					Medium	Place riprap along abutments.		
6959	56200071000B010	SMITHS CROSSING RD	WEEKS DRAIN	Bay								
6960	56200071000B020	SMITHS CROSSING RD	FLEMMING DRAIN	Bay								
6961	56200071000B030	SMITHS CROSSING RD	JO DRAIN	Bay								
6963	56200075000B010	BRADFORD ROAD	SALT RIVER	Bay								
6964	56302H00018B010	GENEVA ROAD	BIG SALT RIVER	Bay								
6965	56303H00004B010	GORDONVILLE ROAD	POTTER CREEK	Bay								
6966	56303H00018B010	GENEVA ROAD	SALT RIVER	Bay								
6967	56303H00019B010	GENEVA ROAD	CHIPPEWA RIVER	Bay					High	Install scour countermeasures along pier.		
6968	56303H00021B010	ALAMANDO ROAD	SALT RIVER	Bay			Low	Budget for future bridge replacement.	Medium	Place riprap in NW and SE corners.		
6969	56303H00022B010	DICKENSON ROAD	ONION CREEK	Bay								
6970	56304H00018B010	HOMER ROAD	CARROLL CREEK	Bay								
6971	56304H00019B010	WOODCOCK ROAD	BULLOCK CREEK	Bay	Low	Monitor the condition of the east pile at the north abutment. Currently leaning slightly to the south.	High	Replacement is best option.				
6972	56306H00001B010	TITTABAWASSEE ROAD	WEEKS DRAIN	Bay					High	Riprap at east and west footing.		
6973	56306H00001B020	TITTABAWASSEE ROAD	WHITMORE DRAIN	Bay								
6974	56306H00002B010	HUEY ROAD	FLEMING DRAIN	Bay							High	Clean tensioning strands and grout pockets. Patch spall in north fascia beam.
6975	56306H00005B010	KENT ROAD	JO DRAIN	Bay			Medium	Budget for full replacement.				
6976	56306H00009B010	BROOKS ROAD	JO DRAIN	Bay			High	Full replacement.	High	Place riprap at both abutments.		
6977	56306H00018B010	POSEYVILLE ROAD	FLEMMING DRAIN	Bay	Medium	Monitor deck bottom.	High	Budged for full replacement.				
6978	56306H00018B020	POSEYVILLE ROAD	WRIGHT DRAIN	Bay	High	Monitor condition of deck planks at the south abutment until repairs can be made.	Medium	Budget for future replacement.				
6980	56306H00020B010	SCHREIBER ROAD	WEEKS DRAIN	Bay	Low	Monitor tear forming in steel lagging in north abutment.	Low	Program for future replacement.				
6981	56306H00020B020	SCHREIBER ROAD	FLEMING DRAIN	Bay								
6982	56306H00021B010	SCHREIBER ROAD	JO DRAIN	Bay	Medium	Monitor cracks in abutment backwalls. Monitor bearing area of beam 1W at south abutment.	High	Replacement is best option.				
6983	56306H00023B010	ORR ROAD	WEEKS DRAIN	Bay								
6984	56306H00023B020	ORR ROAD	JO DRAIN	Bay			High	Budget for future replacement.			High	Replace missing NB load posting sign
6985	56307H00001B010	LAPORTE ROAD	LITTLE SALT CREEK	Bay								
6987	56307H00003B010	SHEPHERD ROAD	LITTLE SALT CREEK	Bay								
6988	56307H00005B010	JASPER ROAD	LITTLE SALT CREEK	Bay								
6989	56307H00006B010	LEWIS ROAD	LITTLE SALT CREEK	Bay								
6991	56307H00012B010	MAGRUDDER ROAD	BUSH CREEK	Bay							High	Replace missing southbound load posting sign at the bridge.
6992	56307H00012B020	MAGRUDDER ROAD	PINE RIVER	Bay								
6993	56307H00013B010	MAGRUDDER ROAD	LITTLE SALT CREEK	Bay			Medium	Bridge too small for stream, budget for replacement.	High	Place riprap along both abutment footings and on raw banks.		
6994	56308H00007B010	IRISH STREET	BIG SALT RIVER	Bay								
6995	56308H00024B020	CASTOR ROAD	BIG SALT RIVER	Bay					High	Place grout bags or riprap at north pier.	Low	Repair damaged/broken portions of utility ducts along west fascia.
6998	56309H00020B010	PERRINE ROAD	STURGEON CREEK	Bay	High	Monitor location of cracks found in the north floor beam, both ends. Perform Other Special Inspection on a frequent basis to ensure there is no propagation.					High	Replace missing bolts at eastside verticals
6999	56310H00004B010	GORDONVILLE ROAD	LITTLE SALT CREEK	Bay								
7000	56310H00007B010	STEWART ROAD	LITTLE SALT CREEK	Bay			High	Full replacement is best option			Medium	Place riprap in SE and NE quadrants to repair erosion behind abutment.
7001	56310H00016B010	CASTOR ROAD	LITTLE SALT CREEK	Bay								
7002	56312H00010B010	PATTERSON ROAD	BULLOCK CREEK	Bay								
7004	56314H00009B010	4 3/4 MILE RD	PINE RIVER	Bay								
7005	56315H00002B010	SEVEN MILE ROAD	BULLOCK CREEK	Bay								
7006	56315H00006B010	KENT ROAD	SUCKER CREEK	Bay								
7008	56316H00021B010	ALAMANDO ROAD	BLUFF CREEK	Bay								
12729	56308H00034B010	7 MILE ROAD	CARROLL CREEK	Bay								
13527	56308H00003C010	HUCKLEBERRY RD	N BR CARROL CREEK	Bay								
13920	56200002000C010	REDSTONE ROAD	LITTLE SALT RIVER	Bay					High	Place riprap at inlet		
13921	56200069000C010	SWEDE ROAD	KAWKAWLIN CREEK	Bay								
13922	56200069000C020	SWEDE ROAD	HERNER DRAIN	Bay					High	Remove debris stuck on inlet		
13923	56313H00007C010	SAIKO ROAD	HERNER DRAIN	Bay								
13935	56200057000C010	9 MILE ROAD	S BR CARROLL CREEK	Bay								
13936	56200057000C020	9 MILE ROAD	N BR CARROLL CREEK	Bay								
13937	56308H00035C010	11 MILE ROAD	N BR CARROLL CREEK	Bay							Medium	Re-attach utility that is loose along west side of structure.
13938	56309H00010C010	MONROE ROAD	NEWELL DRAIN	Bay								
13939	56309H00022C010	STURGEON AVENUE	NEWELL DRAIN	Bay								
13962	56315H00009C010	SHEPHERD RD	SUCKER CREEK	Bay								
13965	56200058000B010	WEST RIVER ROAD	BLACK CREEK	Bay								
13966	56314H00001C010	KENT ROAD	BULLOCK CREEK	Bay								
13967	56315H00015C010	10 MILE ROAD	SUCKER CREEK	Bay								
13971	56308H00024B010	CASTOR ROAD	N BR CARROLL CREEK	Bay								
13972	56313H00011B010	NORTH JEFFERSON RD	HERNER DRAIN	Bay								
14047	56200067000B020	POSEYVILLE ROAD	JO DRAIN	Bay								
14048	56316H00008C010	BAKER ROAD	HIGH DRAIN	Bay								
14049	56200036000B020	SHAFFER RD (EAST)	BLUFF CREEK	Bay	Low	Take measurements and monitor for any movement of the west abutment wall.						
14294	56200025000C010	LETTS RD	WALDO DRAIN	Bay								
14614	56200081000B010	GREY RD	BULLOCK CREEK	Bay								

Appendix 3

APPENDIX A-3																														
Inventory Data													Inspection Findings													Appraisal				
Bridge Type	Structure Number	Bridge ID	Facility Carried	Features Intersected	Primary or Secondary Route	Structure Type Main Span (Item 43A - Material)	Structure Type Main Span (Item 43B)	Number of Main Span (Item 45)	Total Str Length (Item 49)	Year Built (Item 27)	Year Reconstr (Item 106)	ADT	Year of ADT	Inspection Date	Operational Status (Item 41)	Deck Rating (Item 58)	Deck Bottom Rating (Item XX)	SuperStr Rating (Item 59)	Substr Rating (Item 60)	Channel Rating (Item 61)	Culvert Rating (Item 62)	Surface Rating (Item 58A)	Paint Rtg	Exp Joint Rating (Item XX)	Other Joints	Structure Evaluation	Structurally Deficient	Sufficiency Rating	Section Loss	Scour Critical (Item 113)
Prestressed concrete – Box beam/girders—multiple	6927	56200002000B010	REDSTONE ROAD	PINE RIVER	Primary	5	32	2	133.9	1979		1074	2022	8/16/2023	A	7	7	8	5	5	N	7	N	5	5	F		82.9	3	3
Steel - Multistringer	6928	56200002000B020	REDSTONE ROAD	BUSH CREEK	Primary	3	32	1	65	2020		3328	2018	6/17/2022	A	8	8	8	8	4	N	8	8	N	N	G		98.2	3	8
Steel – Multistringer	6929	56200004000B010	LAPORTE ROAD	FLEMMING DRAIN	Primary	3	2	1	45.9	1947		821	1999	8/18/2023	A	6	6	6	6	5	N	8	3	N	N	F		79.5	2	5
Prestressed concrete – Box beam/girders—multiple	6930	56200005000B010	KENT ROAD	LITTLE SALT CREEK	Primary	5	5	1	67.9	1991		703	1999	9/14/2023	A	6	N	6	6	7	N	6	N	N	N	F		99.8	2	5
Prestressed concrete – Box beam/girders—multiple	6931	56200007000B010	FREELAND ROAD	BULLOCK CREEK	Primary	5	5	1	55	2003		2077	2002	9/7/2023	A	5	N	7	6	8	N	5	N	4	N	F		97.8	3	8
Steel – Multistringer	6932	56200008000B010	FREELAND ROAD	JO DRAIN	Primary	3	2	1	29.9	1910	1974	2318	1999	8/29/2023	A	7	8	7	6	7	N	7	6	N	N	F		95	3	U
Prestressed concrete – Box beam/girders—multiple	6933	56200014000B010	GORDONVILLE ROAD	BULLOCK CREEK	Primary	5	5	1	53.8	1995		1964	1999	9/7/2023	A	6	N	7	6	7	N	6	N	N	6	F		99.8	2	5
Prestressed concrete – Multistringer	6934	56200015000B010	GORDONVILLE ROAD	TITTAWABASSEE RIVER	Primary	5	2	6	484.9	1975		6613	2005	9/7/2023	A	6	4	4	6	5	N	6	N	6	N	P	Struct Def	54.1	2	5
Prestressed concrete – Box beam/girders—multiple	6935	56200021000B010	PINE RIVER ROAD	PINE RIVER	Primary	5	5	3	179.8	1970		2115	2015	8/22/2023	P	5	N	4	6	5	N	6	N	N	N	P	Struct Def	55.2	2	3
Prestressed concrete – Box beam/girders—multiple	6936	56200027000B010	BARDEN ROAD	HOWARD DRAIN	Primary	5	5	1	44	1980		738	1999	9/13/2023	A	7	N	6	6	6	N	7	N	N	N	F		99.9	3	8
Prestressed concrete – Box beam/girders—multiple	6937	56200028000B010	N SAGINAW ROAD	BIG SALT RIVER	Primary	5	5	3	162.4	2001		6297	2019	9/13/2023	A	7	N	7	6	7	N	8	N	8	N	F		90.2	3	5
Prestressed concrete – Box beam/girders—multiple	6938	56200028000B020	N SAGINAW ROAD	BIG SALT RIVER	Primary	5	5	3	147.6	2001		2705	2019	9/13/2023	A	7	N	7	7	7	N	7	N	8	N	G		90.5	3	5
Steel – Multistringer	6939	56200036000B010	SHAFFER ROAD	BLUFF CREEK	Primary	3	2	1	28.9	1930	1970	1404	1999	8/16/2023	P	4	4	3	4	3	N	5	5	N	N	P	Struct Def	28.5	2	3
Prestressed concrete – Box beam/girders—multiple	6940	56200042000B010	CURTIS ROAD	TITTABAWASSEE RIVER	Primary	5	5	3	316.6	1997		2067	1999	2/28/2023	A	6	N	6	6	8	N	6	N	5	N	F		96.4	N	5
Prestressed concrete – Box beam/girders—multiple	6941	56200047000B010	LEVELY ROAD	HERNER DRAIN	Primary	5	5	1	32.8	2006		253	2005	9/13/2023	A	6	N	8	8	6	N	6	N	4	N	G	Funct Obs	47.2	3	5
Steel – Multistringer	6942	56200049000B010	COLEMAN ROAD	SALTRIVER	Primary	3	2	1	65.9	1957		1104	1999	9/13/2023	P	7	7	6	7	5	N	7	4	N	N	F		82.6	3	5
Prestressed concrete – Box beam/girders—multiple	6943	56200050000B010	COLEMAN ROAD	CHIPPEWA RIVER	Primary	5	32	2	155.4	2021		2114	2019	8/16/2022	A	9	9	9	9	5	N	9	N	9	9	G		93.8	3	5
Prestressed concrete – Box beam/girders—single/spread	6944	56200051000B010	COLEMAN ROAD	BIG SALT RIVER	Primary	5	6	1	90	2015		2113	2006	8/16/2022	A	7	7	8	7	8	N	7	N	8	N	G		94.8	3	5
Prestressed concrete – Box beam/girders—multiple	6945	56200053000B010	MAGRUDDER ROAD	CHIPPEWA RIVER	Primary	5	5	2	161.7	1989		305	1999	9/14/2023	A	6	N	5	6	7	N	8	N	9	N	F		88.8	2	5
Prestressed concrete – Box beam/girders—multiple	6946	56200054000B010	PORTER ROAD	PINE RIVER	Primary	5	5	2	149.9	1986		226	2016	9/7/2023	A	6	N	6	6	7	N	7	N	6	N	F		98.9	2	5
Prestressed concrete – Box beam/girders—single/spread	6947	56200055000B010	9 MILE ROAD	PINE RIVER	Primary	5	6	2	155.8	2000		448	2016	9/7/2023	A	7	8	7	6	7	N	7	N	6	N	F		99.9	3	5
Prestressed concrete - Multistringer	6948	56200056000B070	8 MILE ROAD	CHIPPEWA RIVER	Primary	5	2	3	211.9	1976		923	1999	9/22/2023	A	7	7	6	6	7	N	6	N	7	N	F		96.1	2	5
Concrete – Girder and floorbeam	6954	56200060000B020	7 MILE ROAD	BIG SALT RIVER	Primary	1	3	1	91.9	1927		4490	1999	9/13/2023	P	5	4	5	6	4	N	5	N	N	N	F	Funct Obs	64.9	2	U
Prestressed concrete - Multistringer	6955	56200064000B010	HOMER ROAD	CHIPPEWA RIVER	Primary	5	2	3	179.3	1977		3145	2015	9/7/2023	A	8	7	7	6	6	N	7	N	5	5	F		98.3	2	5
Prestressed concrete – Box beam/girders—single/spread	6956	56200065000B010	STARK ROAD	STURGEON CREEK	Primary	5	6	1	65	2014		1278	2013	8/16/2023	A	8	8	7	8	8	N	7	N	8	N	G		98.4	3	5
Steel – Culvert	6957	56200067000B010	POSEYVILLE ROAD	BULLOCK CREEK	Primary	3	19	2	32.6	2007		8442	2005	8/22/2023	A	N		N	N	7	7					G		96.2		5
Steel – Multistringer	6958	56200070000B010	SASSE ROAD	FLEMMING DRAIN	Primary	3	2	1	46.9	1946		1507	1999	8/18/2023	A	7	7	7	6	7	N	7	3	N	N	F		82.7	3	5
Prestressed concrete – Box beam/girders—multiple	6959	56200071000B010	SMITHS CROSSING RD	WEEKS DRAIN	Primary	5	5	1	49.9	1994		1793	1999	8/18/2023	A	7	N	7	6	7	N	7	N	N	N	F		99.5	N	8
Prestressed concrete – Box beam/girders—multiple	6960	56200071000B020	SMITHS CROSSING RD	FLEMMING DRAIN	Primary	5	5	1	57	2007		1901	2002	8/29/2023	A	7	N	7	7	8	N	6	N	7	N	G		99.8	N	8
Concrete – Tee beam	6961	56200071000B030	SMITHS CROSSING RD	JO DRAIN	Primary	1	4	1	40	1961		1933	1999	8/29/2023	P	5	5	5	6	7	N	5	N	N	N	F		65	N	5
Prestressed concrete – Box beam/girders—multiple	6963	56200075000B010	BRADFORD ROAD	SALT RIVER	Primary	5	5	1	60	1986		188	1999	9/13/2023	A	7	N	7	7	6	N	8	N	N	N	G		98	3	5
Prestressed concrete – Box beam/girders—multiple	6964	56302H00018B010	GENEVA ROAD	BIG SALT RIVER	Secondary	5	5	3	264.1	1999		146	1999	9/22/2023	A	6	N	6	7	7	N	6	N	7	N	F		99.9	2	8
Prestressed concrete – Box beam/girders—multiple	6965	56303H00004B010	GORDONVILLE ROAD	POTTER CREEK	Secondary	5	5	1	49	1994		22	1999	9/13/2023	A	7	N	7	8	7	N	7	N	N	N	G		100	2	5
Prestressed concrete - Multistringer	6966	GORDONVILLE ROAD	POTTER CREEK	SALT RIVER	Secondary	5	2	2	111.9	1981		131	1999	9/13/2023	A	7	7	8	6	5	N	7	N	7	N	F		100	3	5
Prestressed concrete – Box beam/girders—multiple	6967	56303H00019B010	GENEVA ROAD	CHIPPEWA RIVER	Secondary	5	5	2	150.9	2000		231	1999	9/13/2023	A	7	N	7	7	6	N	7	N	8	N	G		97.8	3	5
Steel – Multistringer	6968	56303H00021B010	ALAMANDO ROAD	SALT RIVER	Secondary	3	2	1	62	1906	2000	73	1999	9/14/2023	P	6	7	6	4	5	N	3	5	N	N	P	Struct Def	45.2	2	7
Timber – Slab	6969	56303H00022B010	DICKENSON ROAD	ONION CREEK	Secondary	7	1	3	62	1991		45	1999	5/8/2023	A	6	6	6	5	6	N	6	N	N	N	F		81	N	5
Prestressed concrete – Box beam/girders—multiple	6970	56304H00018B010	HOMER ROAD	CARROLL CREEK	Secondary	5	5	1	75	2009		585	2009	9/7/2023	A	7	N	7	8	8	N	7	N	6	N	G		89.5	3	8
Timber – Slab	6971	56304H00019B010	WOODCOCK ROAD	BULLOCK CREEK	Secondary	7	1	1	25.9	1988		125	1999	8/22/2023	P	5	5	5	4	3	N	7	N	N	N	P	Struct Def	67	N	3
Steel – Culvert	6972	56306H00001B010	TITTABAWASSEE ROAD	WEEKS DRAIN	Secondary	3	19	1	27.9	1980		1896	2018	8/18/2023	A	N		N	N	4	4					P	Struct Def	72.8		3
Concrete – Tee beam	6973	56306H00001B020	TITTABAWASSEE ROAD	WHITMORE DRAIN	Secondary	1	4	1	31.8	1932		606	1999	8/18/2023	A	4	3	5	4	7	N	6	N	N	N	P	Struct Def	54.9	1	U
Prestressed concrete – Box beam/girders—multiple	6974	56306H00002B010	HUEY ROAD	FLEMING DRAIN	Secondary	5	5	1	40	1935	1982	36	1999	8/29/2023	A	6	N	5	6	7	N	6	N	N	N	F		76.6	N	U
Steel – Girder and floorbeam	6975	56306H00005B010	KENT ROAD	JO DRAIN	Secondary	3	3	1	35.8	1964		141	2016	8/29/2023	P	7	7	5	3	6	N	7	2	N	N	P	Struct Def	36.8	2	5
Steel – Multistringer	6976	56306H00009B010	BROOKS ROAD	JO DRAIN	Secondary	3	2	1	24.9	1938	1973	202	2016	8/22/2023	P	4	3	6	3	6	N	6	6	N	N	P	Struct Def	49.7	2	3
Steel – Multistringer	6977	56306H00018B010	POSEYVILLE ROAD	FLEMMING DRAIN	Secondary	3	2	1	24.9	1929	1955	291	1999	8/18/2023	A	3	3	3	5	7	N	6	3	N	N	P	Struct Def	40.9	1	5
Steel – Multistringer	6978	56306H00018B020	POSEYVILLE ROAD	WRIGHT DRAIN	Secondary	3	2	1	33.8	1929	1962	291	1999	8/18/2023	A	4	4	4	4	6	N	6	4	N	N	P	Struct Def	50.7	2	U
Steel – Multistringer	6980	56306H00020B010	SCHREIBER ROAD	WEEKS DRAIN	Secondary	3	2	1	33.8	1930	1986	51	1999	8/18/2023	A	5	5	5	3	7	N	7	5	N	N	P	Struct Def	48.6	2	3
Prestressed concrete – Box beam/girders—multiple	6981	56306H00020B020	SCHREIBER ROAD	FLEMING DRAIN	Secondary	5	5	1	53.8	1991		117	1999	8/18/2023	A	6	N	7	5	5	N	6	N	N	N	F		87.1	N	5
Steel – Multistringer	6982	56306H00021B010	SCHREIBER ROAD	JO DRAIN	Secondary	3	2	1	28.9	1938		51	1999	8/22/2023	P	6	6	5	3	6	N	7	6	N	N	P	Struct Def	24.5	2	3
Steel – Multistringer	6983	56306H00023B010	ORR ROAD	WEEKS DRAIN	Secondary	3	2	1	60	2019		106	1999	11/2/2023	A	7	7	8	7	9	N	7	8	N	N	G		99	3	7
Steel – Multistringer	6984	56306H00023B020	ORR ROAD	JO DRAIN	Secondary	3	2	1	49.9	1978		124	2002	8/29/2023	P	7	7	4	4	6	N	6	3	N	N	P	Struct Def	37.7	2	5
Prestressed concrete – Box beam/girders—multiple	6985	56307H00001B010	LAPORTE ROAD	LITTLE SALT CREEK	Secondary	5	5	1	49.2	2002		91	1999	9/13/2023	A	5	N	5	8	7	N	5	N	6	N	F		88	2	8
Prestressed concrete – Box beam/girders—multiple	6987	56307H00003B010	SHEPHERD ROAD	LITTLE SALT CREEK	Secondary	5	5	1	51.8	1980		87	1999	9/14/2023	A	5	N	5	7	8	N	5	N	N	N	F		88	2	8
Prestressed concrete – Box beam/girders—multiple	6988	56307H00005B010	JASPER ROAD	LITTLE SALT CREEK	Secondary	5	5	1	62	1994		36	1999	9/14/2023	A	6	N	7	8	6	N	5	N	N	N	G		100	2	5
Prestressed concrete – Box beam/girders—multiple	6989	56307H00006B010	LEWIS ROAD	LITTLE SALT CREEK	Secondary	5	5	1	67	2007		146	1999	9/14/2023	A	6	N	7	8	8	N	6	N	7	N	G		99.9	3	8
Steel – Multistringer	6991	56307H00012B010	MAGRUDDER ROAD	BUSH CREEK	Secondary	3	2	1	51.8	1911	1999	61	1999	9/14/2023	P	6	6	6	5	7	N	3	5	N	N	F		74.6	2	7
Prestressed concrete – Box beam/girders—multiple	6992	56307H00012B020	MAGRUDDER ROAD	PINE RIVER	Secondary	5	5	3	180	1982		290	2019	9/14/2023	A	6	N	5	5	7	N	8	N	9	N	F		85.9	2	5
Steel – Multistringer	6993	56307H00013B010	MAGRUDDER ROAD	LITTLE SALT CREEK	Secondary	3	2	1	37.7	1936		90	2016	8/16/2023	P	4	4	4	4	3	N	3	4	N	N	P	Struct Def	41	2	3
Concrete – Girder and floorbeam	6994	56308H00007B010	IRISH STREET	BIG SALT RIVER	Secondary	1	3	1	94.8	1927		182	1999	9/13/2023	P	5	4	5	6	5	N	5	N	N	N	F		54.1	2	U
Prestressed concrete – Box beam/girders—single/spread	6995	56308H00024B020	CASTOR ROAD	BIG SALT RIVER	Secondary	5	6	3	159	1980	2019	314	2016	8/16/2023	A	8	8	8	6	5	N	8	N	9	9	F		97.4	3	4
Steel – Truss—thru and pony	6998	56309H00020B010	PERRINE ROAD	STURGEON CREEK	Secondary	3	10	1	112	1932	2001	70	1999	9/13/2023	P	5	6	5	6	7	N	5	5	4	N	F			1	5
Prestressed concrete – Box beam/girders—multiple	6999	56310H00004B010	GORDONVILLE ROAD	LITTLE SALT CREEK	Secondary	5	5	2	126	1986		244	1999	9/22/2023	A	5	N	6	5	4	N	4	N	4	4	F		87	2	U
Steel – Multistringer	7000	56310H00007B010	STEWART ROAD	LITTLE SALT CREEK	Secondary	3	2	1	62	1977	2003	131	1999	9/22/2023	P	5	5	3	4	3	N	7	3	N	N	P	Struct Def	38.5	1	7
Prestressed concrete – Box beam/girders—multiple	7001	56310H00016B010	CASTOR ROAD	LITTLE SALT CREEK	Secondary	5	5	1	65	2007		96	2006	9/14/2023	A	7	N	7	8	8	N	7	N	6	N	G		100	3	8
Prestressed concrete – Box beam/girders—multiple	7002	56312H00010B010	PATTERSON ROAD	BULLOCK CREEK	Secondary	5	5	1	42	2006		705	2004	8/22/2023	A	7	N	7	7	8	N	7	N	7	N	G		99.9	N	5
Prestressed concrete – Box beam/girders—multiple	7004	56314H00009B010	4 3/4 MILE RD	PINE RIVER	Secondary	5	5	2	131.2	1997		654	2015	9/7/2023	A	6	N	7	7	7	N	6	N	5	N	G		99	2	5
Concrete – Slab	7005	56315H00002B010	SEVEN MILE ROAD	BULLOCK CREEK	Secondary	1	1	1	30	2019		437	1999	6/17/2022	A	8	8	8	8	8	N	8	N	N	N	G		99.9	3	8
Steel – Culvert	7006	56315H00006B010	KENT ROAD	SUCKER CREEK	Secondary	3	19	1	31	2004		291	1999	8/16/2023	A	N		N	N	7	7					G		96.9		5

Appendix 3

Timber – Slab	**7008**	56316H00021B010	ALAMANDO ROAD	BLUFF CREEK	Secondary	7	1	1	26.9	1965		124	1999	9/22/2023	P	6	6	6	5	7	N	4	N	N	N	F		83	N	5
Prestressed concrete – Multistringer	**12729**	56308H00034B010	7 MILE ROAD	CARROLL CREEK	Secondary	5	2	1	43	2010		50	2009	5/8/2023	A	7	7	7	7	8	N	7	N	7	N	G		94.5	3	8
Concrete – Culvert	**13527**	56308H00003C010	HUCKLEBERRY RD	N BR CARROL CREEK	Secondary	1	19	2	20	1974		163	2001	8/16/2023	A	N		N	N	5	4					P	Struct Def	72.9		5
Timber – Culvert	**13920**	56200002000C010	REDSTONE ROAD	LITTLE SALT RIVER	Primary	7	19	3	22.5	1970		1089	2015	11/2/2023	A	N		N	N	5	6					F	Funct Obs	72.6		8
Steel – Culvert	**13922**	56200069000C020	SWEDE ROAD	HERNER DRAIN	Primary	3	19	2	29	1973		275	2015	11/2/2023	A	N		N	N	6	5					F		84.9		8
Steel – Culvert	**13923**	56313H00007C010	SAIKO ROAD	HERNER DRAIN	Secondary	3	19	2	27	1970		50	2015	9/22/2023	P	N		N	N	6	3					P	Struct Def	39		8
Concrete – Slab	**13935**	56200057000C010	9 MILE ROAD	S BR CARROLL CREEK	Primary	1	1	1	30	2017		500	2014	11/2/2023	A	7	7	7	8	6	N	8	N	N	N	G		99.4	3	4
Concrete – Slab	**13936**	56200057000C020	9 MILE ROAD	N BR CARROLL CREEK	Primary	1	1	1	30	2017		500	2014	11/2/2023	A	6	6	6	8	7	N	7	N	N	N	F		99.4	3	8
Concrete – Slab	**13937**	56308H00035C010	11 MILE ROAD	N BR CARROLL CREEK	Secondary	1	1	1	36	2019		250	2014	11/29/2023	A	8	8	8	7	9	N	8	N	N	N	G		99.8	3	8
Prestressed concrete – Box beam/girders—single/spread	**13938**	56309H00010C010	MONROE ROAD	NEWELL DRAIN	Secondary	5	6	1	36	2020		2307	2018	6/17/2022	A	8	8	8	8	6	N	8	N	N	N	G		97.3	3	5
Prestressed concrete – Box beam/girders—single/spread	**13939**	56309H00022C010	STURGEON AVENUE	NEWELL DRAIN	Secondary	5	6	1	28	2019		3328	2018	8/22/2023	A	8	8	8	8	8	N	7	N	N	N	G		96.5	3	5
Prestressed concrete – Slab	**13965**	56200058000B010	WEST RIVER ROAD	BLACK CREEK	Primary	5	1	1	30	2016		350	2017	8/16/2022	A	7	7	7	7	8	N	8	N	8	N	G		100	N	5
Concrete – Slab	**13966**	56314H00001C010	KENT ROAD	BULLOCK CREEK	Secondary	1	1	1	36	2019		200	2017	11/2/2023	A	7	7	7	6	9	N	8	N	N	N	F		99.9	3	8
Steel – Culvert	**13967**	56315H00015C010	10 MILE ROAD	SUCKER CREEK	Secondary	3	19	1	20	1970		150	2017	8/16/2022	A	N		N	N	7	5					F	Funct Obs	69.9		8
Timber – Slab	**13971**	56308H00024B010	CASTOR ROAD	N BR CARROLL CREEK	Secondary	7	1	1	23.3	2016		158	2015	10/21/2022	A	8	8	8	8	7	N	7	N	N	N	G		99.9	N	8
Timber – Slab	**13972**	56313H00011B010	NORTH JEFFERSON RD	HERNER DRAIN	Secondary	7	1	1	23	2016		283	2016	10/21/2022	A	8	8	8	7	7	N	7	N	N	N	G		99.9	N	8
Concrete – Slab	**14047**	56200067000B020	POSEYVILLE ROAD	JO DRAIN	Primary	1	1	1	24	2017		2196	2016	11/2/2023	A	7	7	7	8	8	N	8	N	N	N	G		92.9	N	7
Concrete – Slab	**14048**	56316H00008C010	BAKER ROAD	HIGH DRAIN	Secondary	1	1	1	24	2023		50	2017	8/16/2023	A	8	8	8	9	6	N	9	N	N	N	G		100	N	8
Concrete – Slab	**14049**	56200036000B020	SHAFFER RD (EAST)	BLUFF CREEK	Primary	1	1	1	30	2017		1034	2017	11/2/2023	A	7	7	7	8	8	N	8	N	N	N	G		99.7	3	8
Steel – Box beam/girders—single/spread	**14614**	56200081000B010	GREY RD	BULLOCK CREEK	Primary	3	6	1	50	2022		644	2022	2/28/2023	A	9	9	9	9	7	N	9	N	N	N	G		99.8	3	8

Appendix 4

APPENDIX A-3

Inventory Data											Replacement				Rehabilitation											Proposed Preventive Maintenance									Proposed Scheduled Maintenance														
Bridge Type	Structure Number	Bridge ID	Facility Carried	Features Intersected	Structure Type Main Span (Item 43A - Material)	Structure Type Main Span (Item 43B)	Number of Main Span (Item 45)	Total Str Length (Item 49)	Total Str Width (Item 52)	Total Str (sq ft)	Total	Super-structure	Deck	Sub-structure	Deep Overlay	Shallow Overlay	HMA Overlay w/ Membrane	HMA Cap	Replace/Retrofit Railing	Steel Beam Repairs	P/S Conc Beam Repairs	Repair/Replace Culvert	Repair/Replace Retaining Wall	Geometric Upgrades	Patch Substruct Concrete	Repair/Replace Deck	Repair/Replace Steel Bearings	Complete Painting	Zone Painting	Epoxy Overlays	HMA Cap w/o Membrane	Concrete Deck Patching	Channel Improvements	Scour Counter Measures	Superstruc Washing	Concrete Surface Washing	Vegetation Control	Debris Removal	Clean Drainage System	Spot Painting	Repair/Replace HMA Surface	Seal HMA Cracks/Joints	Seal Concrete Cracks/Joints	Minor Concrete Patching	Timber Repairs	Repair/Replace Guardrails	Repave Approaches	Repair Slopes	Install RipRap
Prestressed concrete – Box beam/girders—multiple	6927	56200002000B010	REDSTONE ROAD	PINE RIVER	5	32	2	133.9	34.1	4566																							X				X					X						
Steel - Multistringer	6928	56200002000B020	REDSTONE ROAD	BUSH CREEK	3	32	1	65	39.2	2548																																							
Steel – Multistringer	6929	56200004000B010	LAPORTE ROAD	FLEMMING DRAIN	3	2	1	45.9	29.5	1354									X									X									X						X						
Prestressed concrete – Box beam/girders—multiple	6930	56200005000B010	KENT ROAD	LITTLE SALT CREEK	5	5	1	67.9	34.1	2315																																X							
Prestressed concrete – Box beam/girders—multiple	6931	56200007000B010	FREELAND ROAD	BULLOCK CREEK	5	5	1	55	37.4	2057																X				X																			
Steel – Multistringer	6932	56200008000B010	FREELAND ROAD	JO DRAIN	3	2	1	29.9	36	1076																								X															
Prestressed concrete – Box beam/girders—multiple	6933	56200014000B010	GORDONVILLE ROAD	BULLOCK CREEK	5	5	1	53.8	42	2260																											X					X							
Prestressed concrete – Multistringer	6934	56200015000B010	GORDONVILLE ROAD	TITTAWABASSEE RIVER	5	2	6	484.9	61	29579																												X	X										
Prestressed concrete – Box beam/girders—multiple	6935	56200021000B010	PINE RIVER ROAD	PINE RIVER	5	5	3	179.8	36.4	6545						X																		X				X								X			
Prestressed concrete – Box beam/girders—multiple	6936	56200027000B010	BARDEN ROAD	HOWARD DRAIN	5	5	1	44	38.1	1676																											X												
Prestressed concrete – Box beam/girders—multiple	6937	56200028000B010	N SAGINAW ROAD	BIG SALT RIVER	5	5	3	162.4	37.4	6074																																							
Prestressed concrete – Box beam/girders—multiple	6938	56200028000B020	N SAGINAW ROAD	BIG SALT RIVER	5	5	3	147.6	38.3	5653																																							
Steel – Multistringer	6939	56200036000B010	SHAFFER ROAD	BLUFF CREEK	3	2	1	28.9	30.1	870	X																																						
Prestressed concrete – Box beam/girders—multiple	6940	56200042000B010	CURTIS ROAD	TITTABAWASSEE RIVER	5	5	3	316.6	41.7	13202																						X										X							
Prestressed concrete – Box beam/girders—multiple	6941	56200047000B010	LEVELY ROAD	HERNER DRAIN	5	5	1	32.8	31.1	1020																																	X			X			
Steel – Multistringer	6942	56200049000B010	COLEMAN ROAD	SALTRIVER	3	2	1	65.9	28.9	1905																											X												
Prestressed concrete – Box beam/girders—multiple	6943	56200050000B010	COLEMAN ROAD	CHIPPEWA RIVER	5	32	2	155.4	38.9	6045	X																																						
Prestressed concrete – Box beam/girders—single/spread	6944	56200051000B010	COLEMAN ROAD	BIG SALT RIVER	5	6	1	90	43	3870																																							
Prestressed concrete – Box beam/girders—multiple	6945	56200053000B010	MAGRUDDER ROAD	CHIPPEWA RIVER	5	5	2	161.7	34.1	5514																							X	X															
Prestressed concrete – Box beam/girders—multiple	6946	56200054000B010	PORTER ROAD	PINE RIVER	5	5	2	149.9	31.2	4677															X																								
Prestressed concrete – Box beam/girders—single/spread	6947	56200055000B010	9 MILE ROAD	PINE RIVER	5	6	2	155.8	34.2	5328															X														X										
Prestressed concrete – Multistringer	6948	56200056000B070	8 MILE ROAD	CHIPPEWA RIVER	5	2	3	211.9	37.7	7989																								X	X														
Concrete – Girder and floorbeam	6954	56200060000B020	7 MILE ROAD	BIG SALT RIVER	1	3	1	91.9	23.3	2141																																							
Prestressed concrete – Multistringer	6955	56200064000B010	HOMER ROAD	CHIPPEWA RIVER	5	2	3	179.3	42.8	7674			X							X					X			X						X												X			
Prestressed concrete – Box beam/girders—single/spread	6956	56200065000B010	STARK ROAD	STURGEON CREEK	5	6	1	65	38.9	2529					X						X				X									X															
Steel – Culvert	6957	56200067000B010	POSEYVILLE ROAD	BULLOCK CREEK	3	19	2	32.6		1177	X																																						
Steel – Multistringer	6958	56200070000B010	SASSE ROAD	FLEMMING DRAIN	3	2	1	46.9	28.9	1355							X																	X	X														
Prestressed concrete – Box beam/girders—multiple	6959	56200071000B010	SMITHS CROSSING RD	WEEKS DRAIN	5	5	1	49.9	37.1	1851																																	X			X			
Prestressed concrete – Box beam/girders—multiple	6960	56200071000B020	SMITHS CROSSING RD	FLEMMING DRAIN	5	5	1	57	43.6	2485																																							
Concrete – Tee beam	6961	56200071000B030	SMITHS CROSSING RD	JO DRAIN	1	4	1	40	29.2	1168																																							
Prestressed concrete – Box beam/girders—multiple	6963	56200075000B010	BRADFORD ROAD	SALT RIVER	5	5	1	60	33.1	1986																			X																	X			
Prestressed concrete – Box beam/girders—multiple	6964	56302H00018B010	GENEVA ROAD	BIG SALT RIVER	5	5	3	264.1	31.2	8240																																							
Prestressed concrete – Box beam/girders—multiple	6965	56303H00004B010	GORDONVILLE ROAD	POTTER CREEK	5	5	1	49	31	1519																																							
Prestressed concrete – Multistringer	6966	GORDONVILLE ROAD	POTTER CREEK	SALT RIVER	5	2	2	111.9	34.1	3816																				X									X							X			
Prestressed concrete – Box beam/girders—multiple	6967	56303H00019B010	GENEVA ROAD	CHIPPEWA RIVER	5	5	2	150.9	34.4	5191																								X	X														
Steel – Multistringer	6968	56303H00021B010	ALAMANDO ROAD	SALT RIVER	3	2	1	62	22	1364									X																X														
Timber – Slab	6969	56303H00022B010	DICKENSON ROAD	ONION CREEK	7	1	3	62	27.2	1686																																	X						
Prestressed concrete – Box beam/girders—multiple	6970	56304H00018B010	HOMER ROAD	CARROLL CREEK	5	5	1	75	32.8	2460																									X		X	X											
Timber – Slab	6971	56304H00019B010	WOODCOCK ROAD	BULLOCK CREEK	7	1	1	25.9	29.2	756																									X		X	X											
Steel – Culvert	6972	56306H00001B010	TITTABAWASSEE ROAD	WEEKS DRAIN	3	19	1	27.9		778							X																																
Concrete – Tee beam	6973	56306H00001B020	TITTABAWASSEE ROAD	WHITMORE DRAIN	1	4	1	31.8	27.9	887																																				X			
Prestressed concrete – Box beam/girders—multiple	6974	56306H00002B010	HUEY ROAD	FLEMING DRAIN	5	5	1	40	18	720																																	X						
Steel – Girder and floorbeam	6975	56306H00005B010	KENT ROAD	JO DRAIN	3	3	1	35.8	25	895	X																																			X			
Steel – Multistringer	6976	56306H00009B010	BROOKS ROAD	JO DRAIN	3	2	1	24.9	29	722																								X			X												
Steel – Multistringer	6977	56306H00018B010	POSEYVILLE ROAD	FLEMMING DRAIN	3	2	1	24.9	24.3	605											X																									X			
Steel – Multistringer	6978	56306H00018B020	POSEYVILLE ROAD	WRIGHT DRAIN	3	2	1	33.8	24	811											X				X																					X			
Steel – Multistringer	6980	56306H00020B010	SCHREIBER ROAD	WEEKS DRAIN	3	2	1	33.8	26.2	886	X																																						
Prestressed concrete – Box beam/girders—multiple	6981	56306H00020B020	SCHREIBER ROAD	FLEMING DRAIN	5	5	1	53.8	30.8	1657	X																																						
Steel – Multistringer	6982	56306H00021B010	SCHREIBER ROAD	JO DRAIN	3	2	1	28.9	18.7	540	X																																						
Steel – Multistringer	6983	56306H00023B010	ORR ROAD	WEEKS DRAIN	3	2	1	60	30	1800																			X																				
Steel – Multistringer	6984	56306H00023B020	ORR ROAD	JO DRAIN	3	2	1	49.9	29.2	1457																								X												X			
Prestressed concrete – Box beam/girders—multiple	6985	56307H00001B010	LAPORTE ROAD	LITTLE SALT CREEK	5	5	1	49.2	31.2	1535																					X			X			X												
Prestressed concrete – Box beam/girders—multiple	6987	56307H00003B010	SHEPHERD ROAD	LITTLE SALT CREEK	5	5	1	51.8	31	1606	X																																						
Prestressed concrete – Box beam/girders—multiple	6988	56307H00005B010	JASPER ROAD	LITTLE SALT CREEK	5	5	1	62	30.8	1910																																							
Prestressed concrete – Box beam/girders—multiple	6989	56307H00006B010	LEWIS ROAD	LITTLE SALT CREEK	5	5	1	67	31	2077																																				X			
Steel – Multistringer	6991	56307H00012B010	MAGRUDDER ROAD	BUSH CREEK	3	2	1	51.8	20	1036																				X																			
Prestressed concrete – Box beam/girders—multiple	6992	56307H00012B020	MAGRUDDER ROAD	PINE RIVER	5	5	3	180	34.3	6174																											X					X							
Steel – Multistringer	6993	56307H00013B010	MAGRUDDER ROAD	LITTLE SALT CREEK	3	2	1	37.7	28.9	1090																																X							
Concrete – Girder and floorbeam	6994	56308H00007B010	IRISH STREET	BIG SALT RIVER	1	3	1	94.8	24.9	2361																																							
Prestressed concrete – Box beam/girders—single/spread	6995	56308H00024B020	CASTOR ROAD	BIG SALT RIVER	5	6	3	159	30.7	4881																									X														
Steel – Truss—thru and pony	6998	56309H00020B010	PERRINE ROAD	STURGEON CREEK	3	10	1	112	40	4480																																							
Prestressed concrete – Box beam/girders—multiple	6999	56310H00004B010	GORDONVILLE ROAD	LITTLE SALT CREEK	5	5	2	126	34.8	4385																						X		X												X			
Steel – Multistringer	7000	56310H00007B010	STEWART ROAD	LITTLE SALT CREEK	3	2	1	62	28	1736																								X	X		X									X			
Prestressed concrete – Box beam/girders—multiple	7001	56310H00016B010	CASTOR ROAD	LITTLE SALT CREEK	5	5	1	65	31	2015																																							
Prestressed concrete – Box beam/girders—multiple	7002	56312H00010B010	PATTERSON ROAD	BULLOCK CREEK	5	5	1	42	45.5	1911										X												X			X														
Prestressed concrete – Box beam/girders—multiple	7004	56314H00009B010	4 3/4 MILE RD	PINE RIVER	5	5	2	131.2	31.2	4093																						X		X	X														
Concrete – Slab	7005	56315H00002B010	SEVEN MILE ROAD	BULLOCK CREEK	1	1	1	30	24	720	X																																						
Steel – Culvert	7006	56315H00006B010	KENT ROAD	SUCKER CREEK	3	19	1	31		744																																	X						
Timber – Slab	7008	56316H00021B010	ALAMANDO ROAD	BLUFF CREEK	7	1	1	26.9	27.6	742																				X												X							
Prestressed concrete – Multistringer	12729	56308H00034B010	7 MILE ROAD	CARROLL CREEK	5	2	1	43	30.1	1294																																	X			X			
Concrete – Culvert	13527	56308H00003C010	HUCKLEBERRY RD	N BR CARROL CREEK	1	19	2	20		480																																							
Timber – Culvert	13920	56200002000C010	REDSTONE ROAD	LITTLE SALT RIVER	7	19	3	22.5	42	945																																							
Steel – Culvert	13922	56200069000C020	SWEDE ROAD	HERNER DRAIN	3	19	2	29	48	1392																																						X	
Steel – Culvert	13923	56313H00007C010	SAIKO ROAD	HERNER DRAIN	3	19	2	27	40	1080																							X													X			
Concrete – Slab	13935	56200057000C010	9 MILE ROAD	S BR CARROLL CREEK	1	1	1	30	36.6	1098																																				X			
Concrete – Slab	13936	56200057000C020	9 MILE ROAD	N BR CARROLL CREEK	1	1	1	30	36.6	1098																																							
Concrete – Slab	13937	56308H00035C010	11 MILE ROAD	N BR CARROLL CREEK	1	1	1	36	40	1440																																							
Prestressed concrete – Box beam/girders—single/spread	13938	56309H00010C010	MONROE ROAD	NEWELL DRAIN	5	6	1	36	36.2	1303																																							
Prestressed concrete – Box beam/girders—single/spread	13939	56309H00022C010	STURGEON AVENUE	NEWELL DRAIN	5	6	1	28	36.2	1014																																							
Prestressed concrete – Slab	13965	56200058000B010	WEST RIVER ROAD	BLACK CREEK	5	1	1	30	36	1080																																							
Concrete – Slab	13966	56314H00001C010	KENT ROAD	BULLOCK CREEK	1	1	1	36	30	1080																																							
Steel – Culvert	13967	56315H00015C010	10 MILE ROAD	SUCKER CREEK	3	19	1	20	30	600																																							
Timber – Slab	13971	56308H00024B010	CASTOR ROAD	N BR CARROLL CREEK	7	1	1	23.3	36.5	850																																							
Timber – Slab	13972	56313H00011B010	NORTH JEFFERSON RD	HERNER DRAIN	7	1	1	23	36.5	840																																							
Concrete – Slab	14047	56200067000B020	POSEYVILLE ROAD	JO DRAIN	1	1	1	24	36	864																																							
Concrete – Slab	14048	56316H00008C010	BAKER ROAD	HIGH DRAIN	1	1	1	24	38	912																																							
Concrete – Slab	14049	56200036000B020	SHAFFER RD (EAST)	BLUFF CREEK	1	1	1	30	36	1080																																							
Steel – Box beam/girders—single/spread	14614	56200081000B010	GREY RD	BULLOCK CREEK	3	6	1	50	39.3	1965																																							

Appendix 5

APPENDIX A-5																		
Inventory Data											Inspection Items							
Bridge Type	Structure Number	Bridge ID	Facility Carried	Features Intersected	Structure Type Main Span (Item 43A - Material)	Structure Type Main Span (Item 43B)	Number of Main Span (Item 45)	Total Str Length (Item 49)	Total Str Width (Item 52)	Total Str (sq ft)	Initial Inspection	In Depth Steel Inspection	Pin and Hanger Inspection	Diving Inspection	Provide Monitoring	Review Scour Criticality	Load Rating	Update SIA
Prestressed concrete – Box beam/girders—multiple	6927	56200002000B010	REDSTONE ROAD	PINE RIVER	5	32	2	133.9	34.1	4566								
Steel - Multistringer	6928	56200002000B020	REDSTONE ROAD	BUSH CREEK	3	32	1	65	39.2	2548								
Steel – Multistringer	6929	56200004000B010	LAPORTE ROAD	FLEMMING DRAIN	3	2	1	45.9	29.5	1354								
Prestressed concrete – Box beam/girders—multiple	6930	56200005000B010	KENT ROAD	LITTLE SALT CREEK	5	5	1	67.9	34.1	2315								
Prestressed concrete – Box beam/girders—multiple	6931	56200007000B010	FREELAND ROAD	BULLOCK CREEK	5	5	1	55	37.4	2057								
Steel – Multistringer	6932	56200008000B010	FREELAND ROAD	JO DRAIN	3	2	1	29.9	36	1076								
Prestressed concrete – Box beam/girders—multiple	6933	56200014000B010	GORDONVILLE ROAD	BULLOCK CREEK	5	5	1	53.8	42	2260								
Prestressed concrete – Multistringer	6934	56200015000B010	GORDONVILLE ROAD	TITTAWABASSEE RIVER	5	2	6	484.9	61	29579								
Prestressed concrete – Box beam/girders—multiple	6935	56200021000B010	PINE RIVER ROAD	PINE RIVER	5	5	3	179.8	36.4	6545								
Prestressed concrete – Box beam/girders—multiple	6936	56200027000B010	BARDEN ROAD	HOWARD DRAIN	5	5	1	44	38.1	1676								
Prestressed concrete – Box beam/girders—multiple	6937	56200028000B010	N SAGINAW ROAD	BIG SALT RIVER	5	5	3	162.4	37.4	6074								
Prestressed concrete – Box beam/girders—multiple	6938	56200028000B020	N SAGINAW ROAD	BIG SALT RIVER	5	5	3	147.6	38.3	5653								
Steel – Multistringer	6939	56200036000B010	SHAFFER ROAD	BLUFF CREEK	3	2	1	28.9	30.1	870								
Prestressed concrete – Box beam/girders—multiple	6940	56200042000B010	CURTIS ROAD	TITTABAWASSEE RIVER	5	5	3	316.6	41.7	13202								
Prestressed concrete – Box beam/girders—multiple	6941	56200047000B010	LEVELY ROAD	HERNER DRAIN	5	5	1	32.8	31.1	1020								
Steel – Multistringer	6942	56200049000B010	COLEMAN ROAD	SALTRIVER	3	2	1	65.9	28.9	1905								
Prestressed concrete – Box beam/girders—multiple	6943	56200050000B010	COLEMAN ROAD	CHIPPEWA RIVER	5	32	2	155.4	38.9	6045								
Prestressed concrete – Box beam/girders—single/spread	6944	56200051000B010	COLEMAN ROAD	BIG SALT RIVER	5	6	1	90	43	3870								
Prestressed concrete – Box beam/girders—multiple	6945	56200053000B010	MAGRUDDER ROAD	CHIPPEWA RIVER	5	5	2	161.7	34.1	5514								
Prestressed concrete – Box beam/girders—multiple	6946	56200054000B010	PORTER ROAD	PINE RIVER	5	5	2	149.9	31.2	4677								
Prestressed concrete – Box beam/girders—single/spread	6947	56200055000B010	9 MILE ROAD	PINE RIVER	5	6	2	155.8	34.2	5328								
Prestressed concrete – Multistringer	6948	56200056000B070	8 MILE ROAD	CHIPPEWA RIVER	5	2	3	211.9	37.7	7989								
Concrete – Girder and floorbeam	6954	56200060000B020	7 MILE ROAD	BIG SALT RIVER	1	3	1	91.9	23.3	2141								
Prestressed concrete – Multistringer	6955	56200064000B010	HOMER ROAD	CHIPPEWA RIVER	5	2	3	179.3	42.8	7674			x					
Prestressed concrete – Box beam/girders—single/spread	6956	56200065000B010	STARK ROAD	STURGEON CREEK	5	6	1	65	38.9	2529								
Steel – Culvert	6957	56200067000B010	POSEYVILLE ROAD	BULLOCK CREEK	3	19	2	32.6		1177								
Steel – Multistringer	6958	56200070000B010	SASSE ROAD	FLEMMING DRAIN	3	2	1	46.9	28.9	1355								
Prestressed concrete – Box beam/girders—multiple	6959	56200071000B010	SMITHS CROSSING RD	WEEKS DRAIN	5	5	1	49.9	37.1	1851								
Prestressed concrete – Box beam/girders—multiple	6960	56200071000B020	SMITHS CROSSING RD	FLEMMING DRAIN	5	5	1	57	43.6	2485								
Concrete – Tee beam	6961	56200071000B030	SMITHS CROSSING RD	JO DRAIN	1	4	1	40	29.2	1168								
Prestressed concrete – Box beam/girders—multiple	6963	56200075000B010	BRADFORD ROAD	SALT RIVER	5	5	1	60	33.1	1986								
Prestressed concrete – Box beam/girders—multiple	6964	56302H00018B010	GENEVA ROAD	BIG SALT RIVER	5	5	3	264.1	31.2	8240								
Prestressed concrete – Box beam/girders—multiple	6965	56303H00004B010	GORDONVILLE ROAD	POTTER CREEK	5	5	1	49	31	1519								
Prestressed concrete – Multistringer	6966	GORDONVILLE ROAD	POTTER CREEK	SALT RIVER	5	2	2	111.9	34.1	3816								
Prestressed concrete – Box beam/girders—multiple	6967	56303H00019B010	GENEVA ROAD	CHIPPEWA RIVER	5	5	2	150.9	34.4	5191								
Steel – Multistringer	6968	56303H00021B010	ALAMANDO ROAD	SALT RIVER	3	2	1	62	22	1364								
Timber – Slab	6969	56303H00022B010	DICKENSON ROAD	ONION CREEK	7	1	3	62	27.2	1686								
Prestressed concrete – Box beam/girders—multiple	6970	56304H00018B010	HOMER ROAD	CARROLL CREEK	5	5	1	75	32.8	2460								
Timber – Slab	6971	56304H00019B010	WOODCOCK ROAD	BULLOCK CREEK	7	1	1	25.9	29.2	756								
Steel – Culvert	6972	56306H00001B010	TITTABAWASSEE ROAD	WEEKS DRAIN	3	19	1	27.9		778								
Concrete – Tee beam	6973	56306H00001B020	TITTABAWASSEE ROAD	WHITMORE DRAIN	1	4	1	31.8	27.9	887								
Prestressed concrete – Box beam/girders—multiple	6974	56306H00002B010	HUEY ROAD	FLEMING DRAIN	5	5	1	40	18	720								
Steel – Girder and floorbeam	6975	56306H00005B010	KENT ROAD	JO DRAIN	3	3	1	35.8	25	895								
Steel – Multistringer	6976	56306H00009B010	BROOKS ROAD	JO DRAIN	3	2	1	24.9	29	722								

Appendix 5

Steel – Multistringer	**6977**	56306H00018B010	POSEYVILLE ROAD	FLEMMING DRAIN	3	2	1	24.9	24.3	605								
Steel – Multistringer	**6978**	56306H00018B020	POSEYVILLE ROAD	WRIGHT DRAIN	3	2	1	33.8	24	811								
Steel – Multistringer	**6980**	56306H00020B010	SCHREIBER ROAD	WEEKS DRAIN	3	2	1	33.8	26.2	886								
Prestressed concrete – Box beam/girders—multiple	**6981**	56306H00020B020	SCHREIBER ROAD	FLEMING DRAIN	5	5	1	53.8	30.8	1657								
Steel – Multistringer	**6982**	56306H00021B010	SCHREIBER ROAD	JO DRAIN	3	2	1	28.9	18.7	540								
Steel – Multistringer	**6983**	56306H00023B010	ORR ROAD	WEEKS DRAIN	3	2	1	60	30	1800								
Steel – Multistringer	**6984**	56306H00023B020	ORR ROAD	JO DRAIN	3	2	1	49.9	29.2	1457								
Prestressed concrete – Box beam/girders—multiple	**6985**	56307H00001B010	LAPORTE ROAD	LITTLE SALT CREEK	5	5	1	49.2	31.2	1535								
Prestressed concrete – Box beam/girders—multiple	**6987**	56307H00003B010	SHEPHERD ROAD	LITTLE SALT CREEK	5	5	1	51.8	31	1606								
Prestressed concrete – Box beam/girders—multiple	**6988**	56307H00005B010	JASPER ROAD	LITTLE SALT CREEK	5	5	1	62	30.8	1910								
Prestressed concrete – Box beam/girders—multiple	**6989**	56307H00006B010	LEWIS ROAD	LITTLE SALT CREEK	5	5	1	67	31	2077								
Steel – Multistringer	**6991**	56307H00012B010	MAGRUDDER ROAD	BUSH CREEK	3	2	1	51.8	20	1036								
Prestressed concrete – Box beam/girders—multiple	**6992**	56307H00012B020	MAGRUDDER ROAD	PINE RIVER	5	5	3	180	34.3	6174								
Steel – Multistringer	**6993**	56307H00013B010	MAGRUDDER ROAD	LITTLE SALT CREEK	3	2	1	37.7	28.9	1090								
Concrete – Girder and floorbeam	**6994**	56308H00007B010	IRISH STREET	BIG SALT RIVER	1	3	1	94.8	24.9	2361								
Prestressed concrete – Box beam/girders—single/spread	**6995**	56308H00024B020	CASTOR ROAD	BIG SALT RIVER	5	6	3	159	30.7	4881								
Steel – Truss—thru and pony	**6998**	56309H00020B010	PERRINE ROAD	STURGEON CREEK	3	10	1	112	40	4480								
Prestressed concrete – Box beam/girders—multiple	**6999**	56310H00004B010	GORDONVILLE ROAD	LITTLE SALT CREEK	5	5	2	126	34.8	4385								
Steel – Multistringer	**7000**	56310H00007B010	STEWART ROAD	LITTLE SALT CREEK	3	2	1	62	28	1736								
Prestressed concrete – Box beam/girders—multiple	**7001**	56310H00016B010	CASTOR ROAD	LITTLE SALT CREEK	5	5	1	65	31	2015								
Prestressed concrete – Box beam/girders—multiple	**7002**	56312H00010B010	PATTERSON ROAD	BULLOCK CREEK	5	5	1	42	45.5	1911								
Prestressed concrete – Box beam/girders—multiple	**7004**	56314H00009B010	4 3/4 MILE RD	PINE RIVER	5	5	2	131.2	31.2	4093								
Concrete – Slab	**7005**	56315H00002B010	SEVEN MILE ROAD	BULLOCK CREEK	1	1	1	30	24	720								
Steel – Culvert	**7006**	56315H00006B010	KENT ROAD	SUCKER CREEK	3	19	1	31		744								
Timber – Slab	**7008**	56316H00021B010	ALAMANDO ROAD	BLUFF CREEK	7	1	1	26.9	27.6	742								
Prestressed concrete – Multistringer	**12729**	56308H00034B010	7 MILE ROAD	CARROLL CREEK	5	2	1	43	30.1	1294								
Concrete – Culvert	**13527**	56308H00003C010	HUCKLEBERRY RD	N BR CARROL CREEK	1	19	2	20		480								
Timber – Culvert	**13920**	56200002000C010	REDSTONE ROAD	LITTLE SALT RIVER	7	19	3	22.5	42	945								
Steel – Culvert	**13922**	56200069000C020	SWEDE ROAD	HERNER DRAIN	3	19	2	29	48	1392								
Steel – Culvert	**13923**	56313H00007C010	SAIKO ROAD	HERNER DRAIN	3	19	2	27	40	1080								
Concrete – Slab	**13935**	56200057000C010	9 MILE ROAD	S BR CARROLL CREEK	1	1	1	30	36.6	1098								
Concrete – Slab	**13936**	56200057000C020	9 MILE ROAD	N BR CARROLL CREEK	1	1	1	30	36.6	1098								
Concrete – Slab	**13937**	56308H00035C010	11 MILE ROAD	N BR CARROLL CREEK	1	1	1	36	40	1440								
Prestressed concrete – Box beam/girders—single/spread	**13938**	56309H00010C010	MONROE ROAD	NEWELL DRAIN	5	6	1	36	36.2	1303								
Prestressed concrete – Box beam/girders—single/spread	**13939**	56309H00022C010	STURGEON AVENUE	NEWELL DRAIN	5	6	1	28	36.2	1014								
Prestressed concrete – Slab	**13965**	56200058000B010	WEST RIVER ROAD	BLACK CREEK	5	1	1	30	36	1080								
Concrete – Slab	**13966**	56314H00001C010	KENT ROAD	BULLOCK CREEK	1	1	1	36	30	1080								
Steel – Culvert	**13967**	56315H00015C010	10 MILE ROAD	SUCKER CREEK	3	19	1	20	30	600								
Timber – Slab	**13971**	56308H00024B010	CASTOR ROAD	N BR CARROLL CREEK	7	1	1	23.3	36.5	850								
Timber – Slab	**13972**	56313H00011B010	NORTH JEFFERSON RD	HERNER DRAIN	7	1	1	23	36.5	840								
Concrete – Slab	**14047**	56200067000B020	POSEYVILLE ROAD	JO DRAIN	1	1	1	24	36	864								
Concrete – Slab	**14048**	56316H00008C010	BAKER ROAD	HIGH DRAIN	1	1	1	24	38	912								
Concrete – Slab	**14049**	56200036000B020	SHAFFER RD (EAST)	BLUFF CREEK	1	1	1	30	36	1080								
Steel – Box beam/girders—single/spread	**14614**	56200081000B010	GREY RD	BULLOCK CREEK	3	6	1	50	39.3	1965								

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Certification of the 2024 Transportation Asset Management Plan

The proposed 2024 Transportation Asset Management Plan was presented to the board for review and discussion.

Moved by Commissioner Cozat and supported by Commissioner Atton to offer the following resolution:

WHEREAS, Beginning October 2019 and on a three-year cycle thereafter, certification must be made for compliance to Public Act 325; and

WHEREAS, A local road-owning agency with 100 certified miles or more must certify that it has developed an asset management plan for the road, bridge, culvert, and traffic signal assets.

THEREFORE, BE IT RESOLVED, that the Board of County Road Commissioners, County of Midland, certifies the 2024 Transportation Asset Management Plan.

Roll Call.
Yeas: Commissioners Atton, Cozat
Nays: None

Resolution Adopted

I, Donna Lowe, Clerk-Secretary of the Board of County Road Commissioners, County of Midland, State of Michigan, do hereby certify that the above is a true copy of the portion of the proceeds as incorporated in the minutes of a regular meeting of the Midland County Road Commission held on September 26, 2024.

Donna Lowe

Donna Lowe, Clerk-Secretary

DATE: September 26, 2024

C. CULVERT ASSET MANAGEMENT PLAN SUPPLEMENT

Culvert Primer

Culverts are structures that lie underneath roads, enabling water to flow from one side of the roadway to the other (Figure C-1 and Figure C-2). The important distinguishing factor between a culvert and a bridge is the size. Culverts are considered anything under 20 feet while bridges, according to the Federal Highway Administration, are 20 feet or more. While similar in function to storm sewers, culverts differ from storm sewers in that culverts are open on both ends, are constructed as straight-line conduits, and lack intermediate drainage structures like manholes and catch basins. Culverts are critical to the service life of a road because of the important role they play in keeping the pavement layers well drained and free from the forces of water building up on one side of the roadway.

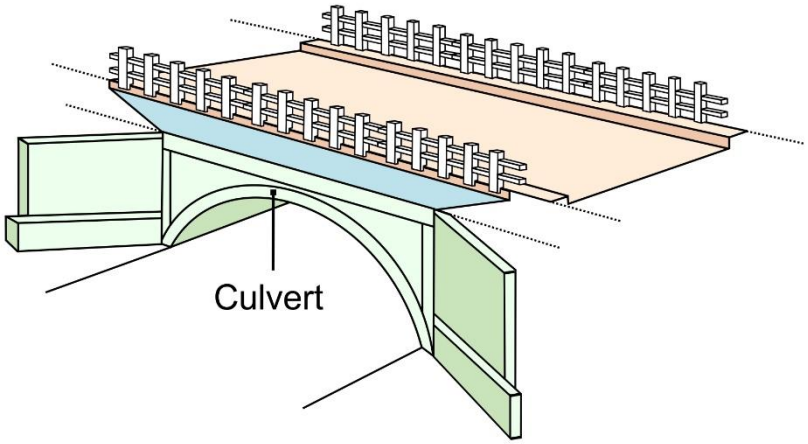

Figure C-1: Diagram of a culvert structure

Figure C-2: Examples of culverts. Culverts allow water to pass under the roadway (left), they are straight-line conduits with no intermediate drainage structures (middle), and they come in various materials (left: metal; middle and right: concrete) and shapes (left: arch; middle: round; right: box).

Culvert Types

Michigan conducted its first pilot data collection on local agency culverts in the state in 2018. Of almost 50,000 culverts inventoried as part of the state-wide pilot project, the material type used for constructing culverts ranged from (in order of predominance) corrugated steel, concrete, plastic, aluminum, and masonry/tile, to timber materials. The shapes of the culverts were (in order of predominance) circular, pipe arch, arch, rectangular, horizontal ellipse, or box. The diameter for the majority of culverts ranged from less than 12 inches to 24 inches; a portion, however, ranged from 30 inches to more than 48 inches.

Culvert Condition

Several culvert condition assessment practices exist. The FHWA has an evaluation method in its 1986 *Culvert Inspection Manual*. In conjunction with descriptions and details in the Ohio Department of Transportation's 2017 *Culvert Inspection Manual* and Wisconsin DOT's *Bridge Inspection Field Manual*, the FHWA method served as the method for evaluating Michigan culverts in the pilot. In 2018, Michigan local agencies participated in a culvert pilot data collection, gathering inventory and condition data; full detail on the condition assessment system used in the data collection can be found in Appendix G of the final report (https://www.michigan.gov/documents/tamc/TAMC_2018_Culvert_Pilot_Report_Complete_634795_7.pdf).

The Michigan culvert pilot data collection used a 1 through 10 rating system, where 10 is considered a new culvert with no deterioration or distress and 1 is considered total failure. Each of the different culvert material types requires the assessment of features unique to that material type, including structural deterioration, invert deterioration, section deformation, blockage(s) and scour. Corrugated metal pipe, concrete pipe, plastic pipe, and masonry culverts require an additional assessment of joints and seams. Slab abutment culverts require an additional assessment of the concrete abutment and the masonry abutment. Assessment of timber culverts only relied on blockage(s) and scour. The assessments come together to generate condition rating categories of good (rated as 10, 9, or 8), fair (rated as 7 or 6), poor (rated as 5 or 4), or failed (rated as 3, 2, or 1).

Culvert Treatments

The *MDOT Drainage Manual* addresses culvert design and treatments. Of most importance to the longevity of culverts is regular cleaning to prevent clogs. More extensive treatments may include re-positioning the pipe to improve its grade and lining a culvert to achieve more service life after structural deterioration has begun.

D. TRAFFIC SIGNALS ASSET MANAGEMENT PLAN SUPPLEMENT

Traffic Signals Primer

Types

Electronic traffic control devices come in a large array of configurations, which include case signs (e.g., keep right/left, no right/left turn, reversible lanes), controllers, detection (e.g., cameras, push buttons), flashing beacons, interconnects (e.g., DSL, fire station, phone line, radio), pedestrian heads (e.g., hand-man), and traffic signals. This asset management plan is only concerned with traffic signals (Figure D-1) as a functioning unit and does not consider other electronic traffic control devices.

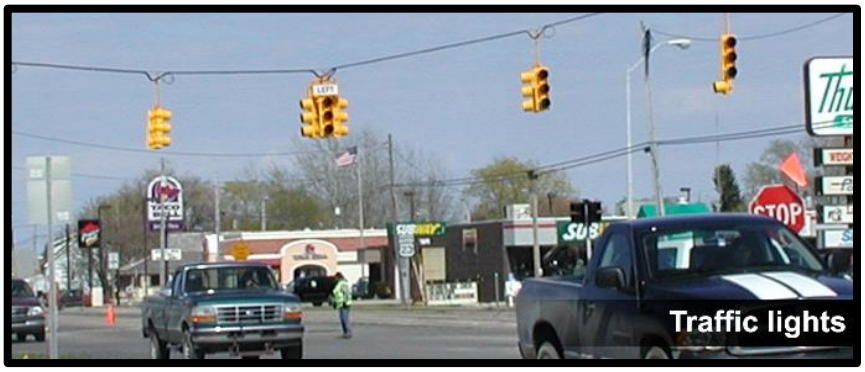

Figure D-1: Example of traffic signals

Condition

Traffic signal assessment considers the functioning of basic tests on a pass/fail basis. These tests include battery backup testing, components testing, conflict monitor testing, radio testing, and underground detection.

Treatments

Traffic signals are maintained in accordance with the *Michigan Manual on Uniform Traffic Control Devices*. Maintenance of traffic signals includes regular maintenance of all components, cleaning and servicing to prevent undue failures, immediate maintenance in the case of emergency calls, and provision of stand-by equipment. Timing changes are restricted to authorized personnel only.

E. GLOSSARY & ACRONYMS

Glossary

Alligator cracking: Cracking of the surface layer of an asphalt pavement that creates a pattern of interconnected cracks resembling alligator hide. This is often due to overloading a pavement, sub-base failure, or poor drainage.[5]

Asset management: A process that uses data to manage and track road assets in a cost-effective manner using a combination of engineering and business principles. Public Act 325 of 2018 provides a legal definition: "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".[6]

Biennial inspection: Inspection of an agency's bridges every other year, which happens in accordance with National Bridge Inspection Standards and Michigan Department of Transportation requirements.

Bridge inspection program: A program implemented by a local agency to inspect the bridges within its jurisdiction systematically in order to ensure proper functioning and structural soundness.

Capital preventative maintenance: Also known as CPM, a planned set of cost-effective treatments to address of fair-rated infrastructure before the structural integrity of the system has been severely impacted. These treatments aim to slow deterioration and to maintain or improve the functional condition of the system without significantly increasing the structural capacity. Light capital preventive maintenance is a set of treatments designed to seal isolated areas of the pavement from water, such as crack and joint sealing, to protect and restore pavement surface from oxidation with limited surface thickness material, such as fog seal; generally, application of a light CPM treatment does not provide a corresponding increase in a segment's PASER score. Heavy capital preventive maintenance is a set of surface treatments designed to protect pavement from water intrusion or environmental weathering without adding significant structural strength, such as slurry seal, chip seal, or thin (less than 1.5-inch) overlays for bituminous surfaces or patching or partial-depth (less than 1/3 of pavement depth) repair for concrete surfaces.

Chip seal: An asphalt pavement treatment method consisting of, first, spraying liquid asphalt onto the old pavement surface and, then, a single layer of small stone chips spread onto the wet asphalt layer.

City major: A road classification, defined in Michigan Public Act 51, that encompasses the generally more important roads in a city or village. City major roads are designated by a municipality's governing body and are subject to approval by the State Transportation Commission. These roads do not include roads under the jurisdiction of a county road commission or trunkline highways.

City minor: A road classification, defined in Michigan Public Act 51, that encompasses the generally less important roads in a city or village. These roads include all city or village roads that are not city major road and do not include roads under the jurisdiction of a county road commission.

[5] https://en.wikipedia.org/wiki/Crocodile_cracking
[6] Inventory-based Rating System for Gravel Roads: Training Manual

Composite pavement: A pavement consisting of concrete and asphalt layers. Typically, composite pavements are old concrete pavements that were overlaid with HMA in order to gain more service life.

Concrete joint resealing: Resealing the joints of a concrete pavement with a flexible sealant to prevent moisture and debris from entering the joints. When debris becomes lodged inside a joint, it inhibits proper movement of the pavement and leads to joint deterioration and spalling.

Concrete pavement: Also known as rigid pavement, a pavement made from portland cement concrete. Concrete pavement has an average service life of 30 years and typically does not require as much periodic maintenance as HMA.

Cost per lane mile: Associated cost of construction, measured on a per lane, per mile basis. Also see *lane-mile segment.*

County local: A road classification, defined in Michigan Public Act 51, that encompasses the generally less important and low-traffic roads in a county. This includes all county roads that are not classified as county primary roads.

County primary: A road classification, defined in Michigan Public Act 51, that encompasses the generally more important and high-traffic roads in a county. County primary roads are designated by board members of the county road commissions and are subject to approval by the State Transportation Commission.

CPM: See *Capital preventive maintenance*.

Crack and seat: A concrete pavement treatment method that involves breaking old concrete pavement into small chunks and leaving the broken pavement in place to provide a base for a new surface. This provides a new wear surface that resists water infiltration and helps prevent damaged concrete from reflecting up to the new surface.

Crack seal: A pavement treatment method for both asphalt and concrete pavements that fills cracks with asphalt materials, which seals out water and debris and slows down the deterioration of the pavement. Crack seal may encompass the term "crack filling".

Crush and shape: An asphalt pavement treatment method that involves pulverizing the existing asphalt pavement and base and then reshaping the road surface to correct imperfections in the road's profile. Often, a layer of gravel is added along with a new wearing surface such as an HMA overlay or chip seal.

Crust: A very tightly compacted surface on an unpaved road that sheds water with ease but takes time to be created.

Culvert: A pipe or structure used under a roadway that allows cross-road drainage while allowing traffic to pass without being impeded; culverts span up to 20 feet.[7]

Dowel bar retrofit repair: A concrete pavement treatment method that involves cutting slots in a cracked concrete slab, inserting steel bars into the slots, and placing concrete to cover the new bars and fill the slots. It aims to reinforce cracks in a concrete pavement.

[7] Adapted from Inventory-based Rating System for Gravel Roads: Training Manual

Dust control: A gravel road surface treatment method that involves spraying chloride or other chemicals on the gravel surface to reduce dust loss, aggregate loss, and maintenance. This is a relatively short-term fix that helps create a crusted surface.

Expansion joint: Joints in a bridge that allow for slight expansion and contraction changes in response to temperature. Expansion joints prevent the build up of excessive pressure, which can cause structural damage to the bridge.

Federal Highway Administration: Also known as FHWA, this is an agency within the U.S. Department of Transportation that supports state and local governments in the design, construction, and maintenance of the nation's highway system.[8]

Federal-aid network: Portion of road network that is comprised of federal-aid routes. According to Title 23 of the United States Code, federal-aid-eligible roads are "highways on the federal-aid highways systems and all other public roads not classified as local roads or rural minor collectors".[9] Roads that are part of the federal-aid network are eligible for federal gas-tax monies.

FHWA: See *Federal Highway Administration*.

Flexible pavement: See *hot-mix asphalt pavement*.

Fog seal: An asphalt pavement treatment method that involves spraying a liquid asphalt coating onto the entire pavement surface to fill hairline cracks and prevent damage from sunlight and oxidation. This method works best for good to very good pavements.

Full-depth concrete repair: A concrete pavement treatment method that involves removing sections of damaged concrete pavement and replacing it with new concrete of the same dimensions in order to restore the riding surface, delay water infiltration, restore load transfer from one slab to the next, and eliminate the need to perform costly temporary patching.

Geographic divides: Areas where a geographic feature (e.g., river, lake, mountain) limits crossing points of the feature.

Grants: Competitive funding gained through an application process and targeted at a specific project type to accomplish a specific purpose. Grants can be provided both on the federal and state level and often make up part of the funds that a transportation agency receives.

Gravel surfacing: A low-cost, easy-to-maintain road surface made from aggregate and fines.

Heavy capital preventive maintenance: See *Capital preventive maintenance*.

HMA: See *hot-mix asphalt pavement*.

Hot-mix asphalt overlay: Also known as HMA overlay, this a surface treatment that involves layering new asphalt over an existing pavement, either asphalt or concrete. It creates a new wearing surface for traffic and to seal the pavement from water, debris, and sunlight damage, and it often adds significant structural strength.

Hot-mix asphalt pavement: Also known as HMA pavement, this type of asphalt creates a flexible pavement composed of aggregates, asphalt binder, and air voids. HMA is heated for placement and

[8] Federal Highway Administration webpage https://www.fhwa.dot.gov/
[9] Inventory-based Rating System for Gravel Roads: Training Manual

compaction at high temperatures. HMA is less expensive to construct than concrete pavement, however it requires frequent maintenance activities and generally lasts 18 years before major rehabilitation is necessary. HMA makes up the vast majority of local-agency-owned pavements.

IBR: See *IBR element*, *IBR number*, and/or *Inventory-based Rating System™*.

IBR element: A feature used in the IBR System™ for assessing the condition of roads. The system relies on assessing three elements: surface width, drainage adequacy, and structural adequacy.[10]

IBR number: The 1-10 rating determined from assessments of the weighted IBR elements. The weighting relates each element to the intensity road work needed to improve or enhance the IBR element category.[11]

Interstate highway system: The road system owned and operated by each state consisting of routes that cross between states, make travel easier and faster. The interstate roads are denoted by the prefix "I" or "U.S." and then a number, where odd routes run north-south and even routes run east-west. Examples are I-75 or U.S. 2.[12]

Inventory-based Rating System™: Also known as the IBR System™, a rating system designed to assess the capabilities of gravel and unpaved roads to support intended traffic volumes and types year round. It assesses roads based on how three IBR elements, or features—surface width, drainage adequacy, and structural adequacy—compare to a baseline, or "good", road.[13]

Investment Reporting Tool: Also known as IRT, a web-based system used to manage the process for submitting required items to the Michigan Transportation Asset Management Council. Required items include planned and completed maintenance and construction activity for roads and bridges and comprehensive asset management plans.

IRT: See *Investment Reporting Tool*.

Jurisdiction: Administrative power of an entity to make decisions for something. In Michigan, the three levels of jurisdiction classification for transportation assets are state highways, county roads, and city and village streets. State highways are under the jurisdiction of the Michigan Department of Transportation, county roads are under the jurisdiction of the road commission for the county in which the roads are located, and city and village streets are under the jurisdiction of the municipality in which the roads are located.

Jurisdictional borders: Borders between two road-owning-agency jurisdictions, or where the roads owned by one agency turn into roads owned by another agency. Examples of jurisdictional borders are township or county lines.

Lane-mile segment: A segment of road that is measured by multiplying the centerline miles of a roadway by the number of lanes present.

Lane-mile-years: A network's total lane-miles multiplied by one year; a method to quantify the measurable loss of pavement life.

[10] Inventory-based Rating System for Gravel Roads: Training Manual
[11] Inventory-based Rating System for Gravel Roads: Training Manual
[12] https://www.fhwa.dot.gov/interstate/faq.cfm#question3
[13] Adapted from Inventory-based Rating System for Gravel Roads: Training Manual

Light capital preventive maintenance: See *Capital preventive maintenance*.

Limited access areas: Areas—typically remote areas—serviced by few or seasonal roads that require long detours routes if servicing roads are closed.

Main access to key commercial districts: Areas where large number or large size business will be significantly impacted if a road is unavailable.

Maintenance grading: A surface treatment method for unpaved roads that involves re-grading the road to remove isolated potholes, washboarding, and ruts, and then restoring the compacted crust layer.

MDOT: See *Michigan Department of Transportation*.

MDOT's Local Bridge Program Call for Projects: A call for project proposals for replacement, rehabilitation, and/or preventive maintenance of local bridges that, if granted, receives bridge funding from the Michigan Department of Transportation. The Call for Projects is made by the Local Bridge Program.

MGF: See *Michigan Geographic Framework.*

Michigan Department of Transportation: Also known as MDOT, this is the state of Michigan's department of transportation, which oversees roads and bridges owned by the state or federal government in Michigan.

Michigan Geographic Framework: Also known as MGF, this is the state of Michigan's official digital base map that contains location and road information necessary to conduct state business. The Michigan Department of Transportation uses the MGF to link transportation assets to a physical location.

Michigan Public Act 51 of 1951: Also known as PA 51, this is a Michigan legislative act that served as the foundation for establishing a road funding structure by creating transportation funding distribution methods and means. It has been amended many times.[14]

Michigan Public Act 325 of 2018: Also known as PA 325, this legislation modified PA 51 of 1951 in regards to asset management in Michigan, specifically 1) re-designating the TAMC under Michigan Infrastructure Council (MIC); 2) promoting and overseeing the implementation of recommendations from the regional infrastructure asset management pilot program; 3) requiring local road three-year asset management plans beginning October 1, 2020; 4) adding asset classes that impact system performance, safety or risk management, including culverts and signals; 5) allowing MDOT to withhold funds if no asset management plan submitted; and 6) prohibiting shifting finds from a country primary to a county local, or from a city major to a city minor if no progress toward achieving the condition goals described in its asset plan.[15]

Michigan Public Act 499 of 2002: Also known as PA 499, this legislation requires road projects for the upcoming three years to be reported to the TAMC.

Michigan Transportation Asset Management Council: Also known as the TAMC, a council comprised of professionals from county road commissions, cities, a county commissioner, a township official, regional and metropolitan planning organizations, and state transportation department personnel. The

[14] Inventory-based Rating System for Gravel Roads: Training Manual
[15] Inventory-based Rating System for Gravel Roads: Training Manual

council reports directly to the Michigan Infrastructure Council.[16] The TAMC provides resources and support to Michigan's road-owning agencies, and serves as a liaison in data collection requirements between agencies and the state.

Michigan Transportation Fund: Also known as MTF, this is a source of transportation funding supported by vehicle registration fees and the state's per-gallon gas tax.

Microsurface treatment: An asphalt pavement treatment method that involves applying modified liquid asphalt, small stones, water, and portland cement for the purpose of protecting a pavement from damage caused by water and sunlight.

Mill and hot-mix asphalt overlay: Also known as a mill and HMA overlay, this is a surface treatment that involves the removal of the top layer of pavement by milling and the replacement of the removed layer with a new HMA layer.

Mix-of-fixes: A strategy of maintaining roads and bridges that includes generally prioritizes the spending of money on routine maintenance and capital preventive maintenance treatments to impede deterioration and then, as money is available, performing reconstruction and rehabilitation.

MTF: See *Michigan Transportation Fund*.

National Bridge Inspection Standards: Also known as NBIS, standards created by the Federal Highway Administration to locate and evaluate existing bridge deficiencies in the federal-aid highway system to ensure the safety of the traveling public. The standards define the proper safety for inspection and evaluation of all highway bridges.[17]

National Center for Pavement Preservation: Also known as the NCPP, a center that offers education, research, and outreach in current and innovative pavement preservation practices. This collaborative effort of government, industry, and academia entities was established at Michigan State University.

National Functional Class: Also known as NFC, a federal grouping system for public roads that classifies roads according to the type of service that the road is intended to provide.

National highway system: Also known as NHS, this is a network of roads that includes the interstate highway system and other major roads managed by state and local agencies that serve major airports, marine, rail, pipelines, truck terminals, railway stations, military bases, and other strategic facilities.

NBIS: See *National Bridge Inspection Standards*.

NCPP: See *National Center for Pavement Preservation*.

NCPP Quick Check: A system created by the National Center for Pavement Preservation that works under the premise that a one-mile road segment loses one year of life each year that it is not treated with a maintenance, rehabilitation, or reconstruction project.

NFC: See *National Functional Class*.

Non-trunkline: A local road intended to be used over short distances but not recommended for long-distance travel.

[16] Inventory-based Rating System for Gravel Roads: Training Manual
[17] https://www.fhwa.dot.gov/bridge/nbis/

Other funds: Expenditures for equipment, capital outlay, debt principal payment, interest expense, contributions to adjacent governmental units, principal, interest and bank fees, and miscellaneous for cities and villages.

PA: See *Michigan Public Act 51*, *Michigan Public Act 325*, and/or *Michigan Public Act 499*.

Partial-depth concrete repair: A concrete pavement treatment method that involves removing spalled or delaminated areas of concrete pavement, usually near joints and cracks, and replacing with new concrete. This is done to provide a new wearing surface in isolated areas, to slow down water infiltration, and to help delay further freeze-thaw damage.

PASER: See *Pavement Surface Evaluation and Rating system*.

Pavement reconstruction: A complete removal of the old pavement and base and construction of an entirely new road. This is the most expensive rehabilitation of the roadway and also the most disruptive to traffic patterns.

Pavement Surface Evaluation and Rating system: Also known as the PASER system, the PASER system rates surface condition on a 1-10 scale, where 10 is a brand new road with no defects, 5 is a road with distress but that is structurally sound and requires only preventative maintenance, and 1 is a road with extensive surface and structural distresses that is in need of total reconstruction. This system provides a simple, efficient, and consistent method for evaluating the condition of paved roads.[18]

Pothole: A defect in a road that produces a localized depression.[19]

Preventive maintenance: Planned treatments to an existing asset to prevent deterioration and maintain functional condition. This can be a more effective use of funds than the costly alternative of major rehabilitation or replacement.

Proactive preventive maintenance: Also known as PPM, a method of performing capital preventive maintenance treatments very early in a pavement's life, often before it exhibits signs of pavement defect.

Public Act 51: See *Michigan Public Act 51 of 1951*

Public Act 325: See *Michigan Public Act 325 of 2018*

Public Act 499: See *Michigan Public Act 499 of 2002*

Reconstruction and rehabilitation programs: Programs intended to reconstruct and rehabilitate a road.

Restricted load postings: A restriction enacted on a bridge structure when is incapable of transporting a state's legal vehicle loads.

Rights-of-way ownership: The owning of the right-of-way, which is the land over which a road or bridge travels. In order to build a road, road agencies must own the right-of-way or get permission to build on it.

Rigid pavement: See *concrete pavement*.

[18] Adapted from Inventory-based Rating System for Gravel Roads: Training Manual
[19] Inventory-based Rating System for Gravel Roads: Training Manual

Road infrastructure: An agency's road network and assets necessary to make it function, such as traffic signage and ditches.

Road: The area consisting of the roadway (i.e., the travelled way or the portion of the road on which vehicles are intended to drive), shoulders, ditches, and areas of the right of way containing signage.[20]

Roadsoft: An asset management software suit that enables agencies to manage road and bridge related infrastructure. The software provides tools for collecting, storing, and analyzing data associated with transportation infrastructure. Built on an optimum combination of database engine and GIS mapping tools, Roadsoft provides a quick, smooth user experience and almost unlimited data handling capabilities.[21]

Ruts/rutting: Deformation of a road that usually forms as a permanent depression concentrated under the wheel path parallel to the direction of travel.[22]

Scheduled maintenance: Low-cost, day-to-day activities applied to bridges on a scheduled basis that mitigates deterioration.[23]

Sealcoat pavement: A gravel road that has been sealed with a thin asphalt binder coating that has stone chips spread on top.

Service life: Time from when a road or treatment is first constructed to when it reaches a point where the distresses present change from age-related to structural-related (also known as the critical distress point).[24]

Slurry seal: An asphalt pavement treatment method that involves applying liquid asphalt, small stones, water, and portland cement in a very thin layer with the purpose of protecting an existing pavement from being damaged by water and sunlight.

Structural improvement: Pavement treatment that adds strength to the pavement. Roads requiring structural improvement exhibit alligator cracking and rutting and are considered poor by the TAMC definitions for condition.

Subsurface infrastructure: Infrastructure maintained by local agencies that reside underground, for example, drinking water distribution systems, wastewater collection systems, and storm sewer systems.

TAMC: See *Michigan Transportation Asset Management Council*.

TAMC pavement condition dashboard: Website for viewing graphs of pavement and bridge conditions, traffic and miles travelled, safety statistics, maintenance activities, and financial data for Michigan's cities and villages, counties, and regions, as well as the state of Michigan.

TAMC's good/fair/poor condition classes: Classification of road conditions defined by the Michigan Transportation Asset Management Council based on bin ranges of PASER scores and similarities in defects and treatment options. Good roads have PASER scores of 8, 9, or 10, have very few defects, and require minimal maintenance. Fair roads have PASER scores of 5, 6, or 7, have good structural support but a deteriorating surface, and can be maintained with CPM treatments. Poor roads have PASER scores

[20] Inventory-based Rating System for Gravel Roads: Training Manual
[21] Inventory-based Rating System for Gravel Roads: Training Manual
[22] Paving Class Glossary
[23] Inventory-based Rating System for Gravel Roads: Training Manual
[24] Inventory-based Rating System for Gravel Roads: Training Manual

of 1, 2, 3, or 4, exhibit evidence that the underlying structure is failing, such as alligator cracking and rutting. These roads must be rehabilitated with treatments like heavy overlay, crush and shape, or total reconstruction.

Tax millages: Local tax implemented to supplement an agency's budget, such as road funding.

Thin hot-mix asphalt overlay: Application of a thin layer of hot-mix asphalt on an existing road to re-seal the road and protect it from damage caused by water. This also improves the ride quality and provides a smoother, uniform appearance that improves visibility of pavement markings.[25]

Transportation infrastructure: All of the elements that work together to make the surface transportation system function including roads, bridges, culverts, traffic signals, and signage.

Trigger: When a PASER score gives insight to the preferred timeline of a project for applying the correct treatment at the correct time.

Trunkline abbreviations: The prefixes *M-*, *I-*, and *US* indicate roads in Michigan that are part of the state trunkline system, the Interstate system, and the US Highway system. These roads consist of anything from 10-lane urban freeways to two-lane rural highways and even one non-motorized highway; they cover 9,668 centerline miles. Most of the roads are maintained by MDOT.

Trunkline bridges: Bridge present on a trunkline road, which typically connects cities or other strategic places and is the recommended rout for long-distance travel.[26]

Trunkline maintenance funds: Expenditures under a maintenance agreement with MDOT for maintenance activities performed on MDOT trunkline routes.

Trunkline: Major road that typically connects cities or other strategic places and is the recommended route for long-distance travel.[27]

Washboarding: Ripples in the road surface that are perpendicular to the direction of travel.[28]

Wedge/patch sealcoat treatment: An asphalt pavement treatment method that involves correcting the damage frequently found at the edge of a pavement by installing a narrow, 2- to 6-foot-wide wedge along the entire outside edge of a lane and layering with HMA. This extends the life of an HMA pavement or chip seal overlay by adding strength to significantly settled areas of the pavement.

Worst-first strategy: Asset management strategy that treats only the problems, often addressing the worst problems first, and ignoring preventive maintenance. This strategy is the opposite of the "mix of fixes" strategy. An example of a worst-first approach would be purchasing a new automobile, never changing the oil, and waiting till the engine fails to address any deterioration of the car.

List of Acronyms

CPM: capital preventive maintenance

[25] [second sentence] http://www.kentcountyroads.net/road-work/road-treatments/ultra-thin-overlay
[26] https://en.wikipedia.org/wiki/Trunk_road
[27] https://en.wikipedia.org/wiki/Trunk_road
[28] Inventory-based Rating System for Gravel Roads: Training Manual

FHWA: Federal Highway Administration

HMA: hot-mix asphalt

I: trunkline abbreviation for routes on the Interstate system

IBR: Inventory-based Rating

M: trunkline abbreviation for Michigan state highways

MDOT: Michigan Department of Transportation

MTF: Michigan Transportation Fund

NBIS: National Bridge Inspection Standards

NCPP: National Center for Pavement Preservation

NHS: National Highway System

PA 51: Michigan Public Act 51 of 1951

PASER: Pavement Surface Evaluation and Rating

R&R: reconstruction and rehabilitation programs

TAMC: (Michigan) Transportation Asset Management Council

US: trunkline abbreviation for routes on the US Highway system