2022 Transportation Asset Management Plan For Grand Traverse County Road Commission

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Foreword

As conduits for commerce and connections to vital services, roads and bridges are some of the most important assets in any community. This includes other assets like culverts, traffic signs, traffic signals, and utilities which support and affect these roads and bridges. The Grand Traverse County Road Commission's (GTCRC) 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 (AMP) is intended to report on how the GTCRC is meeting its obligations to maintain the public assets for which it is responsible.

This plan identifies GTCRC's assets and condition and how GTCRC maintains and plans to improve the overall condition of those assets. An AMP is required by Michigan Public Act 325 of 2018, and this document represents fulfillment of some of GTCRC'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 AMP helps to demonstrate GTCRC'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 GTCRC's assets, and it gives taxpayers the information they need to make informed decisions about investing in GTCRC's essential transportation infrastructure.

The GTCRC had struggled for several years to maintain our Primary and Local Roads due to a history of underfunding. Increased costs, reduced funding, and improved fuel efficiencies have affected both the condition of our roads and the strategic direction of the GTCRC to manage them. While we are not receiving a significant increase in road funding it will take several years to catch up.

Our roads continue to age and deteriorate as a result of increasing traffic. Severe winter and spring break-ups have occurred over recent years speeding up deterioration significantly. Our challenge as the stewards of our road system is to maintain public safety and the quality of our roads. With an AMP, we can select the right treatment at the right time, plan within available funding limits, and maximize the life of our roads. It has been well documented that taking care of our roads with properly-timed preservation treatments is more effective and efficient than being in a reactive repair mode of maintenance or reconstruction.

Until recently, constantly rising construction costs and the reduction of available funding has forced us to adjust our road management strategy by regularly evaluating and prioritizing our needs. We have been fortunate the public elected a county-wide road improvement millage in 2014. The additional millage funding and increased Michigan Transportation Funding (MTF), which began in late 2016, is crucial in supporting this AMP into the future.

By implementing this AMP and because of a county-wide road millage, we have been able to improve the number of paved road miles from less than 35% being rated fair to good to approximately 63% rated fair to good in 8 years.

The information contained in this report outlines the processes and strategies of the GTCRC, and is used to manage available funding to improve the transportation network it is responsible for.

Overview of Asset Management

The State of Michigan has been actively pursuing Asset Management since 1998 when the Michigan Legislature established the Act 51 Transportation Funding Committee. Continued support of Asset Management has occurred as the Legislature established the Transportation Asset Management Council in Act 499 of 2002. This Act encouraged the use of Asset Management in decision processes through Act 338 of 2006, which continued to refine Asset Management in Michigan through Public Act 199 of 2007. Asset Management, according to Public Act 199 of 2007, means an "ongoing process of maintaining, upgrading and operating physical assets cost-effectively, based on a continuous physical inventory and condition assessment." In 2018, the State of Michigan enacted Public Act 325 which requires communities over a certain size to maintain an AMP. The GTCRC has been utilizing an AMP prior to Public Act 325 with its first published plan in 2013. This has been integral to the GTCRC's standard operating procedures for budgeting and project selection.

The implementation of an asset management decision process allows an agency to make the best decisions for their transportation network with the best information they can collect. The process enables good stewardship, transparent decision processes, and measurable performance. The following figure provides an overview of the asset management process.

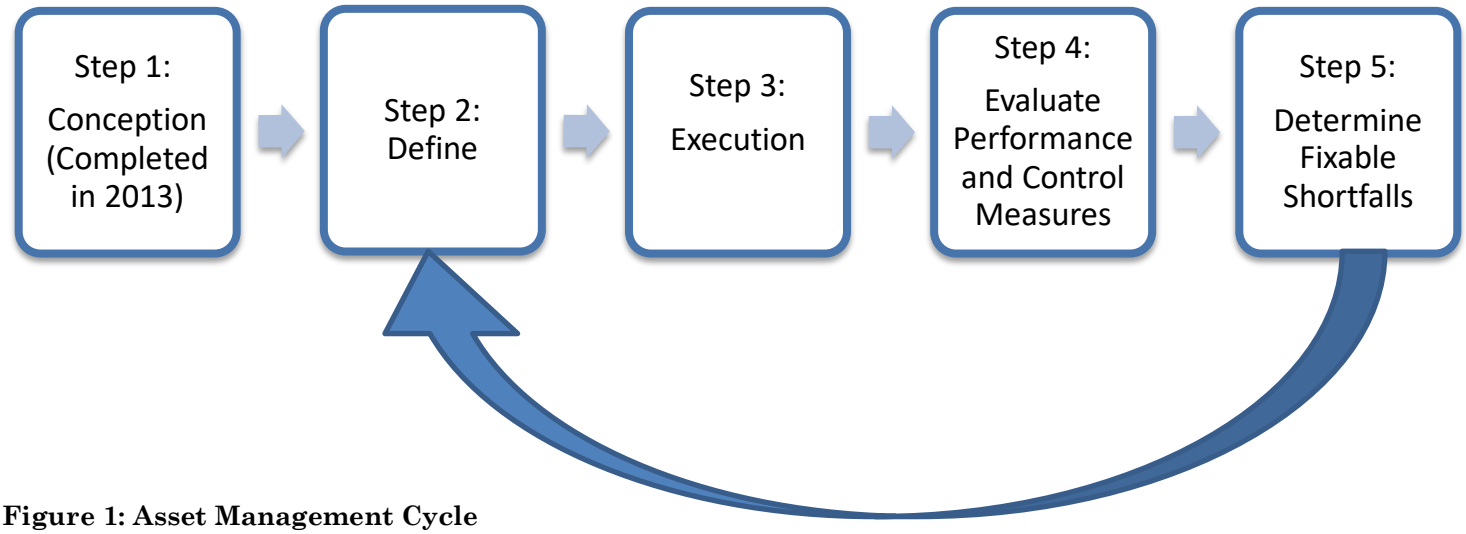

Figure 1: Asset Management Cycle

This 2022 plan identifies the GTCRC's transportation assets and their latest condition, as well as the strategy the GTCRC plans to use to maintain and upgrade particular assets given GTCRC's condition goals, priorities of network's road users, and resources. An updated plan is to be released approximately every two 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:

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Current Data and Software Tools

Data about the pavement and road surface assets under GTCRC's jurisdiction are maintained by three departments at the GTCRC. These departments are Administration, Engineering, and Operations. The roles of these departments are as follows:

Administration
The five sections that fall under Administration include the Board of County Road Commissioners, Finance, Human Resources, Public Information/Community Relations, and Information Technology. These sections oversee the business functions of policy-making, budget, account receivables/payables, employment, bargaining units, workers compensation and safety, employee benefits, community relations, and technology.

Engineering
The Engineering Department is responsible for providing engineering and technical services for road operations, preventative maintenance projects, and improvement projects on the county road system. It is comprised of four sections which are Project Management/Development, Construction Testing and Inspection, Traffic and Safety, and Permitting.

Operations
The Operations Department oversees the maintenance and upkeep of all county roads, as well as Michigan Department of Transportation's (MDOT) state trunklines under a contract. In addition, Operations is responsible for two maintenance garages and approximately 125 pieces of road equipment. Operations consist of District Crews, Heavy Equipment Crews, Road Maintenance Crews, Tree Crews, Equipment/Maintenance Crews, Grounds and Facilities Crews, and the State Trunkline Crews.

The GTCRC currently uses various types of software and filling systems to manage current asset data and cost information. Table 1 lists specific software packages utilized by the GTCRC and descriptions of the functions these software packages perform.

Table 1: Data/Software

Name	Function/Purpose/Data	Location
ESRI ArcGIS	Roadway/Asset Inventory	Server
	CityWorks – Asset Management	
	CityWorks – Work Order Management	
RoadSoft	Roadway Asset Management System	Server
	Asset Inventory	
	Asset Condition Data	
	Asset Deterioration Modeling	
	Strategy Evaluation	
MS Excel	Asset Cost and Depreciation	Server
	Proposed CIP Analysis	
Precision	Accounting Software	Server
	Income and Expenditure	
Hardcopy	Asset Cost Records	Vault

Data Management and Accessibility

ESRI ArcGIS – Inhouse Geographic Information System (GIS) Server, utilizes third-party CityWorks software for complete asset management suite.

RoadSoft – Program, updates and software support is issued by LTAP (Michigan Local Technical Assistance Program). User rights are established to control input procedures and minimized corruption of data.

Excel – Spreadsheets are individually maintained. Worksheets supporting amounts in financial statements are subject to annual audit.

Precision Accounting Software – This software is written specifically for road commissions. Annual updates and software support provided by Precision Computer Solutions. Access is restricted to the Finance Department personnel.

All data files are maintained on the server. The server is backed up nightly and is located at another facility.

Outside professionals assist with maintaining the integrity and security of our IT system.

1.0 Current Assets

The GTCRC is the jurisdictional authority over all public roads, bridges, and support systems lying outside the incorporated cities and villages within Grand Traverse County, exclusive of any state trunkline highways. At the end of 2021, the GTCRC certified approximately 258 center-line miles of county Primary Roads and 763 center-line miles of county Local Roads. Approximately 347 certified center-lines miles are unsealed (i.e., gravel roads). The GTCRC maintains 20 bridges with an additional bridge to be completed in 2022. The support system includes an inventoried 929 culverts, 27 traffic signals, approximately 9,980 signs, approximately 970 miles of long line pavement markings, and approximately 865 pavement symbols.

1.1 Road Asset Inventory

This section provides documentation of the assets contained on the road network. MDOT annually certifies all public roads within the State of Michigan. Certification maps are maintained by the GTCRC and are the basis for determining the amount of money received from the Michigan Transportation Fund (MTF). The GTCRC receives a higher level of reimbursement for Primary Roads than Local Roads. The following tables and figures summarize Grand Traverse County road inventory by location and classification. Additional information can be found in the Pavement Asset Management Plan later in this report, which contains more detailed information on current and future road conditions.

Table 2: Mileage by Location and Classification

2021 Certification Mileage Chart										
County-Wide						**Urban**				
Townships	**Primary**	**Local**		**Total**		**Townships**	**Primary**	**Local**		**Total**
Acme	10.18	39.59		49.77		**Acme**	1.72	27.76		29.48
Blair	15.52	69.21		84.73		**Blair**	6.53	35.86		42.39
East Bay	35.12	92.44		127.56		**East Bay**	15.02	34.27		49.29
Fife Lake	7.67	56.05		63.72		**Fife Lake**	0.00	0.00		0.00
Garfield	37.24	69.91		107.15		**Garfield**	34.73	60.12		94.85
Grant	21.93	36.66		58.59		**Grant**	0.00	0.00		0.00
Green Lake	20.78	47.54		68.32		**Green Lake**	2.25	3.19		5.44
Long Lake	25.64	64.76		90.4		**Long Lake**	1.25	8.47		9.72
Mayfield	13.08	41.21		54.29		**Mayfield**	0.00	0.00		0.00
Paradise	25.36	56.82		82.18		**Paradise**	0.00	0.00		0.00
Peninsula	15.73	62.98		78.71		**Peninsula**	6.24	8.14		14.38
Union	13.59	57.5		71.09		**Union**	0.00	0.00		0.00
Whitewater	16.25	68.71		84.96		**Whitewater**	0.00	0.00		0.00
Totals	**258.09**	**763.38**		**1021.47**			**67.74**	**177.81**		**245.55**
Totals										
Total Primary County Wide				**258.09**			**Total Primary Urban**			**67.74**
Total Local County Wide				**763.38**			**Total Local Urban**			**177.81**
Grand Total County Wide				**1021.47**			**Grand Total Urban**			**245.55**

In the future, the GTCRC will be able to gain a better understanding of the value of pavement assets by improving the quality of the road surface asset information they have. The basic road surface inventory must be updated. Once this information is updated, it can be expanded to document individual pavement layers.

1.2 Bridge Asset Inventory

This section provides documentation of the bridge assets under the jurisdiction of the GTCRC. Bridges greater that 20 feet in span are included in the National Bridge Inventory (NBI), and semi-annual inspections are recorded in the State of Michigan's MiBridge database. The NBI includes large culverts or multi-pipe culverts if the sum of the culvert(s) span is greater than 20 feet. In 2021 the GTCRC had 20 bridges on the NBI and one Non-NBI (less than 20-feet) structure in MiBridge. In 2022, four Non-NBI structures have been added to the MiBridge inventory. The GTCRC has inventoried in MiBridge a total of five non-NBI structures and included them in their inspection cycle. The four bridges inventoried in 2022 are not included in this report due to inspection reports not being completed at the time of this reports writing. The bridge inventory and condition data utilized in this report was obtained from MDOT MiBRIDGE and other sources. Condition data for the bridges will be updated with inspections that are due in September 2022. More information can be found in the Bridge Asset Plan found in Section 4 in this report. The following table breaks down the GTCRC's bridge inventory by location and type.

Table 3: Bridge Inventory

2021 Bridge Inventory			
Bridge ID	**Facility Carried**	**Feature Intersected**	**Bridge Type**
3057	Betsie River Road	Betsie River	Steel – Culvert
3058	Diamond Park Road	Little Betsie River	Prestressed concrete – Box beam/girders - multiple
3059	Beitner Road	Boardman River	Steel – Culvert
3060	River Road	Boardman River	Steel continuous – Box beam/girders - multiple
3061	River Road	Boardman River	Steel continuous – Box beam/girders - multiple
3062	Scharmen Road	Boardman River	Steel – Culvert
3063	Brown Bridge Road	Boardman River	Steel – Culvert
3064	Brown Bridge Road	Boardman River	Timber – Slab
3065	Supply Road	Boardman River	Steel – Culvert
3066	South Airport Road	Boardman River	Steel – Culvert
3067	South Airport Road	Boardman River	Steel – Culvert
3069	County Road 611 (Garfield Road)	Boardman River	Steel – Multi-stringer
3070	Broomhead Road	South Branch Boardman River	Steel – Culvert
13287	Business Park Drive	Mitchell Creek	Concrete – Culvert
13359	Three Mile Road	Mitchell Creek	Concrete – Culvert
13360	Three Mile Road	Mitchell Creek	Concrete – Culvert
13602	Hammond Road	GLC RR	Concrete – Culvert
13603	Keystone Road North	GLC RR	Concrete – Culvert
13969	Cass Road	Boardman River	Prestressed concrete – Multistringer
14353	East Duck Lake Road	Mason Creek	Timber – Slab

1.3 Support System Asset Inventory

The support system for the GTCRC's road network includes the previously mentioned signals, signs, small culverts (not included in MiBridge), and pavement markings. These items require maintenance and upkeep also. Except for pavement markings, pavement maintenance and construction activities often do not disturb these assets and unless there is a proactive approach to inventorying and assessing these assets, they can become neglected and absent of a budget. Support system components are an integral part of the larger network and provide a necessary function to the public. As Grand Traverse County continues to grow, the need for traffic control items is likely to increase as traffic volume increase. Traffic control items are necessary to provide the public with a safe and efficient road network. While there are no requirements by law to inventory these items, the GTCRC has been proactive in collecting all assets it is required to maintain. The table below provides a summary of the known assets in the support system.

Table 4: Support System Inventory

Traffic Control System	
Item	**Count**
Traffic Signals	27
Overhead Flashers	4
Advanced Warning Flashers	10
Network Radios	23
Communication Repeaters	39
Scoot System Server	1
Signs	9,980
Pavement Long Line Paint (miles)	980
Pavement Symbols (each)	865
Small Culverts	
Item	**Count**
Road Cross Culverts	929 (under count)

2.0 Finances

The GTCRC is an independent financial entity. The Board of County Road Commissioners adopts an annual budget and approves all expenditures in accordance with accepted accounting principles for government agencies. Annually, an amendment to the budget will be drafted to reflect actual winter maintenance expenses. This is typically presented by staff and approved by the Board of Road Commissioners in early April each year. An independent audit is performed annually on the Road Commission accounts, and the results are provided to the Michigan Department of Treasury.

The following sections document the financial status of the GTCRC. This data was compiled for the year-end of December 31, 2021, and is provided here for the purposes of asset management considerations. The most recent financial information available can be obtained through the GTCRC.

2.1 Current Asset Investment

The GTCRC currently invests in approximately 1,022 miles of road surface assets. The investments include three main surface types: hot mix asphalt (HMA), concrete, and unsealed roads. Unsealed roads fall into two main subcategories: natural aggregate and sand/dirt.

The GTCRC currently estimates the road surface asset investment to be:

A. Current Investment $147,913,612

B. Depreciated Value $53,953,151

C. Net Value $93,978,461

2.2 Income

The GTCRC's principal source of funding is the MTF. This fund is supported by vehicle registration fees and the Michigan state fuel tax. The Road Commission's allocation is based on a formula including such factors as population, miles of certified roads, and county-wide vehicle registration fees.

In addition to the MTF and a Local Road millage, the Road Commission is contracted by the MDOT to maintain the state trunklines within Grand Traverse County. GTCRC also receives federal and state grants for individual projects and may receive contributions from Townships, private developers, and other governmental entities for specific improvements. The Road Commission also receives revenues from permits and other fees, special assessment districts, and interest from invested funds. The following table lists the anticipated revenues for the 2022 fiscal year.

Table 5: Revenue

Revenue Source	**Budget ($)**
Millage, voted	4,602,000
Michigan Transportation Fund (MTF)	14,376,918
Federal/State Funds	2,083,359
State Trunkline Maintenance	1,206,722
Township Contributions	565,837
Licenses, Permits, and Charges for Service	214,000
Other Revenue	1,073,340
Total	***24,122,176***

2.3 Expenses and Expenditures

Typical annual expenditures (three-year average) are as follows:

Table 6: Expenses and Expenditures

Expense	Amount ($)
Construction/Heavy Maintenance	11,617,000
Routine Maintenance	7,491,000
State Trunkline Maintenance	1,202,000
Administrative Expense	818,000
Equipment and Capital Outlay (Net of Depreciation and Equipment Rental Credits)	501,000
Debt Service	863,000
Other Expenditures	327,000

Construction/Heavy Maintenance is comprised of available funding through Federal, State, Special Assessment Districts (SAD), General, Local Road Millage, and Township Contributions. When Federal, State, and Local Match funds are available, they supplement the Local Road Millage and MTF historical amounts are as follows:

Table 7: Federal and Local Matching Funds

Year	Rural STP	Rural State D	Urban	Local
2016	$ 1,477,000	$ 275,000	$ 0	$ 350,000*
2017	$ 520,000	$ 20,000	$ 0	$ 410,000*
2018	$ 290,000	$ 38,000	$ 0	$ 68,000*
2019	$ 576,960	$ 74,473	$ 375,000	$ 300,000*
2020	$ 560,000	$ 0	$ 0	$ 140,000*
2021	$ 590,000	$ 75,000	$ 375,000	$ 450,000*
2022				

*Pending available funding from SAD, General, and Township contributions.
Italics indicate potential amounts, 2021 has not been programed at the RTF/Small Urban level at this time.

Routine maintenance is inclusive of County Primary and County Local maintenance activities such as snow plowing, pothole patching, road-side mowing, ditch clean out, and other routine activities.

2.4 Unfunded Projects

Based on GTCRC's previous goal of having 80% of all roads in fair or good condition and with continuous pavement deterioration, we estimate there is over $180 million in unfunded projects currently.

2.5 Optimized Capital Plan

Due to the overall condition of the Grand Traverse County Road System and lack of adequate funding to address all needs, we will continue to update our AMP, and anticipated revenues will be used to determine the renewal, replacement, and improvement projects to be implemented in any given year. For further information on the project selections, detailed and projected road and bridge conditions are included later in this plan.

3.0 Make and Know the Rules

3.1 Strategic Goals

The Board of County Road Commissioners adopted its Mission Statement on May 20, 1994. On May 24, 2012, the Board updated its "Board Goals and Priorities." These items form the basis for the development of annual goals and strategies to guide our work with our partners and stakeholders, regularly monitor and report on those efforts, and then to review and adjust plans as necessary.

Mission Statement
The following statement was created by a team of employees, management, and Board Members:
"To maintain and upgrade a safe and efficient road system."

Vision Statement
The Grand Traverse County Road Commission aspires to be a premier road maintenance and planning agency providing a high quality system of roads and bridges through efficient maintenance, fiscal responsibility and innovative planning and improvement strategies. We aspire to provide the highest quality service through an open and fair decision-making process to meet the needs of the traveling public in Grand Traverse County. We strive to enhance the quality of life in urban and rural communities by drawing on the expertise, creativity and commitment of our staff and partners. We recognize that our success is dependent upon the collective talents of our staff and community resources to meet the challenges. We commit to attracting the best and brightest workforce, strengthening their skills and promoting and rewarding excellence, while nurturing diversity and encouraging innovation.

Guiding Principles

Promote Openness and Transparency in Decision-Making

Road Commission decisions must comply with legal requirements and professional standards. We will ensure the community understands these obligations in the decision process and, to the extent we can, we will exercise flexibility in the application of professional standards to address strongly felt needs of the community. As a public body, we also have an obligation to comply with statutory requirements such as the Open Meetings Act and Freedom of Information requirements. We are committed to going beyond those requirements to ensure openness in our decision-making, make appropriate information available in a timely fashion consistent with legal requirements, and reach out to the larger community through the media and other ways to ensure that the community is aware of the decisions we make and the basis for those decisions.

Provide Ample Opportunities for Participation by the Public and Local Government

We are committed to providing ample opportunities for public participation and input into decision-making processes. In addition to mandated public hearings, we will make an affirmative effort to notify and engage residents in areas particularly impacted by proposed projects, and we will work to identify community concerns and needs and address those concerns, consistent with statutory obligations and professional standards.

Be Conscientious Stewards of the Public's Money

As a public agency, we use public resources from the MTF, federal grants, and state grants, as well as township and developer contributions to support our work. We are committed to being effective stewards of these resources, ensuring the long-term fiscal stability of the Road Commission, employing cost-effective solutions to projects, continuing to explore ways to reduce the costs of operations, continually striving to improve service delivery and productivity, and ensuring a high level of customer service in all that we do.

Value Diversity

We serve a diverse community in terms of gender, geography, race, and other characteristics. We are committed to serving the entire community and reflecting the diversity of our county in our choice of employees, projects, vendors, and in our partnerships. The Board adopted its Equal Employment Opportunity policy in 1988 and adopted Title VI guidelines in 2011.

Be Sensitive to the Environment

Consistent with legal obligations and professional standards, we will be sensitive to the impact we have on the natural and built environment, seek to minimize that impact and, to the extent possible within financial and other constraints, seek to enhance and improve the environment. Where possible, consistent with the values of Grand Traverse County residents, we will make decisions and execute activities in a way that is a model of environmental stewardship for other Road Commissions. We will respect historical values reflected in the built environment to the extent we can and will be sensitive to concerns regarding local and county objectives to minimize sprawl and protect open spaces.

Value All Employees

We recognize the success of our agency is largely dependent on the talents and skills of employees. We believe every employee has a role to play in making a positive difference for the success of our agency. We are committed to hire and retain the best possible employees, evaluate them regularly, provide opportunities for professional development and advancement, pay them competitively, reward success and innovation, and treat them with dignity, fairness, and respect.

Provide Leadership in Transportation Planning and Road System Improvement

While we are responsible to the people of Grand Traverse County through the elected County Board of Commissioners, we also recognize an obligation to share our insights, experience, and expertise in transportation and in providing transportation services with others. We support county, regional, and state transportation initiatives through active engagement in the Grand Vision Plan implementation, the County Road Association of Michigan, Northern Michigan Association of Road Commission, Paul Bunyan Council, and Networks Northwest (www.networksnorthwest.org). We strive to be recognized as a source of innovation and cutting-edge performance in everything we do.

3.2 Legislation, Policy, and Standards

Our permits are included in the 2016 GTCRC Right-of-Way Permitting and Public Road Standards, Rules, Specifications, and Guidelines.

The GTCRC hereby recognizes reference and incorporates in these procedures and regulations as is fully stated herein the most current editions of the following list of publications:

- AASHTO A Guide for Accommodating Utilities Within Highway Right-of-Way
- AASHTO A Policy on Geometric Design of Highways and Streets
- AASHTO Roadside Design Guide
- APWA Position Statement, Public Rights-Of-Way Management, September 22, 1999
- ATSSA Quality Standards for Work Zone Traffic Control Devices
- FHWA Roundabouts: An Informational Guide, Publication No. FHWA-RD-00-067
- ITE Trip Generation Handbook
- ITE Trip Generation Manual
- MDOT Design Survey Manual
- MDOT Drainage Manual
- MDOT Geometric Design Guide
- MDOT Maintaining Traffic Typicals, Traffic and Safety Division

- MDOT Road and Bridge Standard Plans
- MDOT Standard Specifications for Construction
- MDOT, Reducing Traffic Congestion and Improving Traffic Safety in Michigan Communities: The Access Management Guidebook, October 2001
- Michigan Manual on Uniform Traffic Control Devices
- TRB, Highway Capacity Manual
- GTCRC Policies and Standard Operating Procedures
- 2016 GTCRC Right-of-Way Permitting and Public Road Standards, Rules, Specifications, and Guidelines

The GTCRC will also comply with Michigan Public Act 199 of 2007, which requires:

> *"The department, each county road commission, and each city and village of this state shall annually submit a report to the Council. This report shall include a multi-year program developed through the asset management process described in this section. Projects contained in the department's annual multi-year program shall be consistent with department's asset management process and shall be reported consistent with categories established by the Council. Projects contained in the annual multi-year program of each Local Agency shall be consistent with the asset management process of each Local Road agency and shall be reported consistent with categories established by the Council."*

3.3 Reporting

GTCRC currently relies on annual Pavement Surface Evaluation and Rating (PASER) ratings and inspections to monitor conditions, results, and comparisons of treatments.

3.4 Evaluation of Goals and Performance Targets

GTCRC evaluates goals and performance targets on a continuous basis throughout the year with in-depth consideration, evaluation, changes, and updated goals/targets being reviewed and implemented on an annual basis based on past successes, our AMP, budget, and projected revenues.

3.5 Reviewing of Goals

The GTCRC's reviews goals throughout the year, but in-depth bi-annually when we update our AMP, as well as when we begin preparing our annual budget and consider road improvement projects for the following year. Projects of significance are planned and adjusted three to five years in advance.

4.0 Decision-Making

The GTCRC takes a multi-disciplinary approach to determining the renewal, replacement, and improvement projects to implement in any given year. This process takes into consideration the condition of a pavement, stakeholder needs, and the changing needs of the area around a road. The decision process is focused around the following key areas:

- The general condition of the road (e.g., the pavement, shoulders, culverts, etc., or bridge).
- The PASER rating of the road.
- The volume of traffic, or number of trips, found on the road.
- The ability to provide, or the need for, safety improvement projects.
- The ability to provide corridor continuity.
- The potential for improved economic development in an area.
- The ability to coordinate with other projects that may be disturbing the roadway such as utility work, or improving the public right-of-way, such as county DPW (utility) projects.
- The ability to partner with other jurisdictions and agencies such as the city, townships, villages, and MDOT in Grand Traverse County or neighboring road commissions, to share the cost burden of a project.

Once the GTCRC establishes the initial potential project list for a fiscal year, the actual field conditions of the project location are verified. The GTCRC reevaluates the project list after completing the field inspections to reprioritize as necessary.

4.1 Basic Process Improvement Plan

The GTCRC has found several areas where the decision-making process can improve. This section of the AMP documents these areas for improvement and provides insight into how the GTCRC chooses to approach these changes to the decision-making process.

The data system used (RoadSoft) to model future preventative maintenance measures to the GTCRC road system is limited to the accuracy of the input data. It was noted over the winter of 2013 that RoadSoft had some base data issues including, but not limited to, incorrect listing of road types, PASER rating and base map variations from other county map sources (ACT 51 maps). It was also recognized that the coding of the roadway segments by past staff did not allow for querying of important aspects of our roadway system such as subdivisions. The GTCRC understands the importance of having accurate data to complete analysis of their roadway system. Based on available staff, it will be difficult to fully optimize the data, but staff understands we need to make a good faith effort. In 2021, the GTCRC began utilizing ESRI's GIS software concurrently with RoadSoft. This allows the GTCRC better control of data inputs and faster corrections to database errors. Currently, the GTCRC is in the process of implementing a third party add-on to ESRI's GIS software called CityWorks. CityWorks allows the GTCRC to inventory and track more assets than with RoadSoft alone. In 2022, RoadSoft adopted the newest road mapping, called Framework 22, incorporating many corrections and updates to the maps. This has improved the accuracy of the data collection. RoadSoft has been aggressive in upgrading the software and is improving the ability to run computations for the AMP. The two systems provide a comprehensive suite of software to analyze data and make informed decisions. The drawback to this approach is maintaining two separate databases. It is the GTCRC's goal to fully implement ESRI/CityWorks as the AMP backbone and utilize RoadSoft where required for state reporting on road conditions. This approach has not been fully utilized to date and, as the ESRI/CityWorks database matures, the shift will naturally take place.

It is recognized that the deterioration curves within RoadSoft are created utilizing standard industry material deterioration properties. It is also recognized that deterioration curves for surface treatments are used as a single determination throughout the entire county. Many roadways within the county have factors/features that can change the deterioration curve for each given roadway segment such as high ridge along the shoulder of the HMA, low shoulder gravel, and trees providing shade over the roadway surface. We have begun to analyze the deterioration curves for actual fixes applied to the roads since 2014. This will improve the predictive abilities of RoadSoft in projecting future PASER ratings and when fixes to the roads will be triggered. This also increases the accuracy of estimating the value of each fix type, making the return-on-investment estimates more accurate.

The GTCRC understands that an AMP is more than just the roadway system within the County. We need to also provide solutions to the deteriorating infrastructure such as bridges, culverts, guardrail, signage, road right-of-way, ground between the edge of pavement and the road right-of-way, and signalize intersections. The Road Commission completed data collection for signs, guardrails, and point pavement markings in the summer of 2017, and has partially completed culvert data collection in 2018 and continues to update it's inventory with input from GTCRC Operations input. This data will be useful in evaluating non-road asset programs, some of which are being incorporated into this update to the AMP.

The amount of time between rating a road and actual construction of a treatment option is considerable. The unfortunate outcome of the delay to construction is the treatment alternative selected may be misaligned to the actual conditions of the pavement when construction begins. The GTCRC is interested in developing strategies to minimize the chance for misalignment. As the condition of the road system improves and any unforeseen deficiencies are corrected during construction, future projects probability of alignment with predictions increases.

The GTCRC also finds the coordination of non-surface concerns to be limiting. The need to upgrade non-motorized facilities to meet current ADA standards, the need to address roadside concerns, and the conditions of drainage/structures are all areas where project coordination is key. The GTCRC needs further work in this area. In 2021/2022, with the implementation of ESRI/CityWorks software, a more detailed inventory of our assets has begun.

5.0 Establishing Sustainability

5.1 Sustainability Assessment

The GTCRC continually monitors the needs of the roadway system and the status of income sources to determine the sustainability of near-term and long-term plans and goals. Currently, the GTCRC finds the projected income will not fully meet the needs of the pavements under their jurisdiction. Due to funding the GTCRC has been unable to perform renewal and replacement work at the necessary levels that work should be performed, however, with the Local Road improvement millage renewal and projected increased MTF funding, we are moving in the right direction to meet our goals.

The following chart provides the historical revenue received from the MTF. State transportation funds are the main source of revenue for repair and maintenance of county roads in Grand Traverse County. This revenue decreased steadily between 2004 and 2009 before stabilizing in 2010 and 2011. State transportation funds are based on fuel taxes and vehicle registration fees. Although fuel consumption and related fuel taxes have decreased over the years, our state legislators were able to approve an increase in road funding (MTF), which began in late 2016 and is projected to be fully funded over a five-year period (2021).

The following financial information is intended to provide a general overview of the Road Commission's finances for all those with an interest in the component unit's finances. Questions concerning any of the information provided in this report or requests for additional financial information should be addressed to the Finance Manager, Grand Traverse County Road Commission, 1881 LaFranier Road, Traverse City, Michigan 49696.

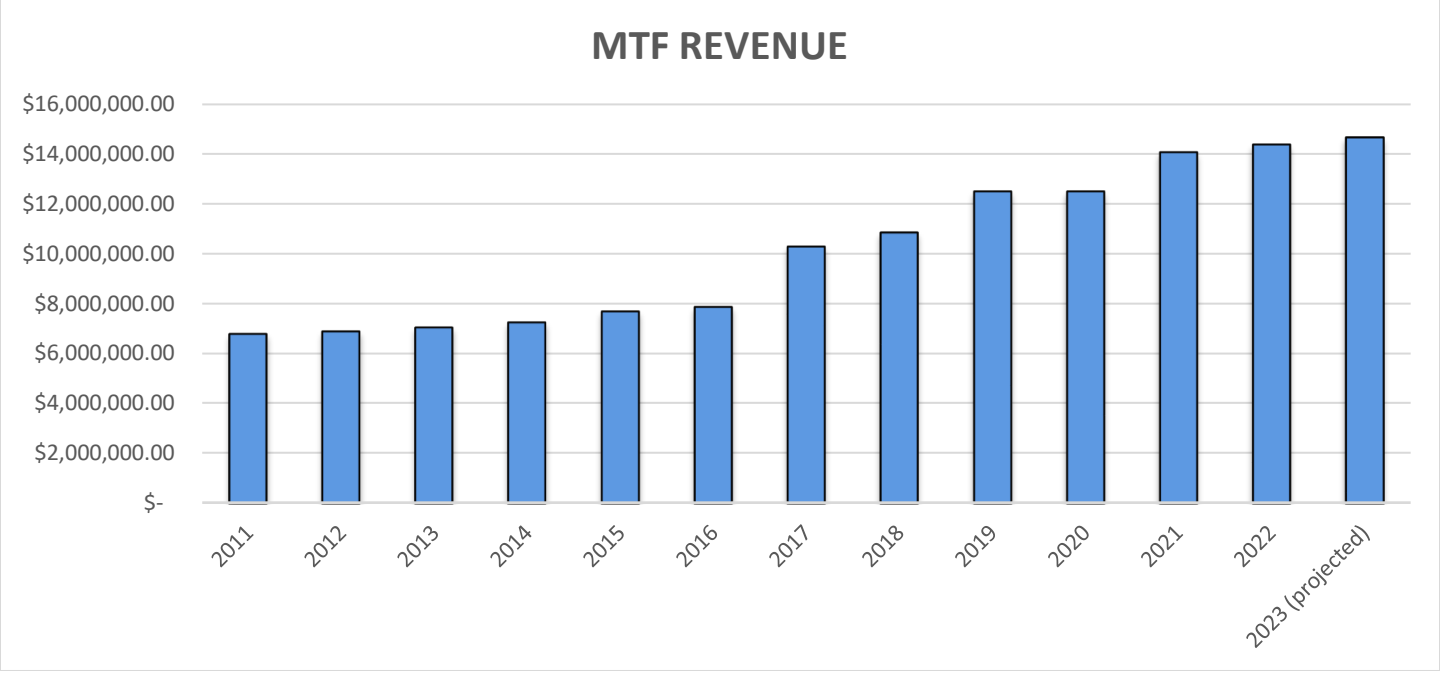

Figure 2: MTF Revenue

The chart below reflects road improvement expenditures for the last ten years. These expenditures include approximately $3 million for major projects, such as the Cass Road Bridge, which skew the amount of expenditures for 2016. 2022 is also an outlier as various industry shortfalls required projects to be carried to subsequent years inflating the expenditures for that year. Variations from average expenditures is expected from year to year.

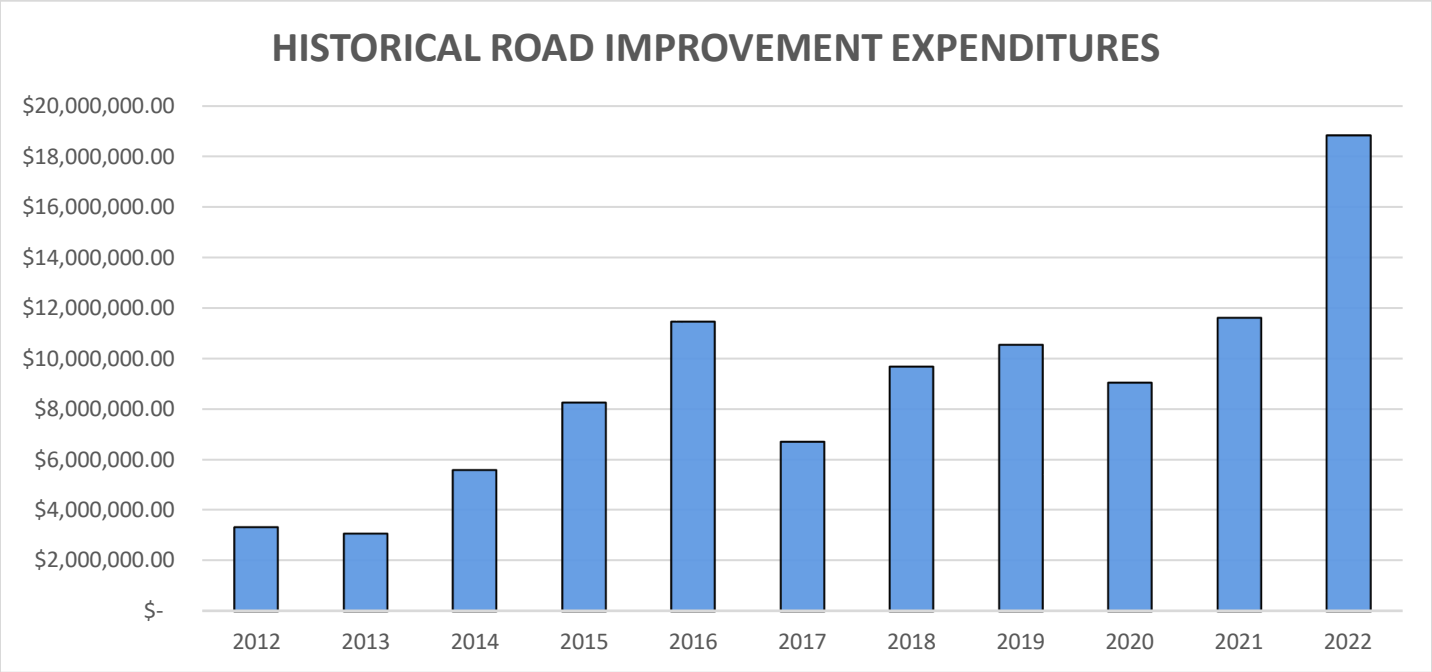

Figure 3: Road Improvement Expenditures

The GTCRC has developed a goal of having 90% of all federal aid/primary paved roads rated as good or fair to align with guidance from state agencies. For the 2018 PASER ratings, this goal had been achieved. However, it was noted that 25% of the federal aid eligible/primary roads rated with a PASER of 4 were beyond simple preventative maintenance fixes. The pavement asset management plan will further detail the projected and realized fluctuation in the Primary Road network. While the Primary Road network supports a disproportional amount of traffic volume compared to the Local Road network, this generalization is not always the case. The GTCRC updated their Local Road policy in 2021 to include the Local Road network on a tiered basis, whereby the critical Local Roads can be assessed and maintained alongside the Primary Road network. Some funds from the county-wide road millage are set aside for individual townships priorities. This creates a mechanism for roads which may inadvertently be neglected due to other higher priority roads to be included capital improvements. The GTCRC was able to take these steps due to adherence to asset management principals out lined in this plan resulting in the continued improvement to the road system.

5.2 Program Coordination

The GTCRC works to coordinate renewal, replacement, and improvement activities with other agencies. The GTCRC plans to continue this coordination in the future.

Key stakeholders the GTCRC coordinates with for design input and funding partnerships are:

- Townships
- City
- Villages
- Counties
- Utilities
- The private sector
- Citizen groups, special interest groups
- Property owners
- BIA and Tribe

The GTCRC also seeks funding partnerships for federal and state grant programs such as the Local Bridge Program, Safe Routes to School Program, Transportation Alternatives Program, Transportation Economic Development, Bureau of Indian Affairs funding, private sector funding opportunities such as new developments and impact mitigation, and through Special Assessment Districts (SADs).

Below are a few examples of projects completed through coordination efforts.

Subdivision Roads

Early on and prior to AMPs being in place, during the mid-1990s, approximately 12 subdivisions located in Garfield Township petitioned for special assessment districts (SAD). The proposed treatments included chip sealing which entailed placing emulsion and aggregate over the existing roadway surface. GTCRC partnered financially at 50% and Garfield Township at 25% with the residents picking up the balance including paving the shoulders to save on GTCRC erosion repairs. This improved and maintained road ratings, making sealcoating a viable preservation option for many Local Roads meeting the criteria for this type of improvement.

The current policy for SAD projects is GTCRC will contribute design engineering and construction engineering services, which is approximately 25% of construction costs, and aligns with prior GTCRC match policies.

Local Paved Roads

We have consistently partnered with Acme, Garfield, Mayfield, East Bay, Peninsula, Paradise, Fife Lake, and Green Lake Townships on road improvement projects such as chip seals, overlays, and shoulder improvements. Most of these road projects were completed at no cost to the property owners.

Gravel Road Program

GTCRC offers a program to partner with the townships. The townships will pay for the material costs and GTCRC pays for the labor and equipment to improve gravel roads. We have had many successful partnerships with Blair, Garfield, Peninsula, Grant, Mayfield, and Green Lake Townships.

Safety Improvements

GTCRC worked with MDOT through a Safety Grant to upgrade and improve guardrail and slope flattening along County Road 633, Cedar Run Road, Garfield Road, and Hobbs Highway. Road Safety Audits (RSA) have been conducted, or will be, at the intersections of Garfield/Potter/Hoch Roads, and Secor/Silver Lake Roads respectively. The Garfield/Potter/Hoch RSA has resulted in an upcoming roundabout safety project.

Stream Crossings

GTCRC has worked with various agencies to address either failed crossings or initiated stream crossing improvements. Partnerships have included the CRA, Conservation District, Bureau of Indian Affairs, and others to assist with grant writing and funding of these improvements. The Road Commission, working with The Fruitbelt Collaborative, has been awarded grants to replace three culvert crossings over the next five years.

Grand Traverse County Road Commission
2022 Primary and Local Road Asset Management Plan

Road Summary

This plan overviews GTCRC's road assets and condition, as well as explains how GTCRC works to maintain and improve the overall condition of those assets. The discussion is intended to explain the following:

- What kinds of road assets GTCRC has in its jurisdiction, who owns them, and the different options for maintaining these assets.
- What tools and processes GTCRC uses to track and manage road assets and funds.
- What condition GTCRC'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 GTCRC's road assets' normal life cycle.
- What condition the GTCRC predicts 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 GTCRC's road assets.

GTCRC owns and/or manages 1021.47 centerline 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 GTCRC historical and current network conditions, projected trends, and goals for county primary network and county local network can be seen in the two figures, below:

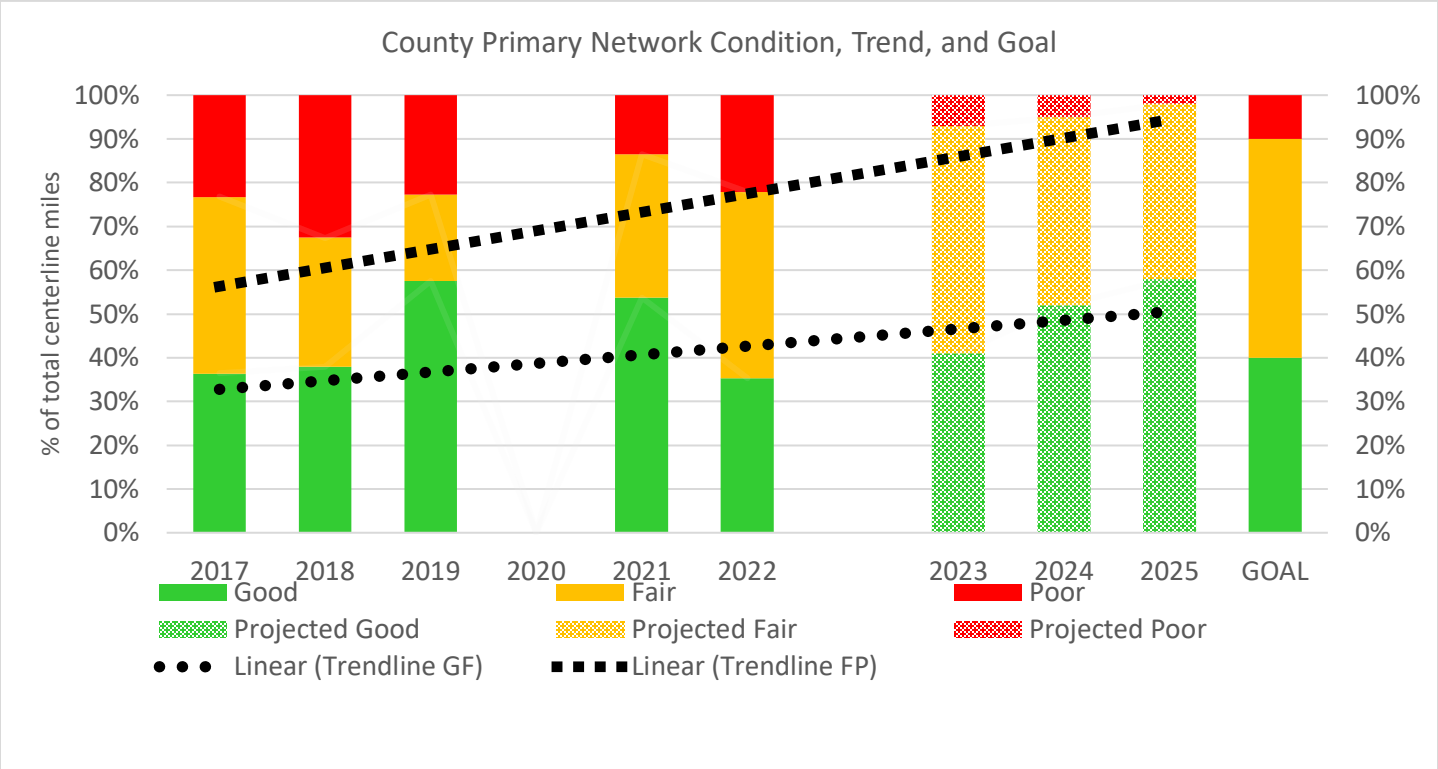

Figure 4: County Primary Trends and Goals

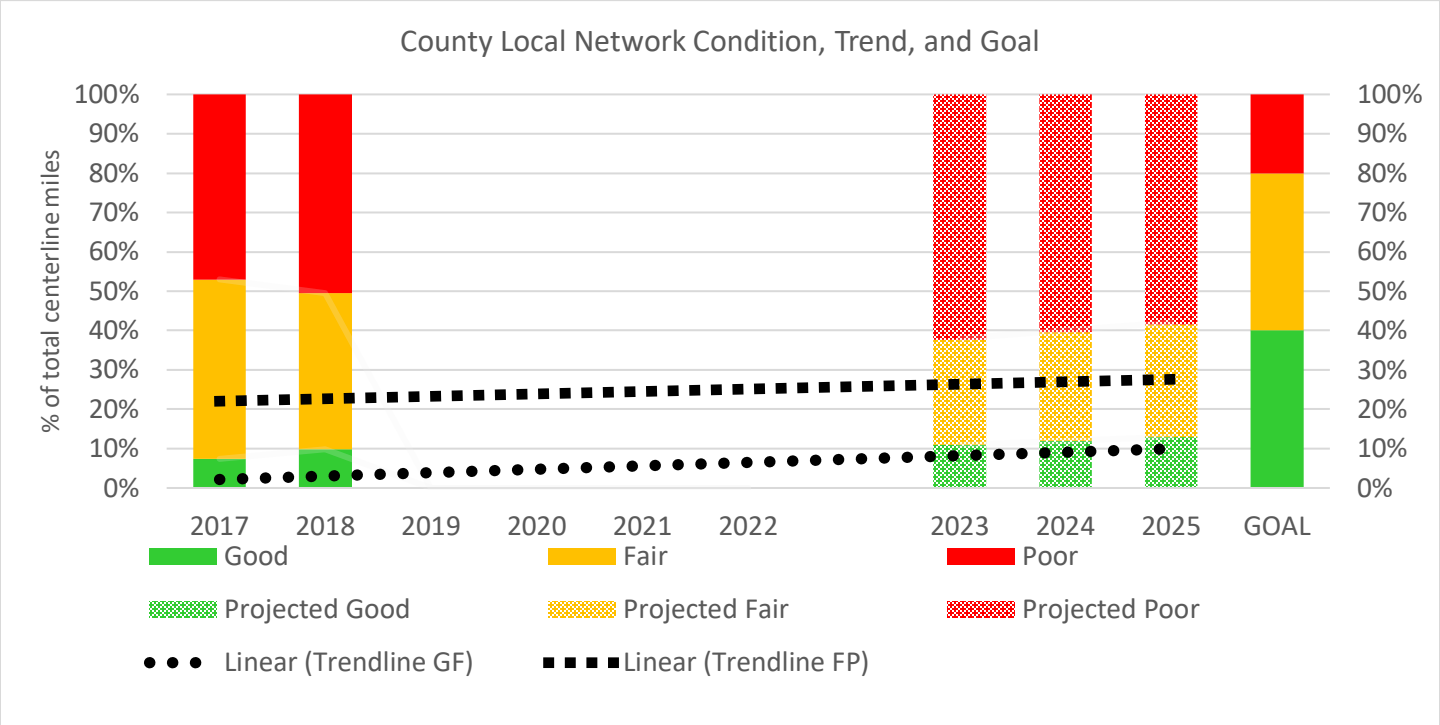

Figure 5: County Local Trends and Goals

In 2020, PASER ratings were not collected due to COVID-19 restrictions. The GTCRC recognizes the need for collecting PASER ratings on the Local Road network. Prior to 2019, ratings were regularly collected. The gap in ratings from 2019 to 2022 has minor effects on model predictions later in the report, as deterioration trends are utilized. The GTCRC plans to resume collecting Local Road ratings in 2023.

A summary of GTCRC current network conditions, projected trend, and goal for the unpaved road network can be seen in the figure below. The GTCRC makes improvements to unpaved roads utilizing matching funds from local sources. The GTCRC intends to maintain unpaved roads in their current condition. IBR ratings were first performed in 2022.

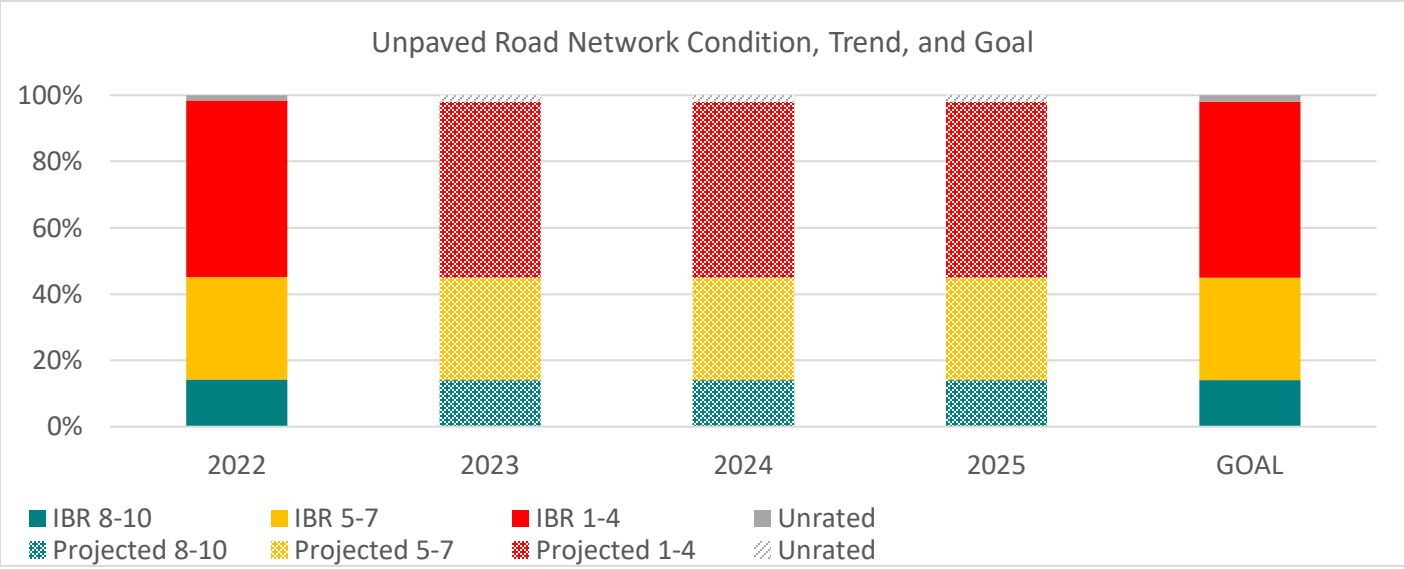

Figure 6: County Unpaved Trends and Goals

An AMP is required by Michigan Public Act 325 of 2018, and this document represents fulfillment of some of GTCRC's obligations towards meeting these requirements. This AMP also helps demonstrate GTCRC's responsible use of public funds by providing elected and appointed officials, as well as the general public, with inventory and condition information of GTCRC'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, Michigan Department of Transportation (MDOT), and the Federal Highway Administration (FHWA). GTCRC 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 GTCRC 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. GTCRC is responsible for maintaining and operating over 1021.47 centerline miles of roads.

This plan outlines how GTCRC 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 two years to reflect changes in road conditions, finances, and priorities.

Questions regarding the use or content of this plan should be directed to Wayne A. Schoonover, PE at 1881 LaFranier Road, Traverse City, Michigan 49684, or at 231-922-4848. https://gtcrc.org/191/Projects-Resources Key terms used in this plan are defined in GTCRC's comprehensive transportation AMP (also known as the "compliance plan") used for compliance with Public Act 325 of 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, demand, materials available, and budget. Each choice represents a balance between budget and costs for construction and maintenance.

Maintenance enables the road to fulfill its particular purpose. To achieve the optimum service life for a given roadway segment, regular monitoring of the roadway 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, or rigid pavement, is durable and can achieve a long service life when properly constructed and maintained. In today's life cycle cost analyses, concrete pavement can be less expensive in initial construction with a similar design life (compared to asphalt) and is not susceptible to rutting and shoving where heavy traffic is expected. Subsurface drainage is very critical in these installations to protect the pavement joints from faulting and premature slab cracking to occur in freeze thaw susceptible regions. Maintenance of traffic can be more expensive and can have a higher impact on user mobility during construction, due to the cure time required. Concrete pavements are typically designed for 20 years; however, they can achieve well over 30 years of service life when properly maintained. This material is rarely used by the GTCRC due to minimum thickness resulting in an overbuilt road section for the loading it will experience.
- **Hot-mix asphalt pavement (HMA):** HMA pavement, or flexible pavement, has a similar initial construction cost to concrete pavement in when traffic demands require substantial structure. HMA allows more flexibility for maintenance of traffic during construction. HMA pavement is typically designed for a 20-year service life; however, it requires crack sealing and resurfacing at regular intervals to maintain the surface integrity. Subbase drainage is also critical to protect the pavement from premature cracking. Heavy traffic can accelerate pavement deterioration, and HMA pavement is susceptible to shoving and rutting when heavy traffic is significant. The majority of Local Agency-owned pavement consists of 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. GTCRC 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

GTCRC 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. GTCRC 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 GTCRC 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 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 7 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 7 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.

Figure 7: PASER Road Ratings. Top image, above – PASER 8 road that is considered "good" by the TAMC and exhibits only minor defects. Second image, above - PASER 5 road that is considered "fair" by the TAMC and exhibits structural soundness, but could benefit from CPM. Third image, above - PASER 6 road that is considered "fair" by the TAMC. Bottom image, above - PASER 2 road that is considered "poor" by the TAMC exhibiting significant structural distress.

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 8 illustrates a road in this category.

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% every 2 years 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, GTCRC collects 100% of its paved non-federal-aid-eligible network using its own staff and resources every two years.

Figure 8: Road IBR Numbers. Top – Road with IBR number of 1 road that has poor surface width, poor drainage adequacy, and poor structural adequacy. Middle – Road IBR number of 7 that has fair surface width, fair drainage adequacy, and fair structural adequacy. Bottom – Road with IBR number of 9 road that has good surface width, good drainage

Unpaved Road Condition Rating System (IBR System™)

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 PASER system works well on most paved roads, which have a relatively-stable surface condition over several months, but it is difficult to adapt to unpaved roads. To address the need for a reliable condition assessment system for unpaved roads, the TAMC adopted the Inventory Based Rating (IBR) System™, and GTCRC also uses the IBR System™ for rating its unpaved roads. Information about the IBR System™ can be found at http://ctt.mtu.edu/inventory-based-rating-system.

The IBR System™ gathers reliable condition assessment data for unpaved road by evaluating three features - surface width, drainage adequacy, and structural adequacy - in comparison to a baseline, or generally considered "good" road. These three assessments come together to generate an overall 1-10 IBR number. A high IBR number reflects a road with wide surface width, good drainage, and a well-designed and well-constructed base, whereas a low IBR number reflects a narrow road with no ditches and little gravel. A good, fair, or poor assessment of each feature is not an endorsement or indictment of a road's suitability for use, but simply provides context on how these road elements compare to a baseline condition. Figure 8 illustrates the range over which features may be assessed. The top example in Figure 8 shows an unpaved road with a narrow surface width, little or no drainage, and very little gravel thickness.

Using the IBR System™, these assessments would yield an IBR number of "1" for this road. The middle example in Figure 8 shows a road with fair surface width, fair drainage adequacy, and fair structural adequacy. These assessments would yield an IBR number of "7" for this road. The bottom example in Figure 8 shows a road with good surface width, good drainage adequacy, and good structural adequacy. These assessments would yield an IBR number of "9" for this road.

Unpaved roads are constructed and used differently throughout Michigan. A narrow, unpaved road with no ditches and very little gravel (low IBR number) may be perfectly acceptable in a short, terminal end of the road network (i.e., , on a road segment that ends at a lake or serves a limited number of unoccupied private properties). However, high-volume unpaved roads that serve agricultural or other industrial activities with heavy trucks and equipment will require wide surface width, good drainage, and a well-designed and well-constructed base structure (high IBR number). Where the unpaved road is and how it is used determines how the road must be constructed and maintained: just because a road has a low IBR number does not necessarily mean that it needs to be upgraded. The IBR number is not an endorsement or indictment of the road's suitability for use, but rather an indication of a road's capabilities to support different traffic volumes and types in all weather.

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 GTCRC - counters at least one of these pavement-damaging forces.

Figure 9: Examples of Reconstruction Treatments. (Left) reconstructing a road and (right) road prepared for full-depth repair.

Reconstruction

Pavement reconstruction treats failing or failed pavements by completely removing the old pavement and base and constructing an entirely new road (Figure 9). Every pavement has to eventually be reconstructed, and it is usually done as a last resort after more cost-effective treatments are completed, 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 25 years and costs $575,000 per centerline mile. The following descriptions outline the main reconstruction treatments used by GTCRC.

Full-Depth Concrete Repair

A full-depth concrete repair removes sections of damaged concrete pavement and replaces it with new concrete of the same dimensions (Figure 9). It is usually performed on isolated deteriorated joint locations or entire slabs that are much further deteriorated than adjacent slabs.

The purpose is 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. This repair lasts approximately 12 years and typically costs $100,000 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 $10,000 per 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 4 inches of new gravel every 15 years at a cost of $25,000 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 rehabilitated with a structural treatment. Examples of structural improvement treatments include HMA overlay, with or without milling, and crush and shape (Figure 10). The following descriptions outline the main structural improvement treatments used by GTCRC.

Figure 10: Examples of Structural Improvements Treatments. (From left) HMA overlay on an un-milled 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 10). 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 5 to 10 years and costs $100,000 to $200,000 per centerline 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 centerline mile to the HMA overlay cost.

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 10). 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 pavement's 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 25 years and cost $575,000 per centerline mile.

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 11). 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 GTCRC.

Figure 11: 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 11). GTCRC 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 2 years and costs $8,000 per centerline 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 GTCRC 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 11). Fog seals are best for good to very good pavements and last approximately 2 years at a cost of $2,000 per centerline 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 11). 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 help 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 5 years and cost $56,000 per centerline 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 11). 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 4 years and costs $40,000 per centerline mile, while a microsurface treatment tends to last for 7 years and costs $50,000 per centerline 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 12). 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 5 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 12). 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 $300 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 12). 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 2 to 4 times per year and each application costs $700 per mile.

Figure 11: Examples of Capital Preventive Maintenance Treatments (continued). (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. GTCRC strives to be innovative with its pavement treatments by looking for ways to prevent pavement damage and save taxpayer dollars.

Crack Relief Layer and Overlay

Crack relief layer and overlay either by first milling the surface or, where feasible, a standard overlay treatment. The crack relief layer is simply a standard Chip Seal applied immediately prior to overlaying with HMA. Overlays can consist of standard superpave mixes or asphalt designed to be placed at less than one-inch in thickness known as HMA-Ultra Thin. The HMA selection is based on the structural needs of the road. The GTCRC's observations are this treatment reduced reflective cracking and prolongs the need for additional preventative maintenance such as crack seal.

Post-Reconstruction Chip and Seal

The GTCRC is proactive in its Preventative Maintenance program and utilizes "Post-Reconstruction Chip Seal." This method chip seals newly reconstructed or crush and shaped roads within two years of the pavement's life. Research has shown this method prolongs the asphalt's flexibility and increases the durability of the asphalt. This reduces the likelihood of transverse cracking later in a pavement's life and reduces future preventative maintenance costs.

Rejuvenators

Rejuvenators are designed to restore lost volatile compound into an HMA surface. As asphalt binder ages, compounds with a higher volatility are lost and the flexibility of the asphalt binder is reduced. This can be seen in typical transverse cracking of an HMA pavement. While the GTCRC has not employed this technique, it is being reviewed for use on high volume roads which are not conducive to a post-reconstruction chip seal. These high-volume roads are generally maintained by frequent mill and resurface projects. The anticipation is rejuvenators will maintain a pavement's flexibility by slowing the aging process and extending the time to mill and fill projects.

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, 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.

1.0 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 GTCRC is responsible for a total of 1021.47 centerline miles of public roads. Maps indicating classification, jurisdiction, and condition are located Appendix A.

1.1 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 GTCRC as either county primary or county Local Roads. State statute prioritizes expenditures on the county Primary Road network.

Of the 1021.47 centerline miles of public roads owned and/or managed by GTCRC, approximately 85% of all County Primary Roads are classified as federal-aid-eligible, which allows them to receive federal funding for their maintenance and construction. Only one percent of County Local Roads are considered federal-aid-eligible, which means state and local funds must be used to manage these roads.

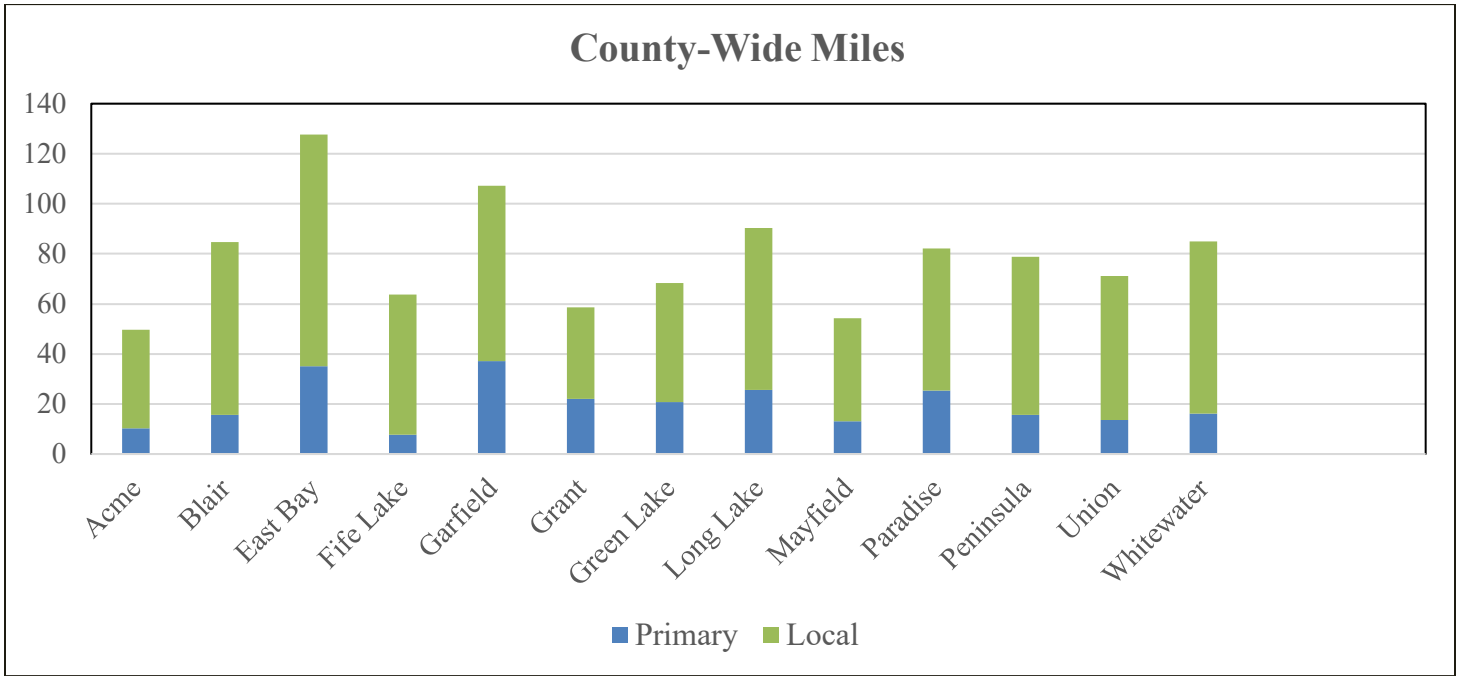

Figure 12: County-Wide by Township

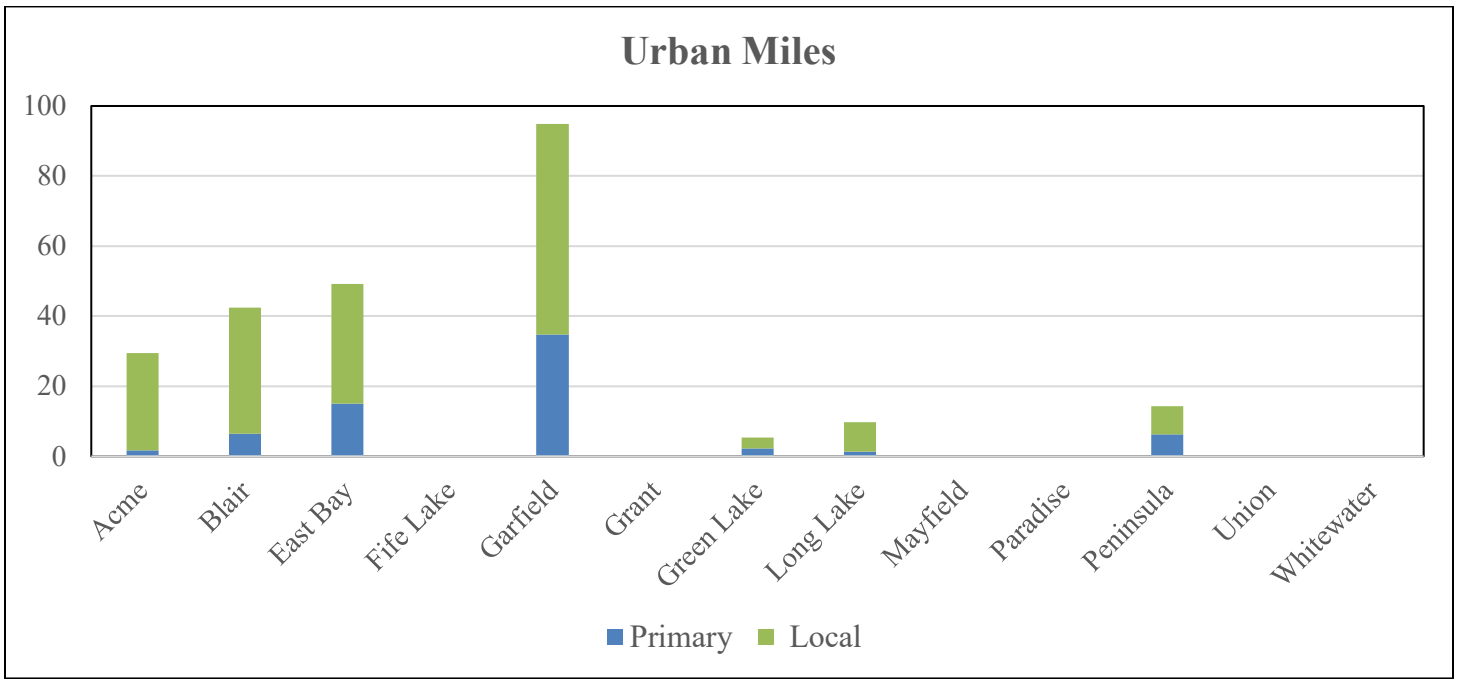

Figure 13: Urban Miles by Township

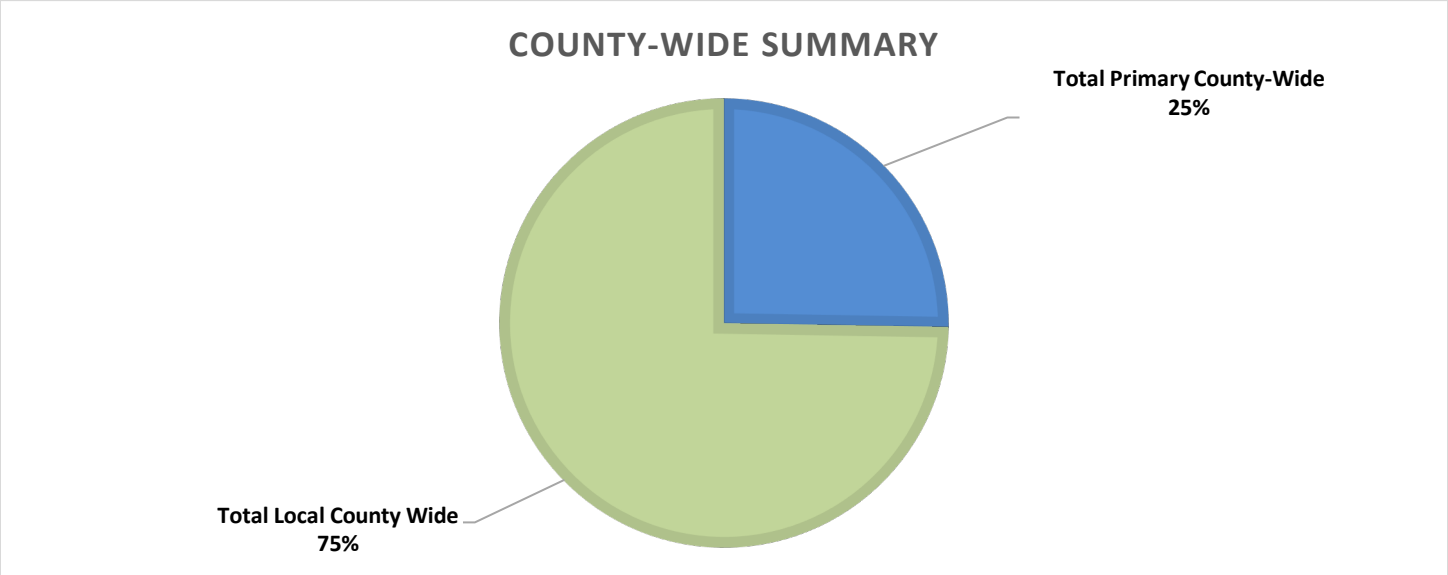

Figure 14: County-Wide Percent Primary and Local

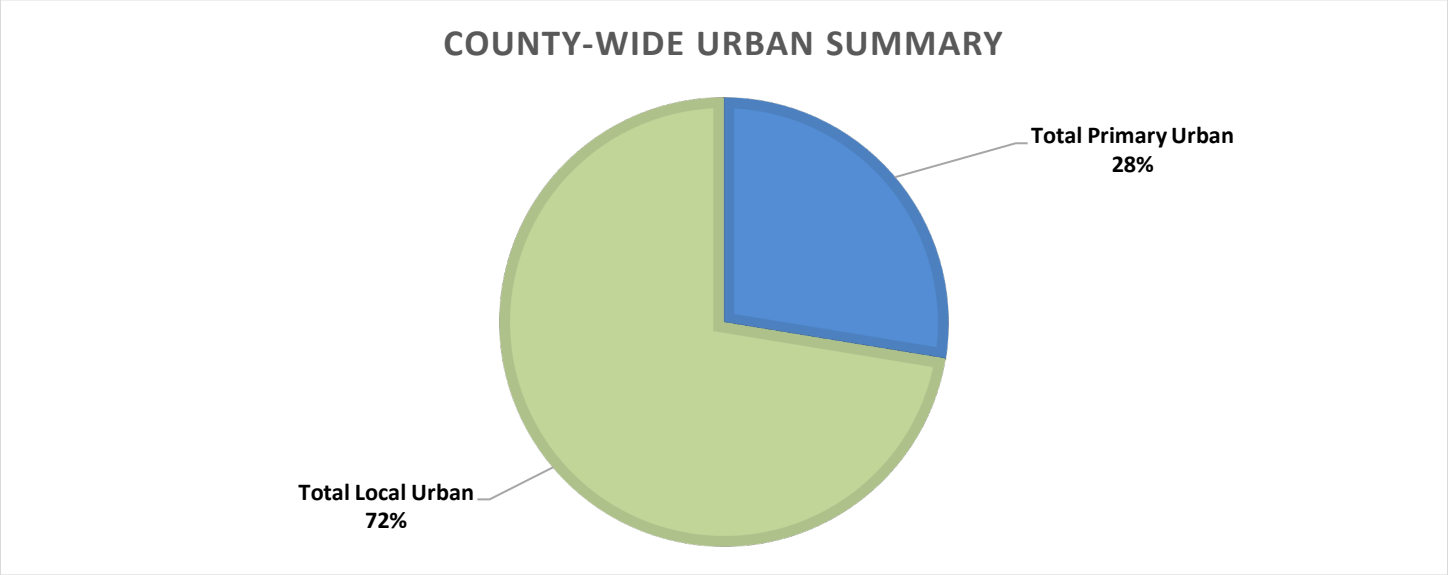

Figure 15: Urban Percent Primary and Local

1.2 Componentized Asset Inventory

Knowledge of the number of miles under the jurisdiction of the GTCRC is an important basis for understanding the current public investment. In order to gain in-depth knowledge about the public investment, we need as much information as possible about the assets. In particular, it is important to understand the types of road surfaces currently maintained. The following table and figure summarize the number of miles in each surface classification, as queried from RoadSoft and established through Act 51 certification maps. It should be noted there are minor discrepancies between certification maps and RoadSoft, which amounts to a difference of 0.16% and does not affect decision-making or projections on asset conditions. These discrepancies are due to varied methods of measurement over time and the amount of error between the two systems is materially insignificant.

Table 8: Mileage by Surface Type

Surface Type (Miles)	Distance (Miles)
Total County Primary and Local	1021.47 (certified)
Lane Miles Maintained under MDOT Contract	225.00
Asphalt	490.14
Sealcoat	183.02
Gravel	93.90
Earth/Unimproved	253.49

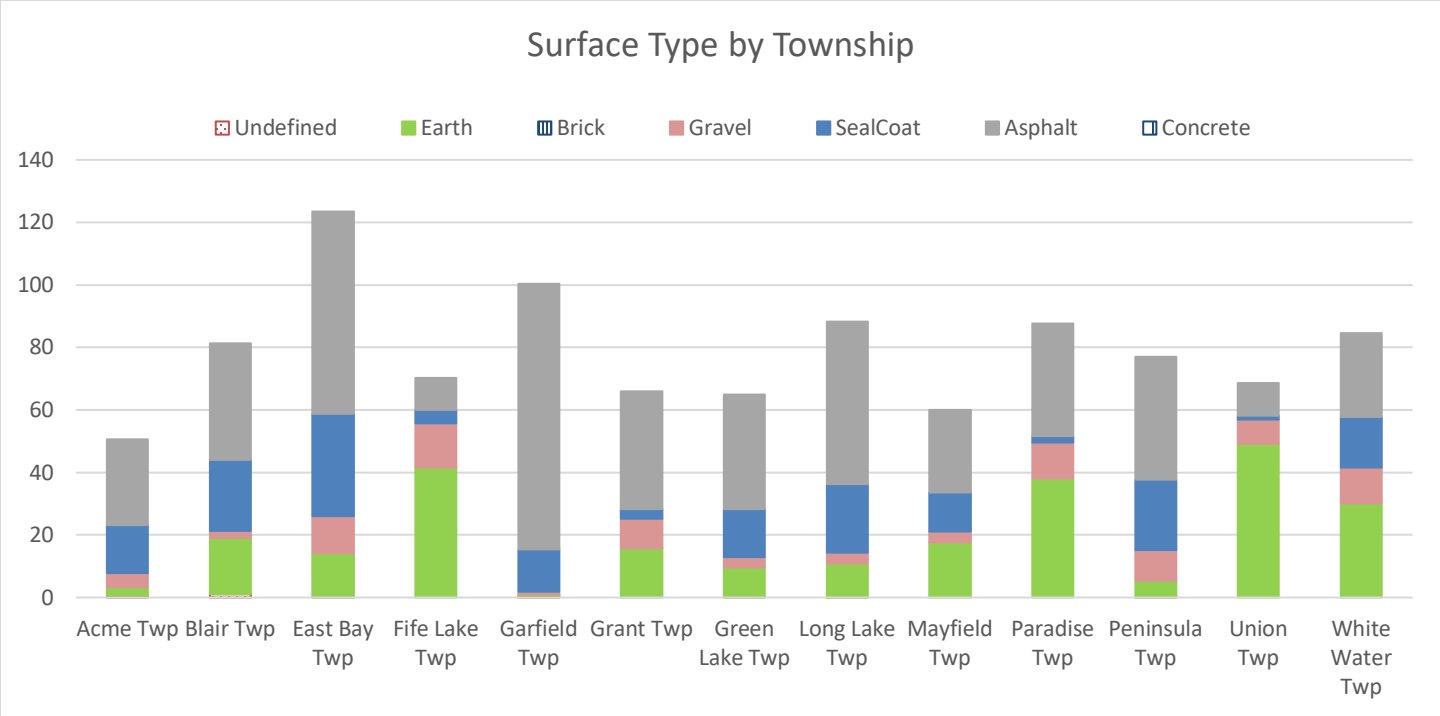

Figure 16: Surface Type by Township

1.3 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. GTCRC 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 GTCRC 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*.

1.4 Paved Roads

GTCRC 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. GTCRC 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.

GTCRC collects 100% of its PASER data every year on all federal-aid-eligible roads. In addition, GTCRC collects 50% of its paved non-federal-aid-eligible network using its own staff and resources.

GTCRC's 2022 paved county Primary Road network has 38% of roads in the TAMC good condition category, 41% in fair, and 21% in poor (Figure 17). The paved county Local Road network has 9% in good, 40% in fair, and 51% in poor (Figure 18).

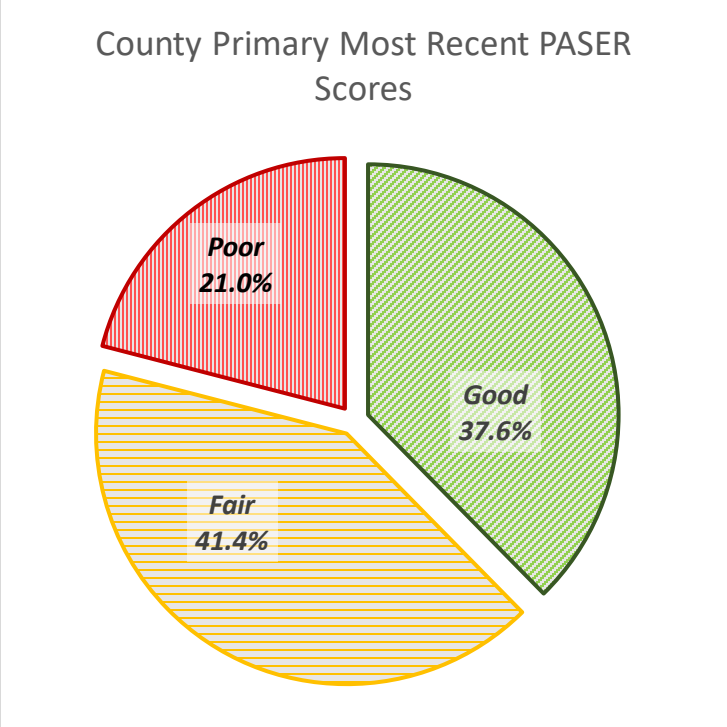

Figure 17: Primary Local Network Conditions

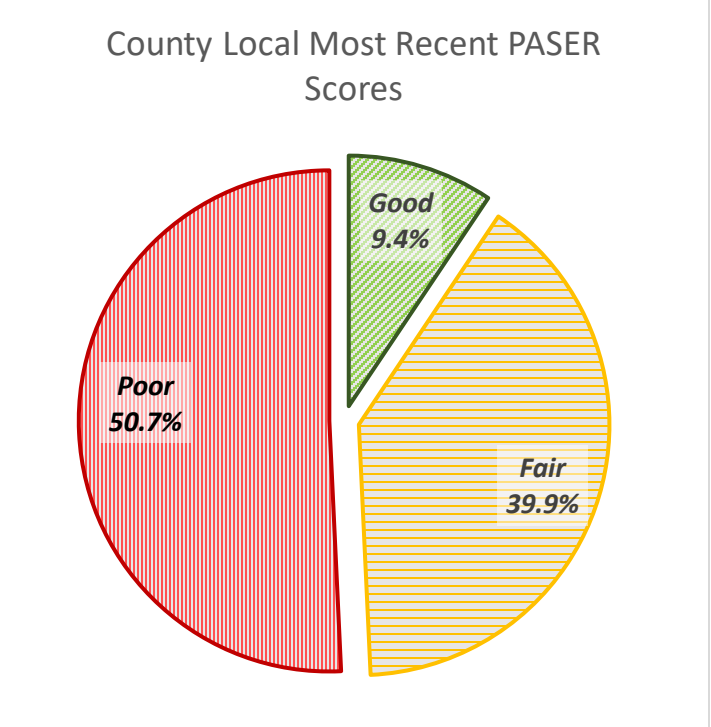

Figure 18: Local Network Conditions

In comparison, the statewide paved county Primary Road network has 21% of roads in the TAMC good condition category, 40% in fair, and 39% in poor (Figure 19). The statewide paved county Local Road network has 16% in good, 30% in fair, and 54% in poor (Figure 20). Comparing Figure 19 and Figure 20 shows that GTCRC's paved county Primary Road network is better than similarly-classified roads in the rest of the state, while Figure 15 and Figure 17 show that GTCRC's paved county Local Road network is slightly 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.

Generally poor roads require reconstruction or major structural improvements such as reconstruction or crush and shapes. Fair roads require preventative maintenance such as HMA Overlays or Chip Seals. Where as good roads require routine maintenance such as Crack Seal.

Act 51 designations of Primary and Local and National Function Classification (Federal Fund eligibility) are not an exact or direct relationship. Though they are close enough for representative comparison and are acknowledged as interchangeable for the purpose of this plan.

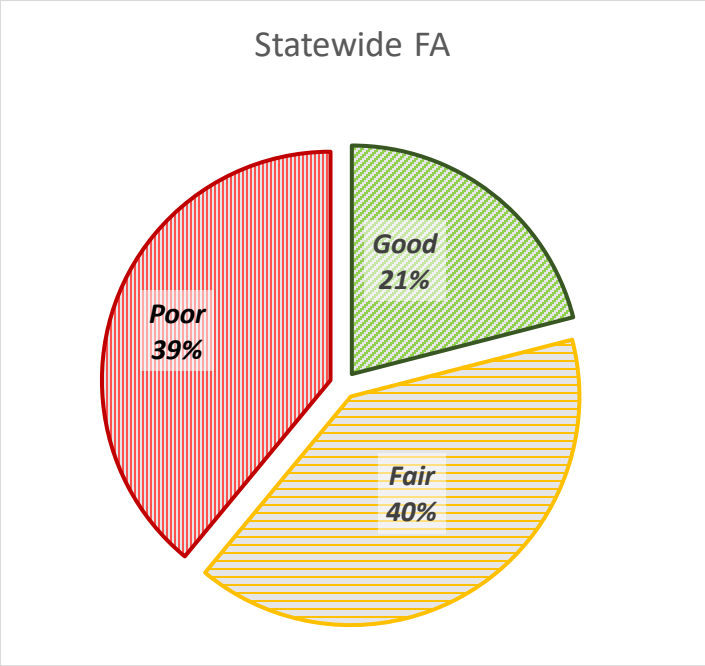

Figure 19: Statewide Federal Aid Conditions

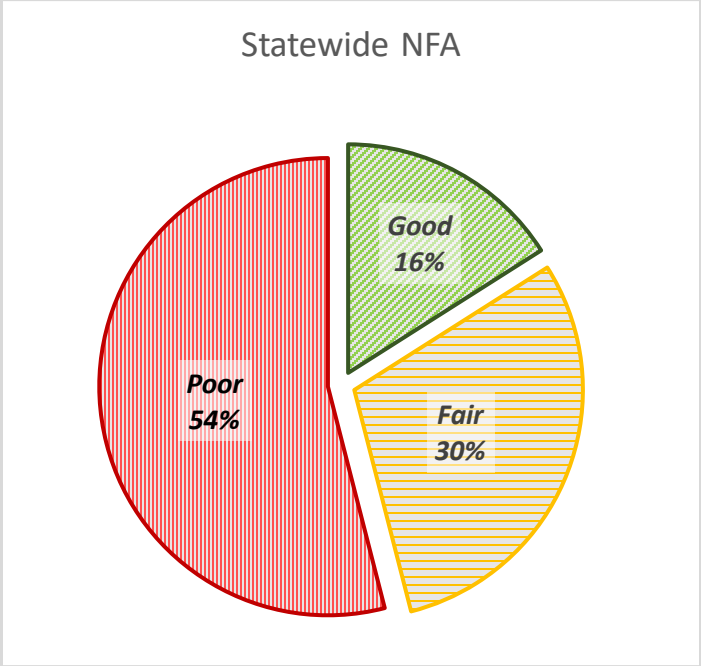

Figure 20: Statewide Non-Federal Aid Conditions

The GTCRC's Primary Road network has seen a steady increase in average PASER ratings since the citizens of Grand Traverse County voted to implement a county-wide road millage. By utilizing asset management techniques for project selection, the Primary Road network has been a focus for the GTCRC. This has resulted in a slight dip in the Local Road network's PASER rating. The GTCRC recognizes the road users do not view the roads as two systems, and some roads in the Local Road network carry more traffic than some roads in the Primary Road system. As a result of a fairly health Primary Road system, and by utilizing asset management techniques to maintain the good and fair roads in the primary network, some focus can now shift to the higher volume Local Roads going forward.

The following figures are a more detailed view of the individual PASER ratings by mile. The GTCRC considers road miles on the transition line between good and fair (PASER 8) and fair and poor (PASER 5) as representing pars of the road network where there is a risk of losing an opportunity to apply less expensive treatments. While this method can seem counter intuitive when there are plenty of poor roads in the network, the increases in service life for a relatively low cost should be focused on. This allows for targeted roads in the poor category to move to the good category where they can be maintained with less expensive maintenance practices.

The following figures utilize the following color key to indicate conditions:

- Green – Good
- Yellow – Fair
- Red – Poor
- Gray - Unrated

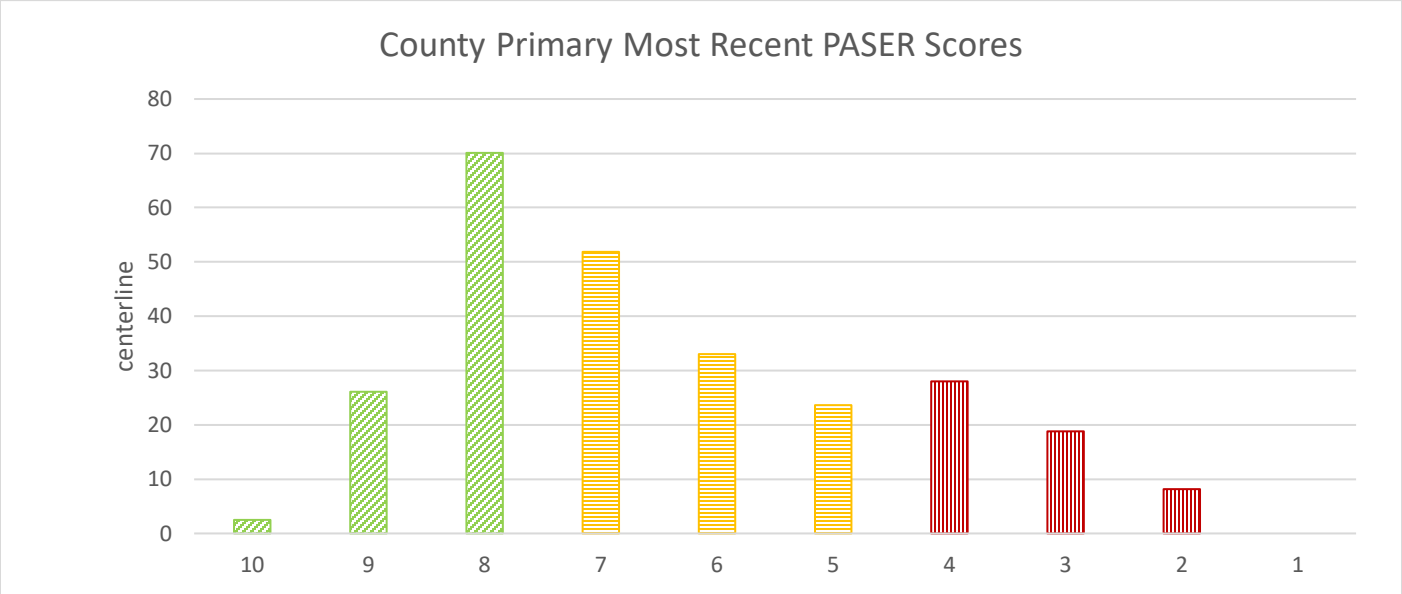

Figure 21: Primary Network PASER

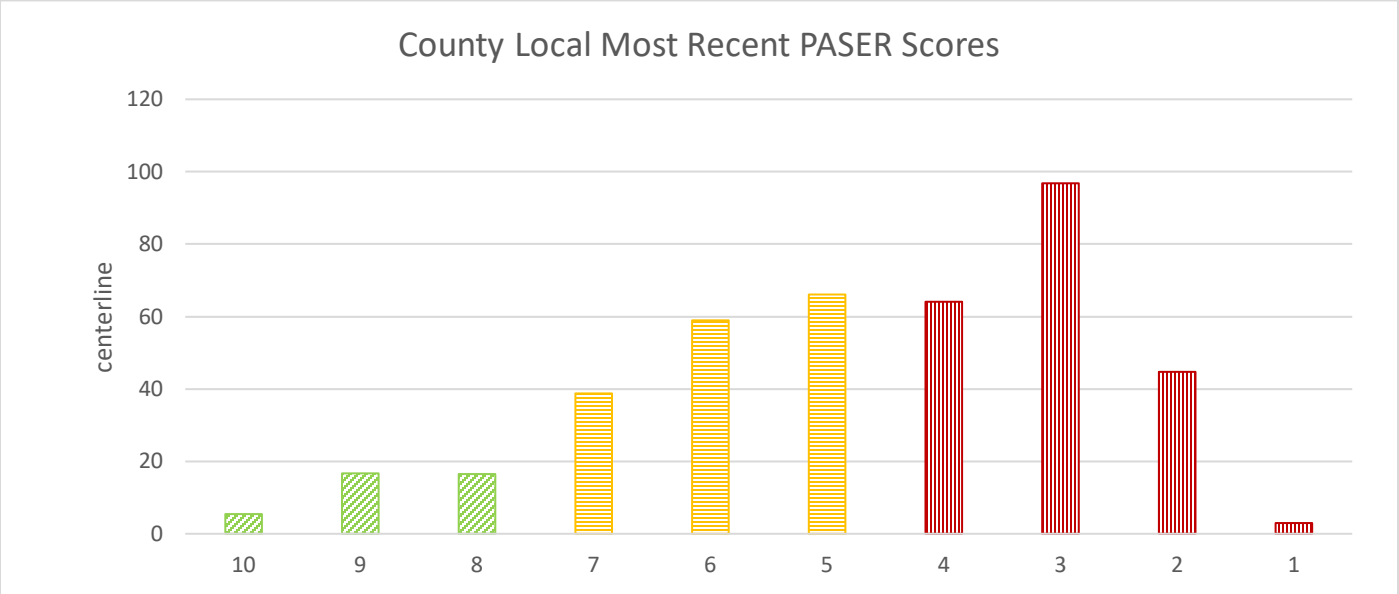

Figure 22: Local Network PASER

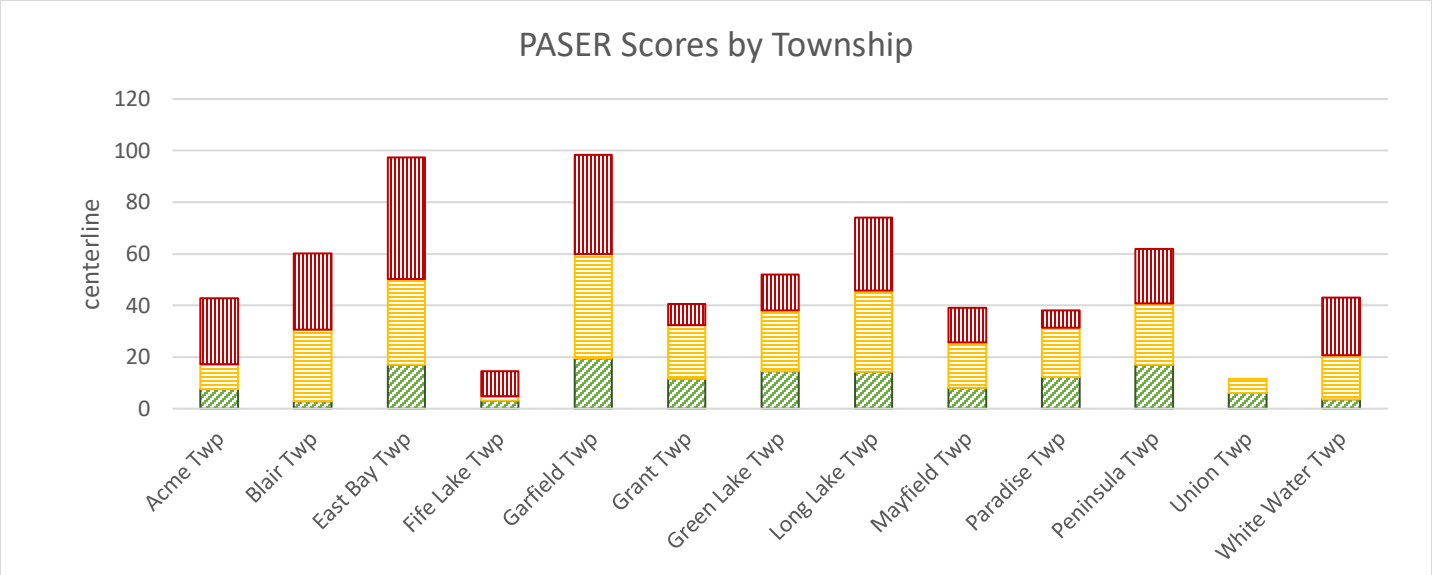

Figure 23: PASER by Township System-Wide

Historically, the overall quality of GTCRC's paved county Primary Roads have been increasing, as can be observed in Figure 24. This is due to the additional millage funds and adherence to asset management principles. Comparing GTCRC's paved county Primary Road condition trends illustrated in Figure 23 with overall statewide condition trends for similarly-classified roads, which are illustrated in Figure 24, shows a different trend locally as in the rest of the state. This highlights the value of the GTCRC's AMP.

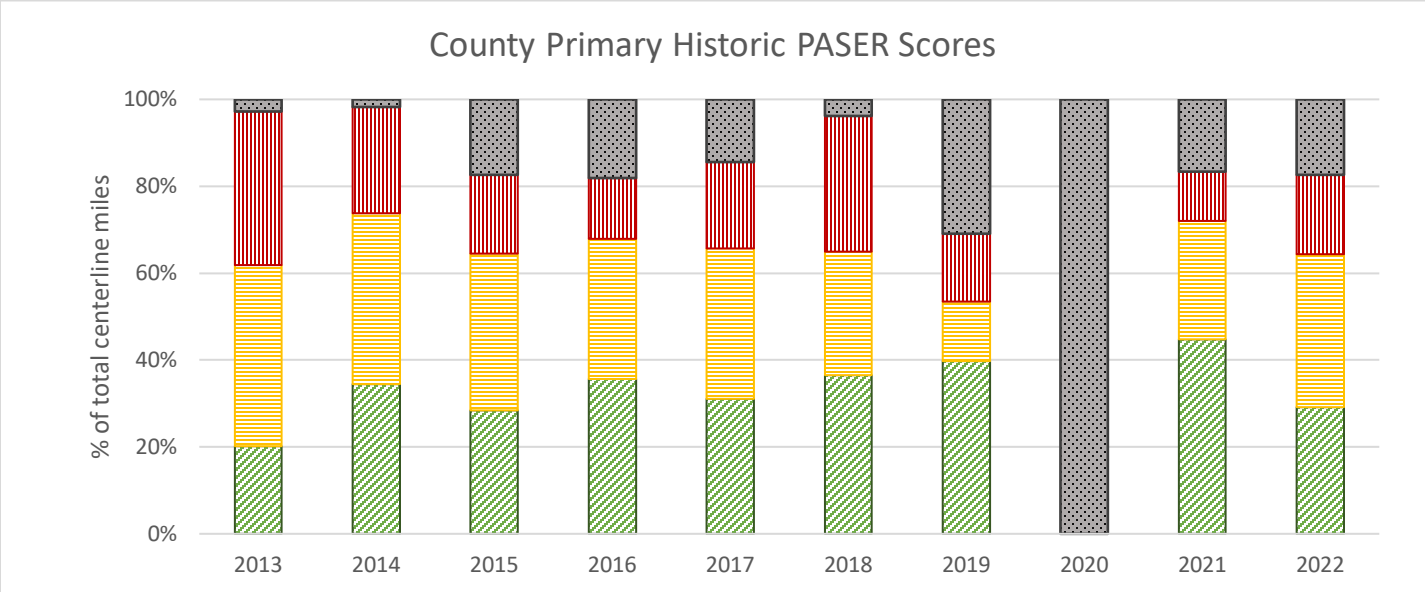

Figure 24: Primary Network Historic PASER Scores

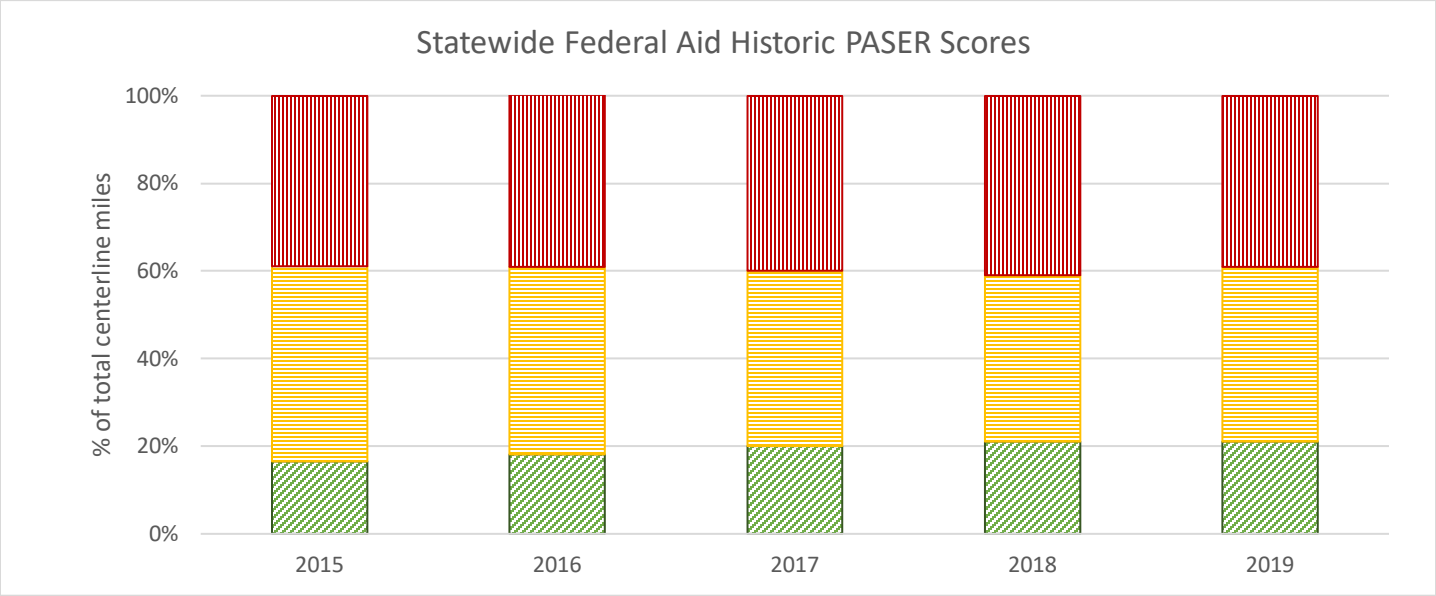

Figure 25: Statewide Historic PASER Scores

Historically, the overall quality of GTCRC's paved county Local Roads have been increasing, but slower than the paved county Primary Road network because they lack a source of state and federal funding and; therefore, must be supported locally. Figure 26 illustrates the condition of the paved county Local Road network in GTCRC while Figure 27 illustrates these conditions statewide.

Comparing GTCRC's paved county Local Road condition trends illustrated in Figure 26 with overall statewide condition trends for all paved county Local Roads illustrated in Figure 25 indicates a similar trend locally as in the rest of the state. The year-to-year variation in the paved county Local Road network is likely due to the fact that only a portion of the network is collected each year, both locally and statewide. This variation is likely a result of reporting bias since a representative sample of roads are not collected each year. The Local Road network was due for evaluation in 2020, but due to unforeseen circumstances this was not able to be performed. The local network is due for evaluation in order to make informed decisions and implement this AMP in an informed manner.

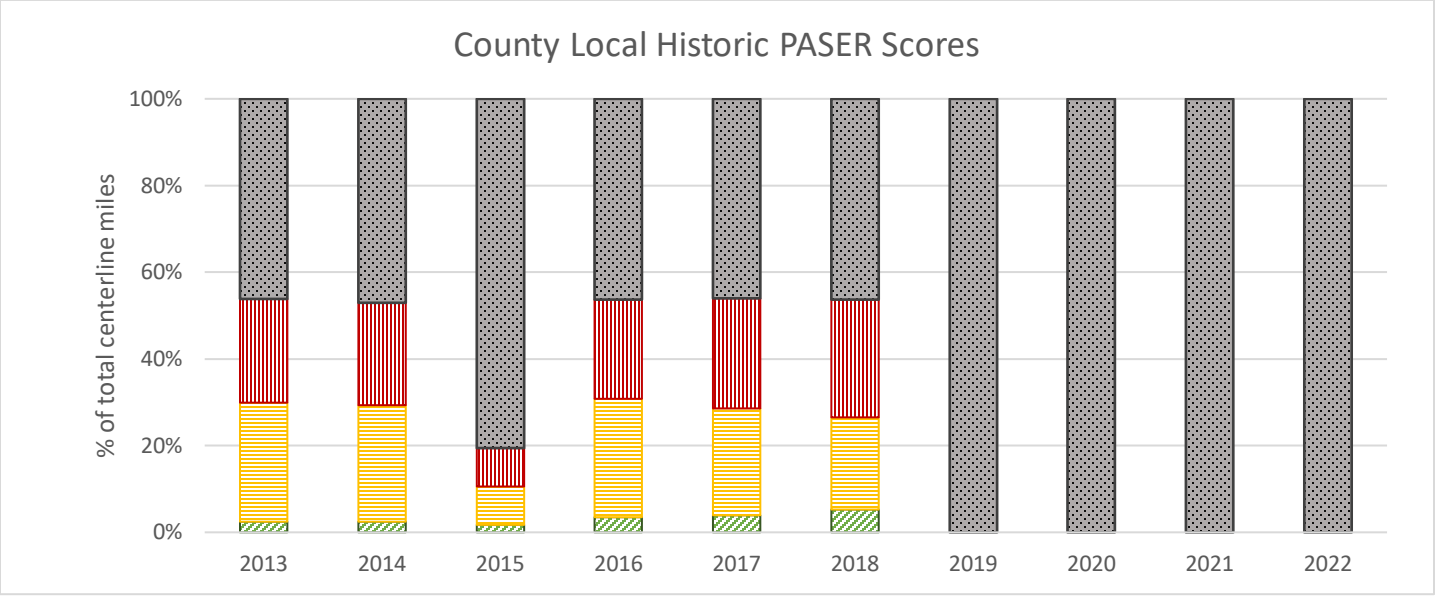

Figure 26: Local Network Historic PASER Scores

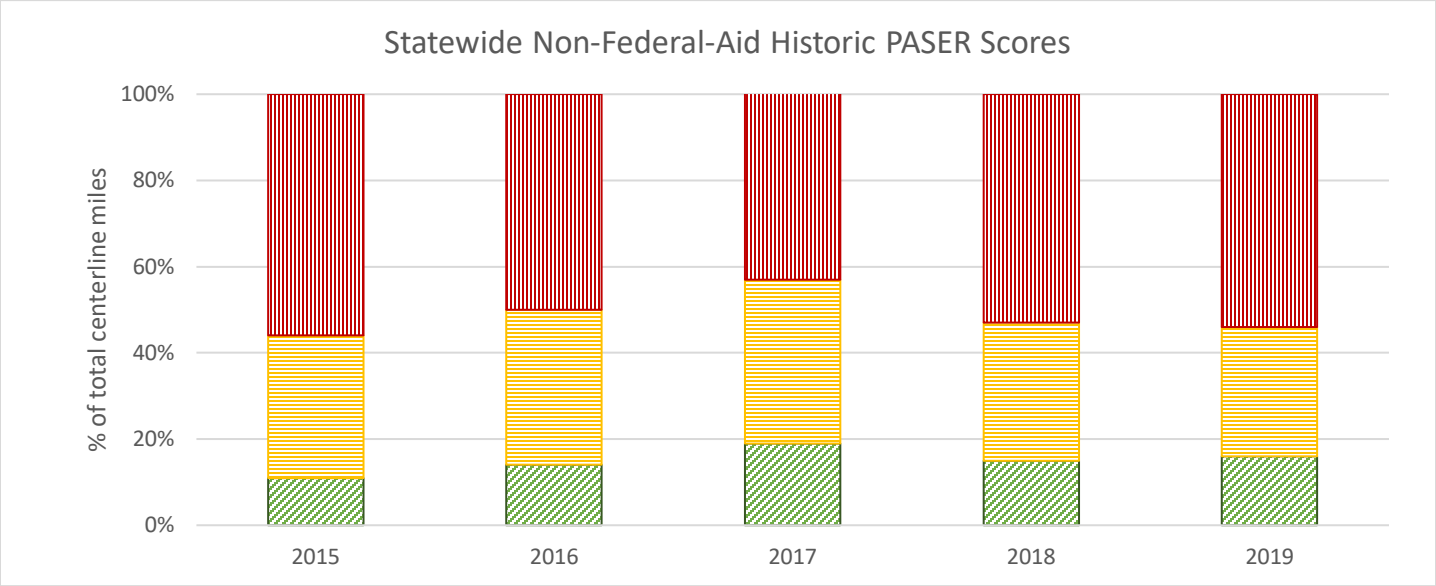

Figure 27: Statewide Non-Federal Aid Historic PASER Scores

1.5 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, and GTCRC uses the IBR System™ for rating its unpaved roads. More information regarding the IBR System™ can be found in Introduction's Pavement Primer.

Depending on the township, some unpaved roads are short terminal road-ends or seasonal roads providing access to state forest lands used for the timber industry or recreation access. In less-developed townships, unpaved roads provide a grid network which supports the agricultural industry. The GTCRC does not provide funds to pave these roads, and funding must be acquired by others.

Figure 28 shows the percentage of unpaved roads in each IBR number ranges of 10, 9, and 8; 7, 6, and 5; and 4, 3, 2, and 1, for all roads. Figure 29 illustrates the miles of unpaved roads in IBR number ranges of 10, 9, and 8; 7, 6, and 5; and 4, 3, 2, and 1, for each township.

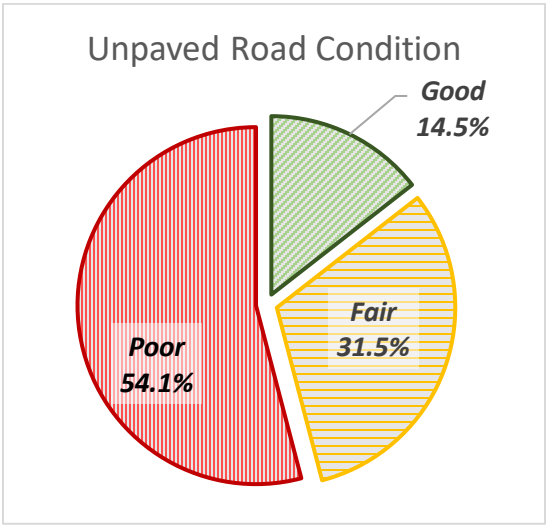

Figure 28: Unpaved Road IBR Scores

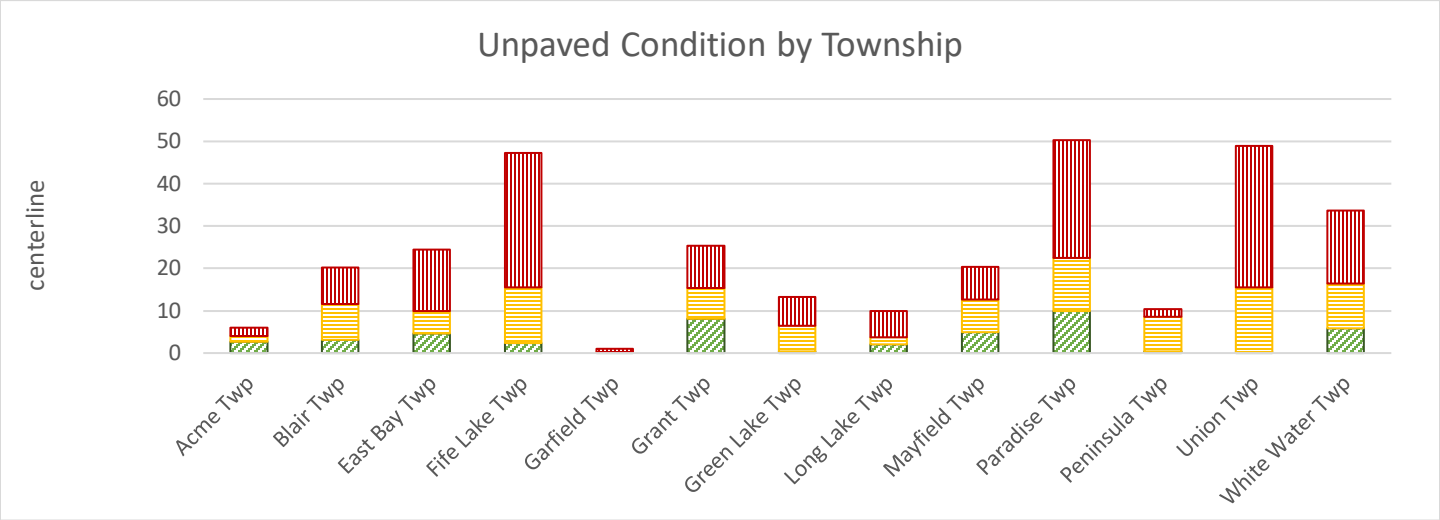

Figure 29: Unpaved Road IBR by Township

1.6 Goals

Goals help set expectations to 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. GTCRC is not able to fully control any of these factors due to seasonal weather changes, traffic pattern changes, and its limited budget. In spite of 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 *1.10 - Pavement Assets*: *Gap Analysis* section of this plan.

<u>Goals for Paved County Primary Roads</u>

The overall goal for GTCRC's paved county Primary Road network is to maintain or improve road conditions network-wide at 2022 levels. The baseline condition for this goal is illustrated in Figure 30.

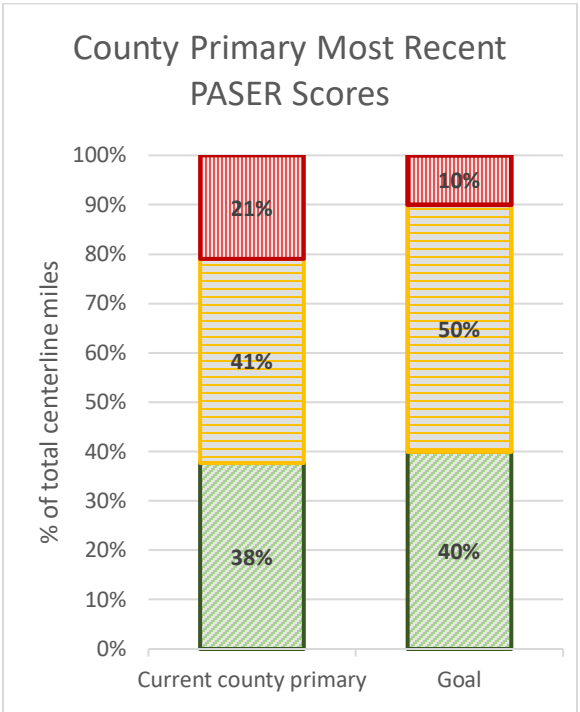

Figure 30: Primary Road Current Conditions by Good/Fair/Poor Percentage and Goal Percentages

The GTCRC previously had a goal of 20% or Primary Roads in the poor PASER category. Recently this topic has been discussed at the state level, and agencies have entertained that the percentage of Primary Roads in the poor category should be 10%. The GTCRC has adopted this goal administratively.

GTCRC'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 approximately ten percent of paved county Primary Roads out of the poor category.

Goals for Paved County Local Roads

The overall goal for GTCRC's paved county Local Road network is to improve road conditions network-wide beyond 2022 levels. The baseline condition for this goal is illustrated in Figure 31. Prior AMPs have had the goal of all GTCRC roads to be 80% good/fair. This goal at current funding levels is not likely to be realized. In order to prioritize Local Roads, those which provide the most benefit the network and road users, the GTCRC has adopted a Local Road match policy. The Local Road network is made up by approximately 264 centerline miles of subdivision roads. This is approximately 35% of the Local Road network and, without participation from Township by Special Assessment Districts or other funding sources, the Local Road network will not meet the goal of 80% good/fair. The GTCRC Local Road match policy can be found in Appendix B. Absent the subdivision road system, there are approximately 500 miles of Local Roads with 180 miles of these roads having a sealed surface. The GTCRC intends to focus on these 180 miles of Local Roads and has classified them as "major local" roads. The following chart provides the current conditions of these Local Roads which make up the 180 miles of roads to be included in this AMP, compared to the GTCRC's goal.

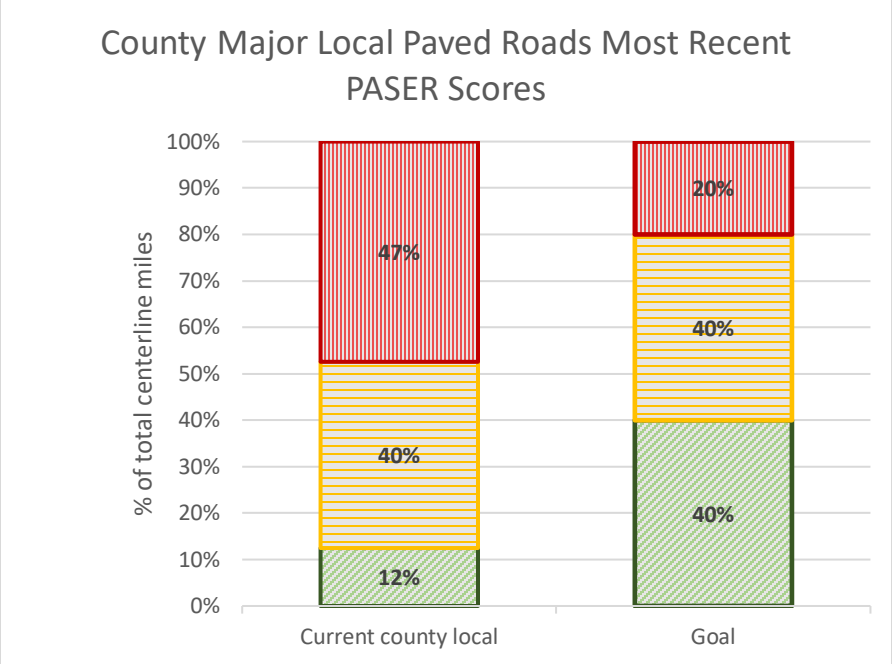

Figure 31: Non-Subdivision Paved Local Road Condition and Goal

Goals for Unpaved Road

The overall goal for GTCRC's unpaved road network is to maintain or improve road conditions network-wide at 2022 levels. The baseline condition for this goal is illustrated in Figure 31. 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, 45.9% of GTCRC's year-round unpaved roads have good or fair structural adequacy and 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 first address drainage issues and then structural issues. The GTCRC Local Roads policy in Appendix B addresses funding sources for unpaved roads. 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.

1.7 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, GTCRC 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 conditions that preservation treatments have affected.

GTCRC 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 GTCRC's financial resources can be found in the *2.0 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 *Introduction to this Pavement* .

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). 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 9 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. Beyond the physical aspects of project selection, partnering agencies may have local priority projects. When these projects align with asset management principles, the GTCRC is willing to prioritize Local Agency desires. Often these projects are accomplished with other sources of funding, and target roads that may be further down the priority list when considering solely road data.

Table 9: Service Life Extension (in years) for Pavement Types Gained by Fix Type Mileage by Surface Type[1] – (This is to be used as a guide for treatment selection)

	Life Extension (in years)*			
Fix Type	**Flexible**	**Composite**	**Rigid**	**PASER**
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 (i.e., 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.

1.8 Forecasting Future Trends

There are two methods for forecasting future trends in pavement conditions. A method by the National Center for Pavement Preservation (NCPP) provides an overall indicator of the impact selected fixes have on the network. An example and description of this method is included as Appendix C. The second method is software such as RoadSoft. RoadSoft is developed by Michigan Technological University and is available at no additional cost to local agencies. RoadSoft utilizes network level pavement data to drive deterioration models which forecast future road conditions based on planned projects. Deterioration of pavement is predicted based on empirical equations which are compared to PASER scores. This allows agencies to assign deterioration curves to specific fixes and pavement structures. The NCPP is best used with smaller networks or data sets and RoadSoft for larger system-wide evaluation. The GTCRC utilizes RoadSoft to prepare future predictions based on different budget scenarios. This provides budget goals based on PASER scores to optimize future conditions. The GTCRC has recognized this prediction does not take into account all the aspects of a roads condition and, as such, uses the NCPP method to evaluate a particular year's project list to optimize a more comprehensive mix of fixes. Within each broad category - Preventative Maintenance, Rehabilitation, and Reconstruction - there are multiple fixes that can be used based on many factors and engineering judgement. Figure below is a screenshot of the RoadSoft model utilized by the GTCRC.

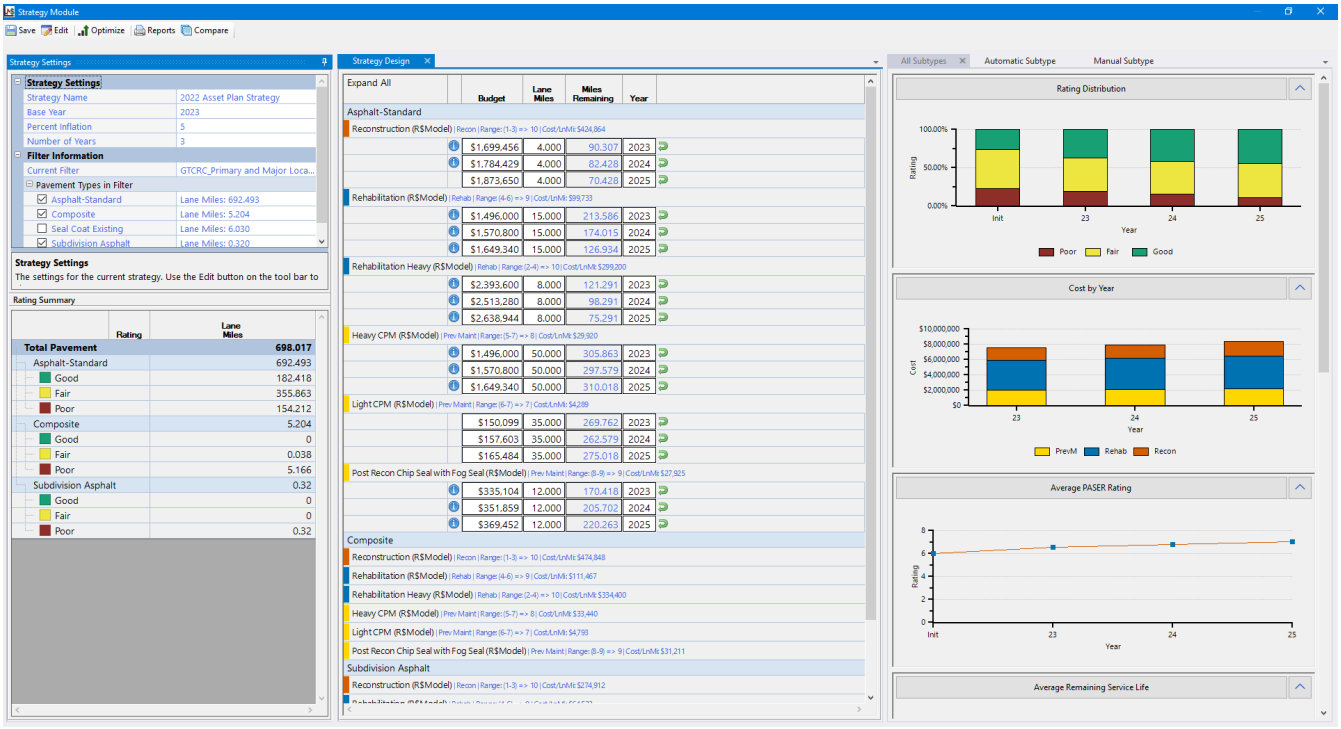

Figure 32: RoadSoft Strategy

The table below provides the categories the GTCRC uses to predict budget impact on the road network. The GTCRC utilize different treatments that fall withing the fix categories in Table 10. Table 11 below lists these fixes which are assigned following a review of each road during the planning phase for the next years projects. This list is not exhaustive and when appropriate additional methods may be employed.

Table 10: RoadSoft Model Fixes

Treatment Name	Annual Miles of Treatment	Years of Life	Trigger Range, Rest
Reconstruction	0-2	25	1-3, 10
Rehabilitation Heavy	0-4	25	2-3, 10
Rehabilitation	0-8	15	4-6, 9
Heavy CPM	10-25	7	5-7, 8
Light CPM	10-20	2	6-7, 7
Post Recon Chip Seal	0-16	10	8-9, 9

Table 11: GTCRC Standard Mix of Fixes

Treatment Name	$/Mile	Years of Life
Reconstruction	575,000 to 800,000	25
Rehabilitation Heavy		
Crush and Shape	575,000 to 750,000	25
2" HMA Overlay	150,000	11
Crack Relief Layer and 1.5" HMA Overlay	171,200	12
Rehabilitation		
1.5" HMA Overlay	120,000	10
Crack Relief Layer and HMA Ultra-Thin Overlay	104,000	9
Heavy CPM		
Crack Seal and Chip Seal	58,000	5
HMA Wedge and Chip Seal	119,000	9
HMA Ultra-Thin	60,000	7
CPM		
Crack Seal	6,800	2-3
Post Reconstruction Chip Seal	51,200	10

The RoadSoft model for budgeting purposes use the highest cost per mile for the respective categories. This allows budgeting for assets such as the support system, or safety upgrades while still improving the network surface condition. Using the highest value per category limits, RoadSoft utilizes the cheapest fix for a given PASER rating, as this is not always the best fix and engineering judgement must be used.

The GTCRC uses ESRI GIS mapping software and reviews and assigns specific fixes, primarily from Table 11, to primary and major Local Roads. These fixes are assigned to specific road segments, and the data is stored in ESRI's GIS database. This allows the GTCRC to query the ESRI database in Microsoft Excel and use the NCPP Method to refine the project selection and ensure a particular year's pavement improvement plan is giving the best return on the investment. An example of this method from previous project selection years is provided below.

Prop Fix	Fix Type	PASER Trigger	Miles Available	Target Miles	Miles Selected	$/Mile	Years Added	Target Budget	Selected Budget	Target Total Gain	Total Gain
1	Crack Seal	7	14.15	14.15	14.15	$ 3,880.00	3	$ 54,917.52	$ 54,917.52	42.5	42.5
2	Crack Seal & Chip Seal	5-7	46.86	46.86	46.86	$ 36,095.00	5	$ 1,691,339.51	$ 1,691,339.51	234.3	234.3
3	C&S, HMA-wdn for pvd shld	2-4	15.46	2.59	0.64	$ 349,825.30	25	$ 907,437.24	$ 223,538	64.8	16.0
4	crck rlf lyr & Ultra-thin	4-5	0.54	0.54	0.54	$ 86,189.45	9	$ 46,456.11	$ 46,456.11	4.9	4.9
5	Ultra-Thin	4-5	0.00	0.00	0.00	$ 53,974.45	9	$ -	$ -	0.0	0.0
6	1.5" HMA Overlay	3-5	0.00	0.00	0.00	$ 86,383.98	10	$ -	$ -	0.0	0.0
7	HMA wedge(s) & Chip Seal	3-5	3.07	3.07	3.07	$ 86,267.00	9	$ 264,839.69	$ 264,839.69	27.6	27.6
8	C&S w/ HMA	1-3	0.00	0.00	0.00	$ -	25	$ -	$ -	0.0	0.0
9	crck rlf lyr & HMA Overlay	3-5	10.55	10.55	10.55	$ 118,598.98	12	$ 1,250,626.24	$ 1,250,626.24	126.5	126.5
10	trench add HMA shld, chip seal	5-6	0.84	0.00	0.00	$ 180,625.98	5	$ -	$ -	0.0	0.0
11	2" HMA Overlay	5-7	0.99	0.99	0.99	$ 113,633.93	11	$ 112,838.49	$ 112,838.49	10.9	10.9
12	Post Recon Chip Seal	8-9	23.15	23.15	23.15	$ 32,215.00	10	$ 745,745.04	$ 745,745.04	231.5	231.5
13	No Work Needed	NA	128.24	NA	NA	$ -	0	$ -	$ -	NA	NA
			243.84	78.75	76.80						
	Millage	$ 4,500,000.00				Target Total Gain Sum				743.0	Target Total Yrs Gained
	Fed Aid	$ 574,199.85				Target Sum		$ 5,074,199.85	$ 4,390,300.97	694.2	Selected Total Yrs Gained
						Budget		$ 5,074,199.85	$ 5,074,199.85	243.8	Total Yrs Needed
						Balance		$ -	$ 683,898.88	450.3	Balance
	Total	$ 5,074,199.85									

Figure 33: GTCRC NCPP Example

The GTCRC method utilizes the strengths of RoadSoft and the NCPP method to determine future projects and apply the correct fixes at the appropriate time, while being able to quickly determine the given years plan is fiscally responsible.

1.9 Planned Projects

GTCRC 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 Public Act 499 of 2002 (later amended by Public Act 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 GTCRC to alter initial plans. Project planning information is used to predict the future condition of the road networks that GTCRC maintains. The Pavement Assets: Modelled Trends section of this plan provides a detailed analysis of the impact of the proposed projects on their respective road networks.

The proposed project maps for the next three years are provided in Appendix D. This list was determined utilizing the RoadSoft project selection tool and will be refined as described in the Forecasting Future Trends section above as is subject to change.

1.10 Gap Analysis

The current funding levels that GTCRC receives are not sufficient to meet all the goals for the paved county Primary Road network, the paved county Local Road network, and the Unpaved Road network. The Pavement Assets: Goals (1.06) section of this plan provides further detail about the goals, and the Pavement Assets: Modelled Trends (1.07) section provides further detail on the shortfall given the current budget. However, GTCRC believes that the overall condition of its network can be improved with the current funding for construction and maintenance, with the exclusion of subdivision roads. The GTCRC's Local Road match policy omits the use of GTCRC funds on subdivision roads. With this exclusion the goals for the paved county Primary Road network can be accomplished and improvements made on some of the paved county Local Road network and some of the Unpaved Road network. The GTCRC recognizes the absence of subdivision roads in this plan will not allow for the Local Road network goals to be met. Subdivision improvements will rely on alternative sources of funds. Appendix E contains the RoadSoft Strategy reports for review. The reports are derived by evaluating the Primary Road network and major Local Roads, as described in the Goals for Local Roads section of this report, as a complete system. Future maintenance activities are assigned to the network using the model budgets. The Primary and Local networks can then be evaluated individually by importing the scheduled activities into their respective network. This allows the GTCRC to review budget decisions across the road network as it functions in the real world and employ asset management principles to those roads which impact the motoring public the most. The results predict the GTCRC will be able to meet and maintain the Primary Road network goal of 90% good and fair, but the Local Road network will continue to deteriorate, except for the 180 miles of Local Road discussed above. The table below shows the additional activities needed to achieve the goal of 80% of paved Local Roads to be rated good/fair.

Table 12: Local Road Treatments to Meet Goal

Treatment	Annual Miles of Treatment	Years of Life	Trigger, Rest
Rehabilitation Heavy	0-10	25	2-4, 10
Rehabilitation	0-37	12	4-6, 9
Heavy CMP	0-60	5	5-7, 8
Light CMP	0-19	3	6-7, 7
Post Recon Chip Seal	0-123	10	8-9, 9

To fund the construction and maintenance activities in Table 9 ,the GTCRC would need to invest $8,000,000 annually into the paved Local Road network over the next ten years. The RoadSoft report detailing this work can be found in Appendix F.

2.0 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. GTCRC 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 on our website at https://gtcrc.org/217/Financial-Dashboard, or by request submitted to our agency contact (listed in this plan).

GTCRC has a projected budget for pavement asset management of $7,500,000 per year.

Historical spending on construction projects can be found in Figure 3: Road Improvement Expenditures. The amounts reported in Figure 3 include funds for bridge improvements, capacity improvements, traffic signal upgrades, safety projects, and pavement improvement projects.

2.1 County Primary and Local Major Network

GTCRC has historically spent $10,750,000 annually on pavement-related projects. Over the next three years, GTCRC plans to spend $7,500,000 on county primary and local major-network projects consisting of, but not limited to, reconstruction, overlay, culvert replacement, and preventive maintenance. Spending on projects depends on revenue from MTF, bonds, millages, and federal/state programs. While this may appear like a reduction in spending on asset improvements. It is due to an increased need in the support system, such as traffic signal upgrades, capacity improvements, and safety related projects all of which support the road network. The GTCRC has also increased the amount of routine maintenance activities such as ditching and unpaved road grading.

2.2 County Local Network

GTCRC has historically budgeted $500,000 annually on pavement-related projects. Over the next three years, GTCRC plans to spend $1,000,000 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 MTF, millages, and township contributions. Projects will be based on the GTCRC's Local Road Match Policy.

3.0 Risk of Failure Analysis

Transportation infrastructure is designed to be resilient. The system of interconnecting roads and bridges maintained by GTCRC 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. The key transportation links in GTCRC'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:

- South Airport Road
- Hammond Road
- Cedar Run Road
- Beitner/Keystone Road
- Garfield Road
- Three Mile Road
- Silver Lake Road
- Supply Road
- North Long Lake Road
- Williamsburg Road.

These roadways are high volume links to rural communities that commute to the Traverse City area for employment and shopping. Closure of these links creates lengthy detours and delays on other roads which currently operate at or near capacity.

4.0 Coordination with Other Entities

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

4.1 Example Coordinated Planning Text

GTCRC right-of-way contains drinking water, sanitary, and storm sewer assets in addition to transportation assets. GTCRC does not have authority over all these major assets.

GTCRC 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 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.
- Road reconstruction projects will not be completed until agency owned subsurface utilities are upgraded to have at least a 40 years of remaining service life.

4.2 Example Summit Text

Annually GTCRC convenes an infrastructure planning summit in the first quarter of the year. Representatives from all of the major public and private infrastructure owners that have assets in the road right-of-way are provided notice for the meeting and are invited to attend. An attempt is made to coordinate the schedule of the event to allow the majority of infrastructure owners to attend.

GTCRC provides all attendees of the infrastructure planning summit with a list of all planned road projects for the next three years that include new pavement structure. Infrastructure owners are encouraged to discuss planned projects that would disrupt transportation services or cause damage to pavements. Projects which may cause damage to pavements in good or fair condition are discussed and mitigation measures are proposed to minimize the impact to pavements. Mitigation measures could include rescheduling and coordinating projects to maximize value and minimize disruptions and cost to the public.

Grand Traverse County Road Commission
2022 Bridge
Asset Management Plan

Portions of this section
were completed by
OHM Advisors

1.0 Purpose

The Grand Traverse County Road Commission (GTCRC) seeks to implement a cost-effective program of preventive maintenance to maximize the useful service life of the local bridges under its jurisdiction.

The Road Commission recognizes that limited funds are available for improving the bridge network. Preventive maintenance is a more effective use of these funds than the costly alternative of major rehabilitation or replacement, and we seek to identify those bridges that will benefit from a planned maintenance program.

2.0 Goal

The goal of the program is the preservation of the Road Commission's bridge network.

3.0 Performance Measure

The plan will monitor and report the annual change in the number of its bridges and culverts rated fair/good (5 or higher) and the annual change in the number of structurally deficient bridges.

3.1 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 six-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.)

Figure 34: Girder Bridge

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

The most common bridge design is the **girder system** (Figure 34). With this design, the bridge deck transfers vehicle loads to girders (or beams) that, in turn, transfer the load to the piers or abutments.

A similar design that lacks girders (or beams) is a **slab bridge** (Figure 35). A slab bridge transfers the vehicle load directly to the abutments and, if necessary, piers.

Figure 35: Slab Bridge

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 36). Structural members may consist of steel tubes or angles connected at joints with gusset plates.

Another common bridge design in Michigan is the three-sided pre-cast box or arch bridge (Figure 37).

Michigan is also home to several unique bridge designs.

Figure 36: Truss Bridge

Adding another layer of complexity to bridge typing is the primary construction materials used. 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 37: Three-Sided Box Bridge

Figure 60: Examples of Common Bridge Construction Materials Used in Michigan

3.2 Bridge Condition

Michigan inspectors rate bridge condition on a 0-9 scale known as the National Bridge Inventory (NBI) rating scale (see Table 13 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 13: 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

3.3 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 rebuilding a bridge at the same location (Figure 39).

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.

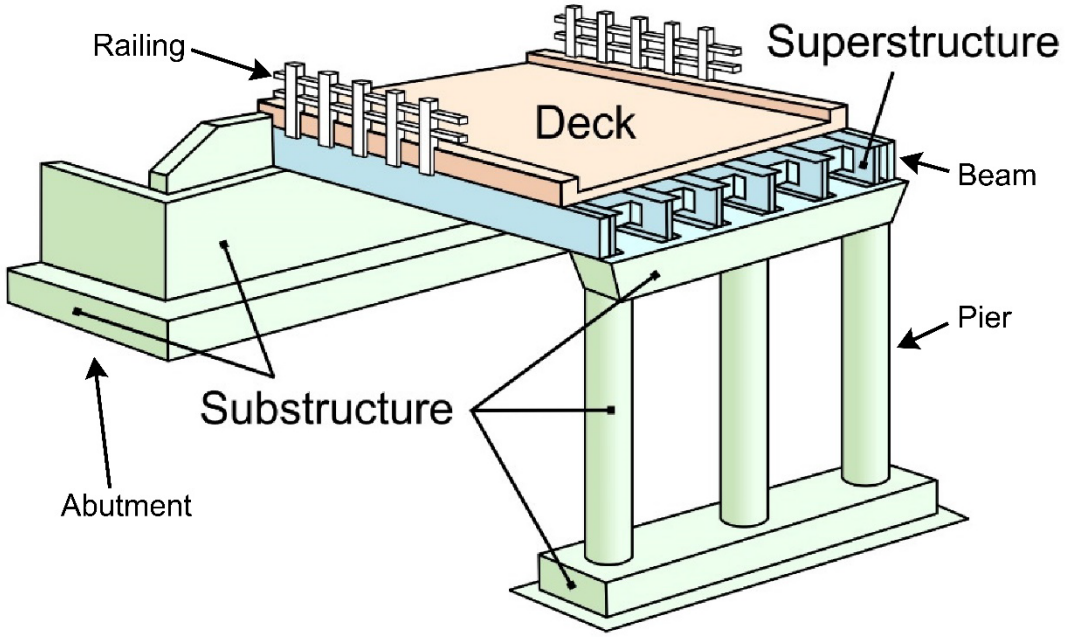

Figure 39: Diagram of Basic Elements of a Bridge

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 39). 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 39). In the case of steel beams, it is performed if there is 25% 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% 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% 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 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% 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% 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 5 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 two and five percent of the deck surface that 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:** Repainting a bridge structure can either be done in totality or in part. Total repainting 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 repainting can either consist of zone repainting, which is a preventive maintenance technique, or spot repainting, which is scheduled maintenance (see below). Zone repainting is done when less than 15% 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.

- **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.

4.0 Bridge Assets

The Road Commission in 2021 had 20 local bridges on its NBI inventory. In 2022, four non-NBI structures, less than 20 feet in length have been added to the MiBridge inventory, for a total of 5 non-NBI structures.

The bridge inventory data was obtained from MDOT MiBridge and other sources, and the 2021 condition data and maintenance actions are taken from the inspector's summary report (see Appendix A). Condition data for the bridges will be updated with inspections that are due in September 2022.

A summary and distribution of the bridge population is presented in the following table:

Table 14: Bridge Summary

	Number of Bridges, NBI				2021 Condition		
Bridge Type	**Total**	**Structural Deficiency**	**Posted**	**Closed**	**Poor/ Serious**	**Fair**	**Good**
Precast Concrete Box/ Arches	5	0	0	0	0	1	4
Prestressed Concrete-Box/ I-beams,	4	1	1	0	1	0	3
Timber Deck Slab	2	0	0	0	0	1	1
Steel - Culvert	8	1	0	0	1	2	5
Steel – Multi-stringer	1	0	0	0	0	0	1
Total	**20**	**2**	**1**	**0**	**2**	**4**	**14**
Percentage (%)		**10%**	**5%**	**0**	**10%**	**20%**	**70%**

Of the Road Commission's 20 NBI structures, 4 are precast/prestressed concrete bridges, 1 is a steel multi-stringer bridge, 8 are steel multi-pipe culverts, 5 are precast concrete arch or three-sided culverts, and 2 are timber nail laminated deck bridges. The distribution of overall condition is 2 (10%) are serious, 4 (20%) are fair ,and 14 (70%) are good.

The Road Commission bridge inventory includes two structurally deficient bridges. One of those is funded for superstructure replacement in 2024 and the other has an application for funding submitted for 2025 construction.

Statewide, MDOT's statistics for Local Agency bridges show that 14% are poor/serious and 86% are good/fair, with 15% of Local Agency bridges being classified as structurally deficient. The Road Commission has 90% of its bridges in fair/good condition and is therefore just above the statewide conditions, however, should be in better condition after completion of the bridge projects in 2024 and 2025 (if funded).

Some of the bridges require 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.

The Road Commission's objective in formulating this preservation plan is to maintain 95% of the agency's local bridges in fair to good condition and to increase the number of good bridges to 90% by 2030.

5.0 Culvert Assets

Statewide, MDOT and other local agencies are just starting to collect and report information on their culverts, so statistics are not widely available nor reliable yet. However, compared to the condition data for bridges, it is obvious that culverts are in worse condition and in need of attention. The lack of a specific funding program for structures less than 20 feet in length and the lack of requirements for inspection and reporting have resulted in neglect of these structures. By nature, many of these structures are hardly noticed as they often do not have a separate deck or railing system that would distinguish them from the normal roadway. Failures of culverts often occur during flood events due to the inadequate hydraulic capacity. Maintenance and safety issues occur with the development of sinkholes in the roadway over the culverts when corrosion has rusted through the steel plates.

The Road Commission has 5 structures that are greater than 10 feet in span and less than 20 feet, allowing them to be included in the MDOT MiBridge inventory as non-NBI structures. Inspection of 1 non-NBI structures was completed in 2020, 3 were inspected in 2021, and the fifth will be added to the inspection program in 2022.

The following chart is recommended to track the types and conditions of the non-NBI population. The three culverts inspected are shown in the chart, with the intent that additional culverts be added as they are identified and documented.

Of the Road Commission's 5 known non-NBI structures, 2 are steel beam structures, 1 is a concrete box culvert, and 2 are steel pipe culverts. The distribution of overall condition is 2 (40%) are poor and 3 (60%) are fair.

The Road Commission's objective in formulating this preservation plan is to improve the inspection and maintenance of the culverts, with a goal of fair to good culverts to 80% by 2030.

	Number of Culverts				**2021 Condition**		
Type	**Total**	**Structural Deficiency**	**Posted**	**Closed**	**Poor/ Serious**	**Fair**	**Good**
Concrete - Box Culvert	0	0	0	0	0	1	0
Precast Concrete - Box	0	0	0	0	0	0	0
Steel beams/deck <20 feet	2	2	2	0	2	0	0
Steel - CMP Pipe	3	0	0	0	0	2	0
Steel – Multi-Plate Pipe Arch	0	0	0	0	0	0	0
Total	**3**	**2**	**2**	**0**	**2**	**3**	**0**
Percentage (%)		**40%**	**40%**	**0**	**40%**	**60%**	**0%**

6.0 Risk Management

The Road Commission recognizes that the potential risks associated with bridges and culverts generally fall into several categories:

- Personal injury and property damage resulting from a structure 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 or missing expansion joints, sinkholes, etc.

The Road Commission has addressed these risks by implementing a regular bridge inspection program and a preservation program of preventive maintenance.

The Road Commission administers the biennial inspection of its bridges in accordance with NBIS and MDOT requirements. The inspection reports document the condition of the Road Commission's bridges and evaluates them in order to identify new defects and monitor advancing deterioration. The summary inspection report identifies items needing follow-up special inspection actions and recommends maintenance activities.

The preservation program 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, then to address other needs based on the operational importance of each bridge and the long-term preservation of the network. The inspection results are used to modify and update the operations and maintenance plan annually.

7.0 Preservation Strategy

The Road Commission's preservation plan employs "mix of fixes" strategy made up of replacement, rehabilitation, preventive maintenance, and scheduled maintenance. The aim of this plan is to address the structures of critical concern by targeting elements rated as being in poor condition and to improve the overall condition of the bridge and culvert inventory to good or fair condition.

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 may be performed by the agency's in-house maintenance crews while larger, more complex work is typically contracted.

The replacement, rehabilitation, and preventive maintenance projects are generally eligible for funding under the local bridge program, and requests for funding may be submitted by the road commissions during the annual call for applications.

The Road Commission'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.

Culverts, which typically are buried structures, have less maintenance activities, and hence tend to be overlooked. Rehabilitation options are available, including full and partial liners, but are most effective if used when a pipe is in the early stages of deterioration. The "mix of fixes" strategy uses medium-term rehabilitation fixes and short-term preventive maintenance fixes and a regular program of scheduled maintenance with medium-term rehabilitation fixes and short- term preventive maintenance fixes. Implementing this balanced mixture, as described in the Operations and Maintenance Plan below, will increase the number of bridges improved each year and preserve the overall health of the Road Commission's bridge network.

8.0 Implementation of the Strategy

The Road Commission's implementation of the preservation plan strategy begins with an annual review of the current condition of each of the agency's bridges using the NBI inspection data contained on the Bridge Safety Inspection Report (BSIR) and the inspector's work recommendations contained on the BSIR. The inspection inventory and condition data are summarized in Appendix A. The preservation actions are selected in accordance with criteria contained in the Summary of Preservation Criteria table in Appendix B.

These criteria are based on MDOT's Project Scoping Manual, which is intended to address MDOT's trunkline bridges. The Road Commission has modified the selection criteria to address its local bridge network better.

9.0 Cost Estimate

The Road Commission computes the estimated cost of each typical preservation action using unit prices in the latest Bridge Repair Cost Estimate spreadsheet contained in MDOT's Local Bridge Program Call for Projects. The cost of items of varying complexity such as maintenance of traffic, staged construction, scour counter-measures, and so forth are computed on a bridge-by-bridge basis. The cost estimates will be reviewed and updated annually.

10. Project Prioritization Criteria

The Prioritization of Projects considers the following factors:

- Condition
- Load capacity
- Traffic volume
- Emergency service response
- Detour length and user delay

Due to the relatively small inventory and variety of bridges and culverts, the Road Commission does not use a scoring system to rate the projects. Instead, they judge them primarily on the condition rating, the significance of the structure, and the availability of funding to select projects for implementation.

Structures	2024	2025	2026 - 2029	2030-2033	Total
Superstructure Replacement					
Diamond Park Road over Little Betsie River	$692,000				
Bridge Replacement					
Beitner Road over Boardman River		$3,700,000			
Preventive Maintenance					
Brown Road Bridge over Boardman River (resurface and waterproofing)			$57,000		
Business Park over Mitchell Creek (concrete patching)			$48,000		
Replacement of Culverts, Greater than 20 feet (NBI Bridges)					
South Airport Road (EB and WB) over Boardman River			$2,770,000		
South Airport Road, New Bridge over Boardman River			$6,330,000		
Scharmen Road over Boardman River				$2,030,000	
Brown Bridge Road over Boardman River				$2,050,000	
Supply Road over Boardman River				$1,991,000	
Broomfield Road over South Bridge Boardman River				$1,356,000	
Totals	$692,000	$3,700,000	$9,205,000	$7,427,000	$11,924,000

11.0 Summary of Primary Recommendations

- Maintain clean deck surfaces and clear vegetation to avoid moisture from seeping into decks, railings, and other elements.
- If not selected in 2022, continue to submit application for funding for replacement of the Beitner Road structure and seek additional funding for the local share.
- Perform studies to determine the type and size of structures and costs for replacement of the South Airport Road structures number 3066 (Eastbound) and 3067 (Westbound) at the existing Boardman River crossing and the non-NBI culvert structure approximately 800 feet east. A new bridge to the east over the original Boardman River location with span and height to clear over the trail is desired, which would allow downsizing the existing twin culverts. The further to the east the better for a higher road profile and narrower roadway width (after transition from boulevard section) and to maintain the existing culvert flow while constructing the bridge.
- Submit funding applications for the preventive maintenance of the Brown Road Bridge over the Boardman River (HMA resurfacing and waterproofing) and for Business Park Bridge over Mitchell Creek (concrete patching and surface treatments).
- Develop a long-term plan for replacement of steel culvert structures over the Boardman River.
- Plan for replacement of non-NBI structures, Ramsay Road, West County Line Road, and Broomfield Road over the North Branch of the Boardman River (currently in line for CRA fund raising).

Grand Traverse County Road Commission
2022 Culvert Assets

1.0 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: 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).

2.0 Culvert Types

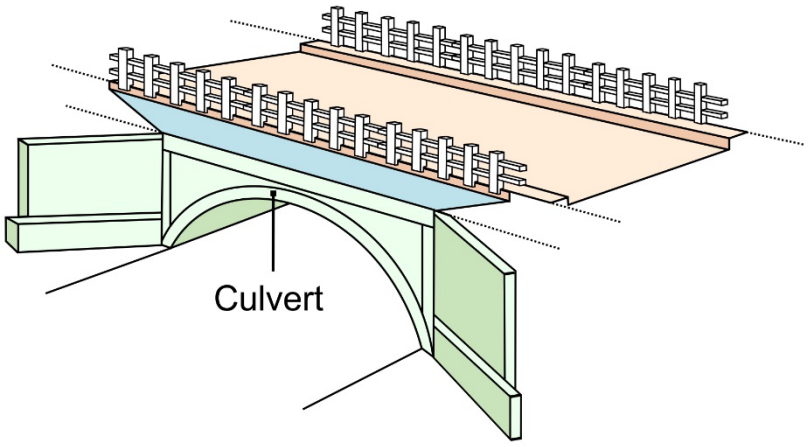

Figure C-2: Diagram of a Culvert Structure

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.

3.0 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 details 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).

4.0 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 repositioning the pipe to improve its grade and lining a culvert to achieve more service life after structural deterioration has begun.

5.0 GTCRC Culvert Inventory and Conditions

The GTCRC conducted a culvert inventory in 2018. During this process culvert location, size, and condition were recorded. The figures below summarize this effort.

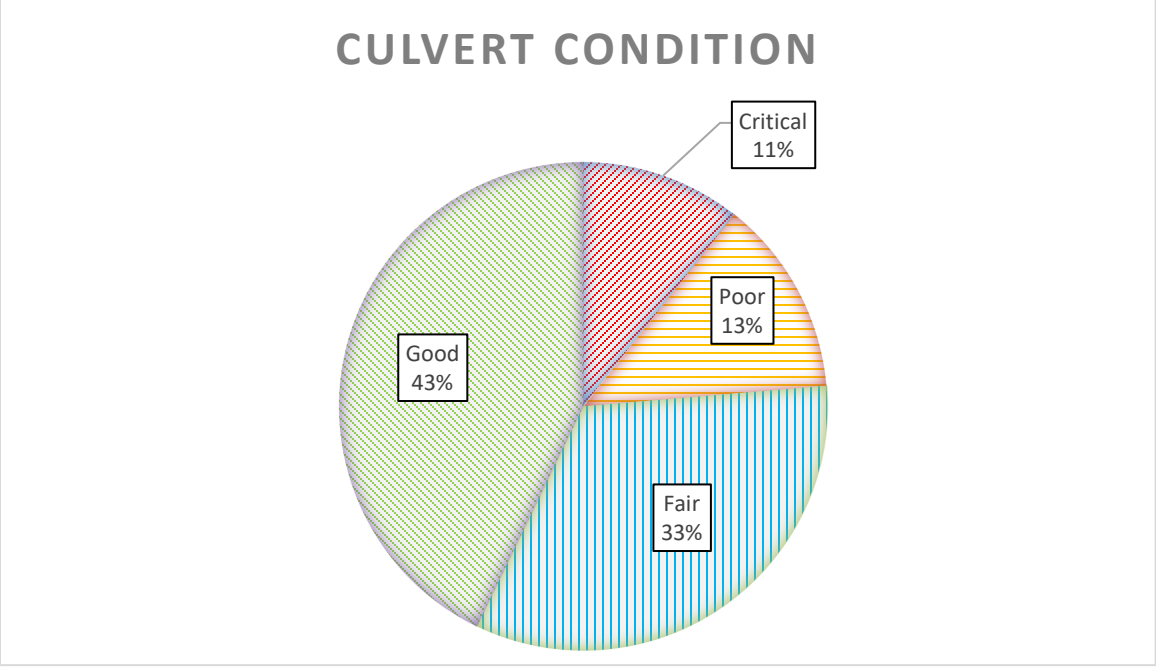

Figure 40: Culvert Conditions

Table 15: Culvert Material and Condition Count

Material	0	1	2	2	4	5	6	7	8	9	10	Total By Material
Aluminum Corrugated Metal Pipe (CMP)	0	0	0	0	0	0	0	1	2	1	0	4
Aluminum Plate	0	0	0	0	0	1	0	0	0	0	0	1
Concrete	6	3	3	7	8	12	7	16	31	23	10	126
Plastic	0	0	0	1	2	1	0	2	1	5	1	13
Steel Corrugated Metal Pipe (CMP)	24	22	21	34	40	52	86	181	167	153	3	783
Undefined	1	0	0	0	1	0	0	0	0	2	0	4
Totals	31	25	24	42	51	66	93	200	201	184	14	931

As the GTCRC performs routine maintenance along its roadway, additional culverts are often discovered. Maintenance staff marks and lists the location of these culverts and they are evaluated and added to the inventory. The inventory above is likely one-third to half the actual number of culverts in the system.

6.0 Culvert Replacement and Funding Plan

The GTCRC is working to collect an accurate and thorough inventory of all its assets. Currently culverts are replaced in conjunction with road surface projects depending on the culvert condition. As minor failures occur, culverts are repaired or replaced.

Grand Traverse County Road Commission
2022 Traffic Signal Assets

1.0 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

2.0 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.

The GTCRC is in the process of modernizing and upgrading it's traffic signal network. This network consist of 27 signals. Many of the signal in service are at or beyond the average service life of 20-years. As a result, frequent failures and service calls are occurring. The GTCRC plans to upgrade one to two signals per year for the foreseeable future. This will help ensure proper operation of this critical asset. The table below summarized the current GTCRC signal infrastructure:

Table 16: Signal Componentize Inventory

GTCRC Signal System			
Span Configuration	**Cross Span**	**Box Span**	**Mast Arm**
Number	13	6	8
Pole Construction	**Wood**	**Steel**	**Mast Arm**
Number	12	8	7
Cabinet Configuration	**8-Channel**	**12-Channel**	**16-Channel**
Number	2	13	12

3.0 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.

There are open project contracts for steel structure testing of the steel strain poles and the mast arm poles, and for a current condition status of the systemic signal infrastructure. The conclusion of these inspections will give the GTCRC the data it needs to establish and prioritize the next several years' worth of modernizations and heavy maintenance fixes

Appendix A: GTCRC Public Road Maps

Grand Traverse County 2022 Primary PASER

PASER 2022 RATING
- 1: Failed
- 2: Very Poor
- 3: Poor
- 4: Fair
- 5: Fair
- 6: Good
- 7: Good
- 8: Very Good
- 9: Excellent
- 10: Excellet
- Not Rated

GRAND TRAVERSE COUNTY ROAD COMMISSION

Peninsula
Acme
Whitewater
Long Lake
Garfield
East Bay
Green Lake
Blair
Union
Grant
Mayfield
Paradise
Fife Lake

Old Mission Rd
Mission Rd
Bowers Harbor Rd
Peninsula Dr
Island View Rd
East Shore Rd
Bates Rd
Angell Rd
Yuba Rd
Elk Lake Rd
Hawley Rd
Williamsburg Rd
Holiday Rd
S Mile Rd
Parsons Rd
3 Mile Rd
Cedar Run Rd
Tilton Rd
Gray Rd
North Long Lake Rd
Barnes Rd
Silver Lake Rd
West Long Lake Rd
East Long Lake Rd
County Road 610
Secor Rd
W South Airport Rd
E South Airport Rd
Barlow St
Cass Rd
N Keystone Rd
S Keystone Rd
N Garfield Rd
Birmley Rd
W Hammond Rd
Hammond Rd E
N 4 Mile Rd
3 Mile Rd
High Lake Rd
Hobbs/Supply Cutoff
N Hobbs Hwy
S Hobbs Hwy
Brown Bridge Rd
Supply Rd
S Muncie Lake Rd
Rudolf Rd
Ranch
Arbutus Hill Rd
Hobbs Hwy
River Rd
W River Rd
S Garfield Rd
Beitner Rd
N West Silver Lake Rd
S West Silver Lake Rd
N East Silver Lake Rd
S East Silver Lake Rd
N South Long Lake Rd
S South Long Lake Rd
West Long Lake Rd
S Long Lake Rd
Fall Rd
County Road 633
East Duck Lake Rd
Diamond Park Rd
J Maddy Pkwy
Hilltop Rd
Betsie River Rd
Youker Rd
Nessen Rd
Schell Rd
Wilson Rd
Davis Rd
Karlin Rd
W County Line Rd
Miller Rd
W Center Rd
E Center Rd
Fenton St
Blackman Rd
Summit City Rd
Voice Rd
Clark Rd
Knight Rd
Townline Rd
Walton Rd
Fife Lake Rd
Fife Boyd Lake Rd St

GIS MAP DISCLAIMER
Maps are for graphical purposes only. They do not represent a legal survey. While every effort has been made to ensure that these data are accurate and reliable within the limits of the current state of the art, GTCRC cannot assume liability for any damages caused by any errors or omissions in the data, nor as a result of the failure of the data to function on a particular system. GTCRC makes no warranty, expressed or implied, nor does the fact of distribution constitute such a warranty. (Very similar to NOAA disclaimer)

N:\apps\GIS\Townships\

N W E S

Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA

0 0.75 1.5 3 4.5 6 7.5 Miles

Acme Township 2018 Local PASER

2018 Local Road PASER
- 1: Failed
- 2: Very Poor
- 3: Poor
- 4: Fair
- 5: Fair
- 6: Good
- 7: Good
- 8: Very Good
- 9: Excellent
- 10: Excellet
- Not Rated

GRAND TRAVERSE COUNTY ROAD COMMISSION

Townline R
Shaw Rd
Yuba Park Rd
Kay Ray Rd
Yuba Rd
Crook Rd
Sun Bay Ct
Maitland Rd
Bayvalley Drive
Windale Dr
Havenhill Ln
Peaceful Valley Rd
Deepwater Point Rd
Kesner Rd
Lochenheath Rd
Sawyer Rd
Bennett Rd
Acme
Dock Rd
Brackett Rd
Hawley Rd
Deepwater Point Rd
Lautner Rd
Manor St
Shore Rd
Acme Rd
Huffman Rd
Mount Holt Rd
Hope Rd
Ridge Rd
Apple Valley Rd
Crest Haven Ln
Scenic Hills Dr
Michael Dr
Kirkridge Dr
James Rd
Pleasant Ridge Dr
David Dr
Arthur Ct
Ridge Crest Rd
Bartlett Rd
Kennedy Pl
Eagle Crest Dr
Country View Dr
Brook View Dr
Springbrook Dr
S Rainbow Ct
Westridge Dr
Circle View Dr
Bunker Hill Rd
Whiteford Road
Hampshire Dr
Bates Rd
Arnold Rd
Crisp Rd
Wild Juniper Trl
Paper Birch Ln
Pine Hill Ct
Greenwood Dr
Basswood Dr
Timberwood Dr
Holiday Pines Rd
Sherwood Dr
Holiday Rd
Park Ln
Evelyn St

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N W E S

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0 0.2 0.4 0.8 1.2 1.6 2 Miles

Blair Township 2018 Local PASER

2018 Local Road PASER
- 1: Failed
- 2: Very Poor
- 3: Poor
- 4: Fair
- 5: Fair
- 6: Good
- 7: Good
- 8: Very Good
- 9: Excellent
- 10: Excellet
- Not Rated

GRAND TRAVERSE COUNTY ROAD COMMISSION

Silver Lake Shores Rd
Rennie School Rd
Hoch Rd
W Potter Rd
Stafford Dr
Malachi Way
Heartland Dr
Farmstead Ln
Commerce Dr
Stadium Dr
Foster Dr
Perimeter Dr
Jet Dr
Sierra Dr
Apollo Dr
Fieldcrest Ln
Astro Dr
Chums Village Dr
Blair Valley Rd
Brakel point Dr
Williams Rd
S Rusch Rd
Seabrook Ln
Cherry Blossom Dr
Snow Apple Dr
Valley View Dr
Margeret Anne Dr
E Commerce Dr
W Commerce Dr
Stepke Ct
Curtis Rd
Brook St
Ewing St
State St
N Brentwood St
Creek Ave
S Brentwood St
E Brentwood St
Crompton Ct
Old St
Maple Trl
N Flamingo Dr
S Flamingo Dr
Kory Ln
N Curry Dr
S Curry Dr
Brammer Dr
Canterbury Ln
Radcliff Rd
Kymbra Ln
Vance Rd
W Needle Dr
Scotch Pine Dr
Glorianne Marie Dr
Grosbeak Dr
Conetree Dr
Rd
Garn Rd
W Sleights Rd
Hoosier Valley Rd
Shumsky Rd
Sawyer Rd
Pine Valley Ct
Gary Rd
Woodcock Ln
W Mobile Trl
E Mobile Trl
Luanne Ln
Rustic Manor Ct
Grouse Dr
Nimrod Rd
N Manor Wood Dr
S Manor Wood Dr
Manor Wood Dr
W Ironwood Dr
E Ironwood Dr
North Dr
Meadow Woods Dr
Plainfield Ct
W Blair Townhall Rd
Blair
Megan Ln
Unnamed County Rd
Norton Rd
Lemcool Rd
W Mill Rd
Old M 37
Fouch Rd
E Mill Rd
Red School Rd
Hannah Rd
Schneider Rd
Johnson Rd
Weaver Rd

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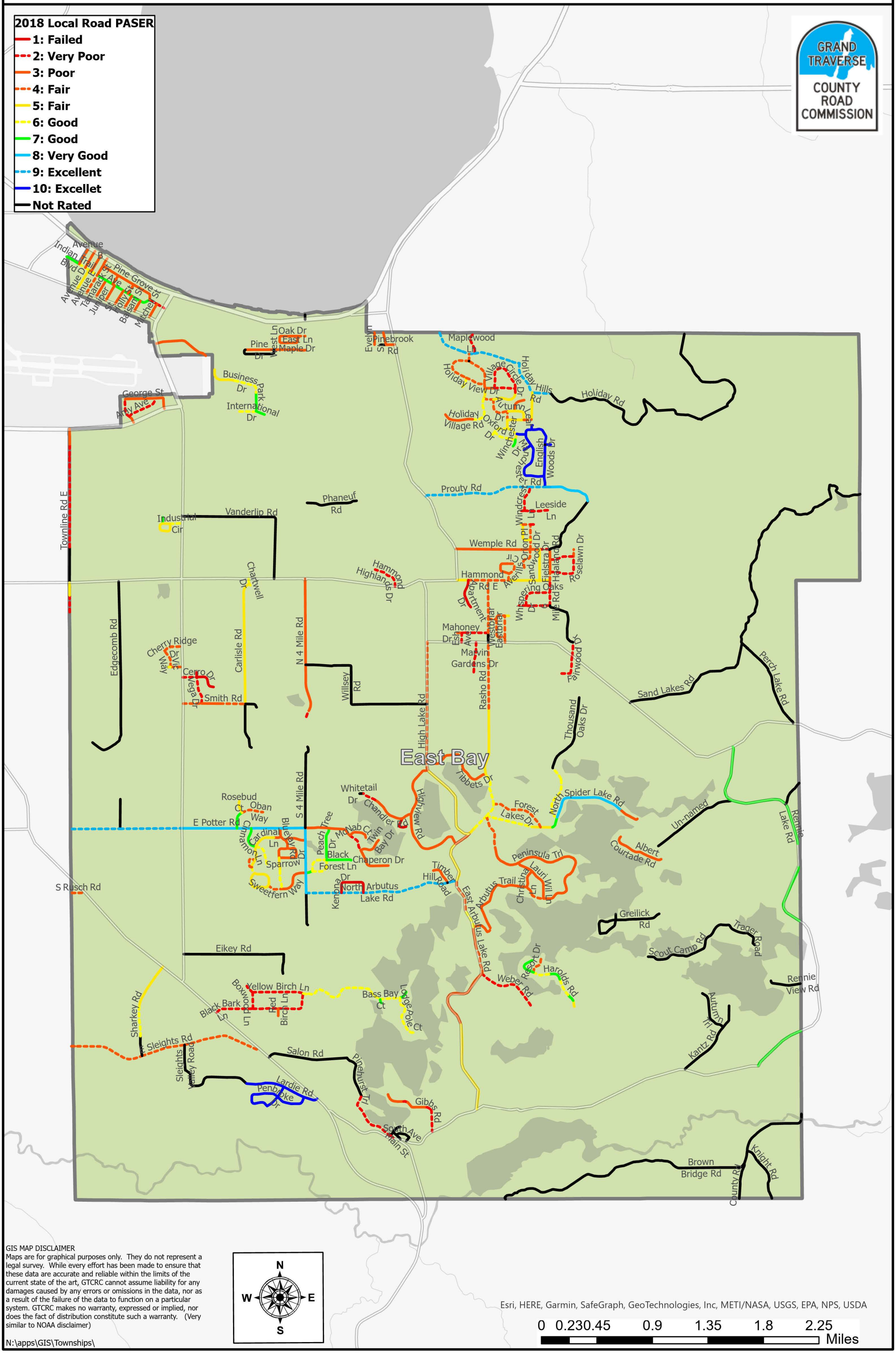
0 0.2 0.4 0.8 1.2 1.6 2 Miles

East Bay Township 2018 Local PASER



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N W E S

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0 0.230.45 0.9 1.35 1.8 2.25 Miles

Fife Lake Township 2018 Local PASER

2018 Local Road PASER
- 1: Failed
- 2: Very Poor
- 3: Poor
- 4: Fair
- 5: Fair
- 6: Good
- 7: Good
- 8: Very Good
- 9: Excellent
- 10: Excellet
- Not Rated

GRAND TRAVERSE COUNTY ROAD COMMISSION

Marsh Rd
Keffer Rd
Forrest Rd
Vans Ln
Merritt St
Hodge Rd
E Sparling Rd
Gleaner Hall Rd
Fife Lake
Johnson Rd
Lake Road
Conservation Rd
Lakeshore Dr
Headquarters Lake Rd
Walton Rd
Grand Kal Rd
Townline Rd
Unknown 30 1
Lake Rd
County Rd
County Road 13
Ramsay Rd
Union St
Phillips St
Oak St
E Elliott Rd
Fritz Rd
Fife Lake Rd
Number Two Rd

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0 0.2 0.4 0.8 1.2 1.6 2 Miles

Garfield Township 2018 Local PASER

2018 Local Road PASER
- 1: Failed
- 2: Very Poor
- 3: Poor
- 4: Fair
- 5: Fair
- 6: Good
- 7: Good
- 8: Very Good
- 9: Excellent
- 10: Excellet
- Not Rated

GRAND TRAVERSE COUNTY ROAD COMMISSION

Garfield

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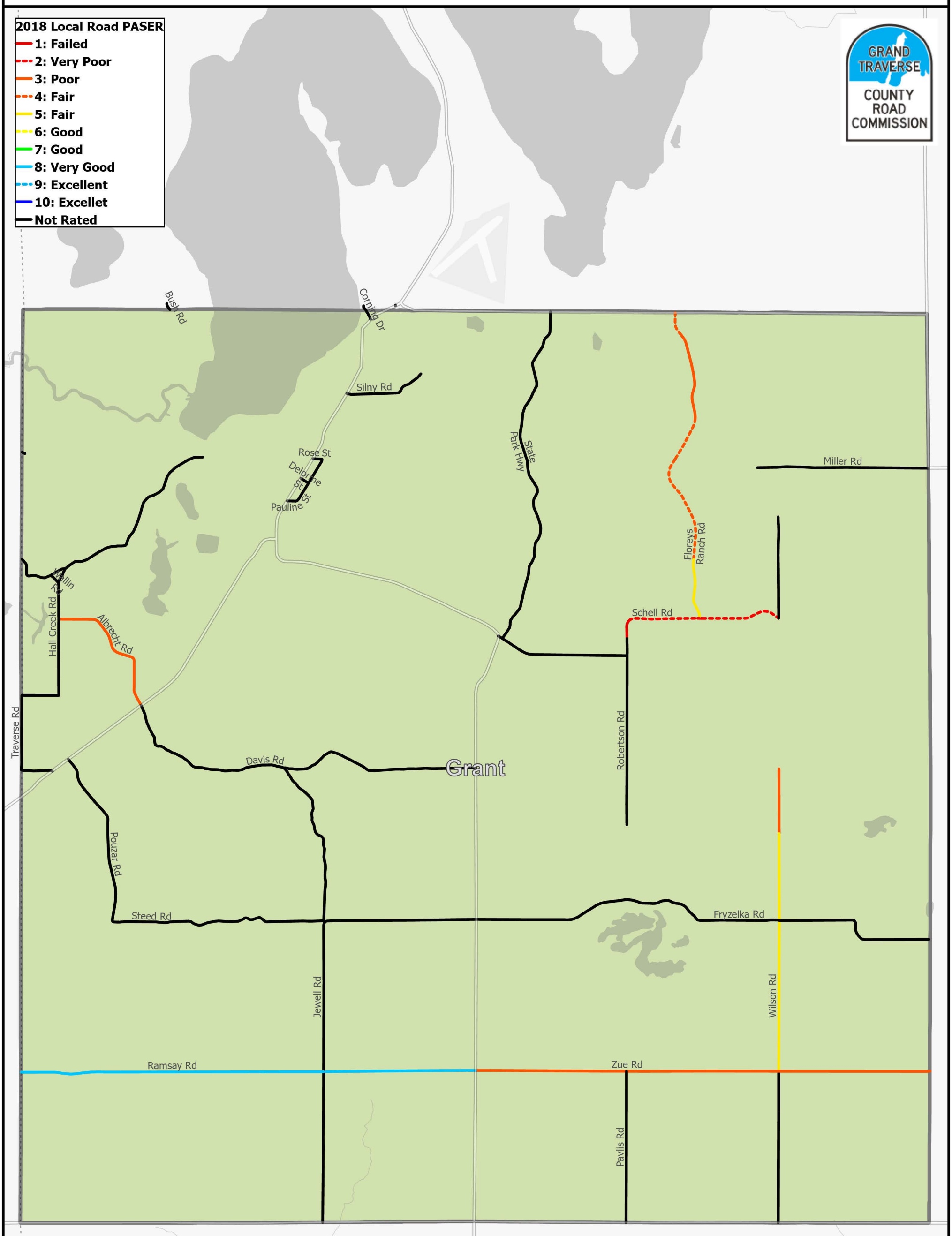
Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA

0 0.2 0.4 0.8 1.2 1.6 2 Miles

Grant Township 2018 Local PASER



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Green Lake Township 2018 Local PASER

2018 Local Road PASER
- 1: Failed
- 2: Very Poor
- 3: Poor
- 4: Fair
- 5: Fair
- 6: Good
- 7: Good
- 8: Very Good
- 9: Excellent
- 10: Excellet
- Not Rated

GRAND TRAVERSE COUNTY ROAD COMMISSION

Buckley Rd
S Lake Dubonnet Trl
Fischer Rd
Wintergreen Ave
Bass Lake Trl
Betsie River
Mud Lake Rd
Old Timber Trl
Lost Lake Trl
Resort Trl
White Birch Ct
Cedar Lodge Trl
Wildwood Rd
White Pine Rd
Cedar Hedge Trl
Chateau St
Innwood N
Tenor Dr
Harmony Dr
Green Oak Dr
Melody Ln
Innwood W
Toni Trl
Circle Dr
Pine Ln
Outer Dr
Kozy Ct
White Oak Ln
Ellis Lake Rd
Greenlawn Dr
Walter Dr
Fairfield Dr
Lois Ave
Pinetree
Scotch Pine Dr
Sullivan Rd
Cherry Blossom Dr
Mulberry Dr
Apple Blossom Dr
Betsie River Rd
Gonder Rd
Dylan Dr
Sweet Lilac Ln
Morgan Run Dr
Lakes North Dr
Betsie Creek Dr
Pine Breeze Dr
Gray Fox Dr
Woodwind Dr
Riley Rd
Grinar Pkwy
1st St
3rd St
4th St
5th St
East Railroad St
Commons
S Railroad St
West Ave
Artist Ave
Fashion Ave
Depot Dr
7th St
9th St
10th St
Green Lake
Tonawanda Rd
Birch Rd
Betsie River/Riley Cutoff
Bush Rd
Main Ave
Euclid Ave
Park Ln
Blvd
Case
Vagabond Ln
Timberwyck Trl
Pennington Dr
Penn Lock Colony Rd
Corning Dr
State Park Hwy
North Shore Ct
Peninsular Shores Dr
Mason Rd
White Birch Dr
E Shore Dr
Central Park Dr
Brigham Rd W
Maple St
Birch St
Moulton Rd
Hulett Rd

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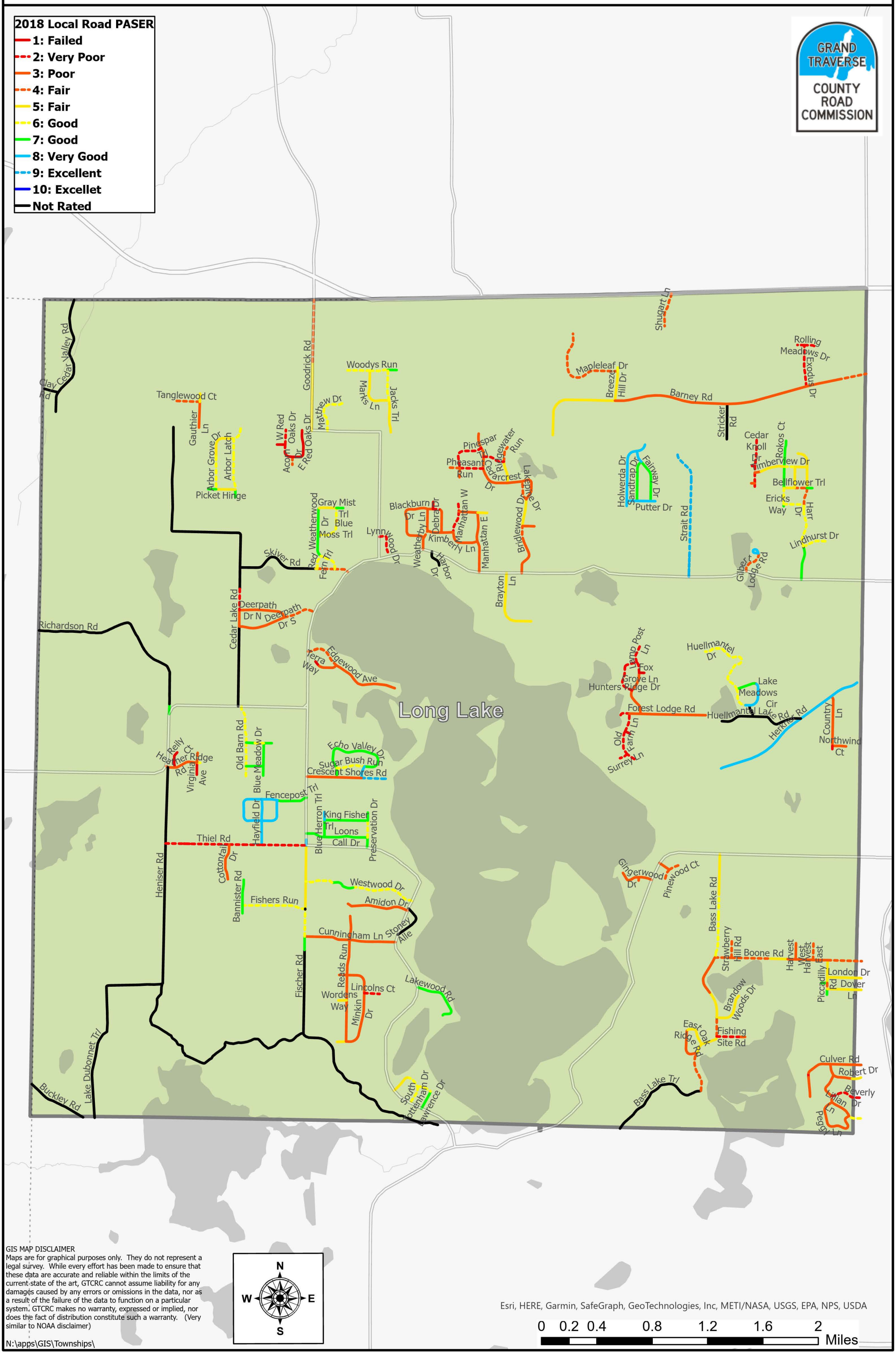
0 0.2 0.4 0.8 1.2 1.6 2 Miles

Long Lake Township 2018 Local PASER



Mayfield Township 2018 Local PASER

2018 Local Road PASER
- 1: Failed
- 2: Very Poor
- 3: Poor
- 4: Fair
- 5: Fair
- 6: Good
- 7: Good
- 8: Very Good
- 9: Excellent
- 10: Excellet
- Not Rated

GRAND TRAVERSE COUNTY ROAD COMMISSION

Hamlin Rd
Clous Rd
Schneider Rd
Bancroft Rd
Bott Rd
Rahe Rd
Harrand Rd
W Sparling Rd
Fox Rd
Hannah Rd
Schichtel Rd
Hency Rd
York Rd
Bartlett Rd
Mayfield
Center Place Dr
Leopold Dr
Remington Dr
W Hammer Rd
E Hammer Rd
Zue Rd
W Barratt Rd
Matchett Rd
W Elliott Rd
Allen Rd
W County Line Rd

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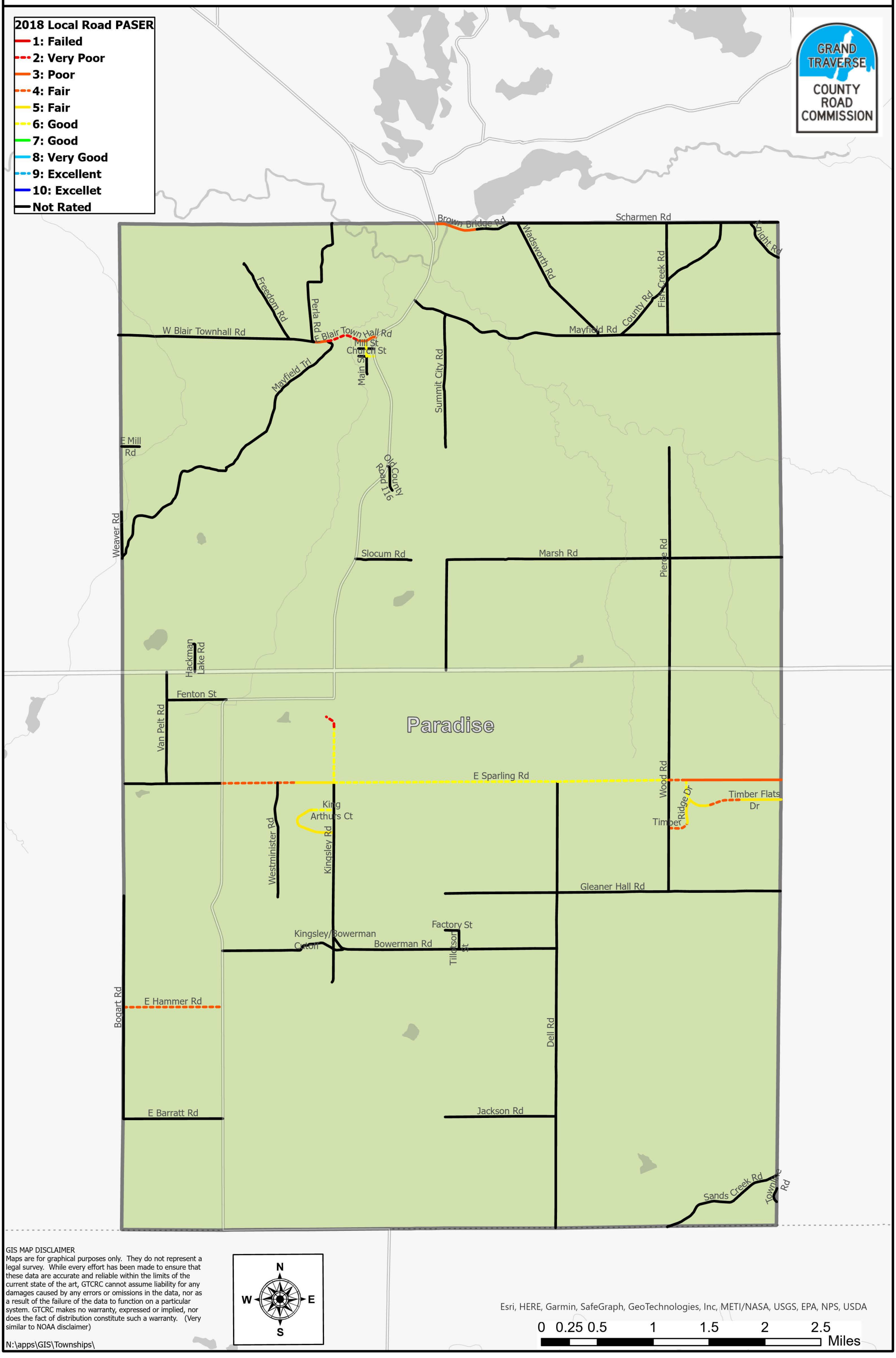
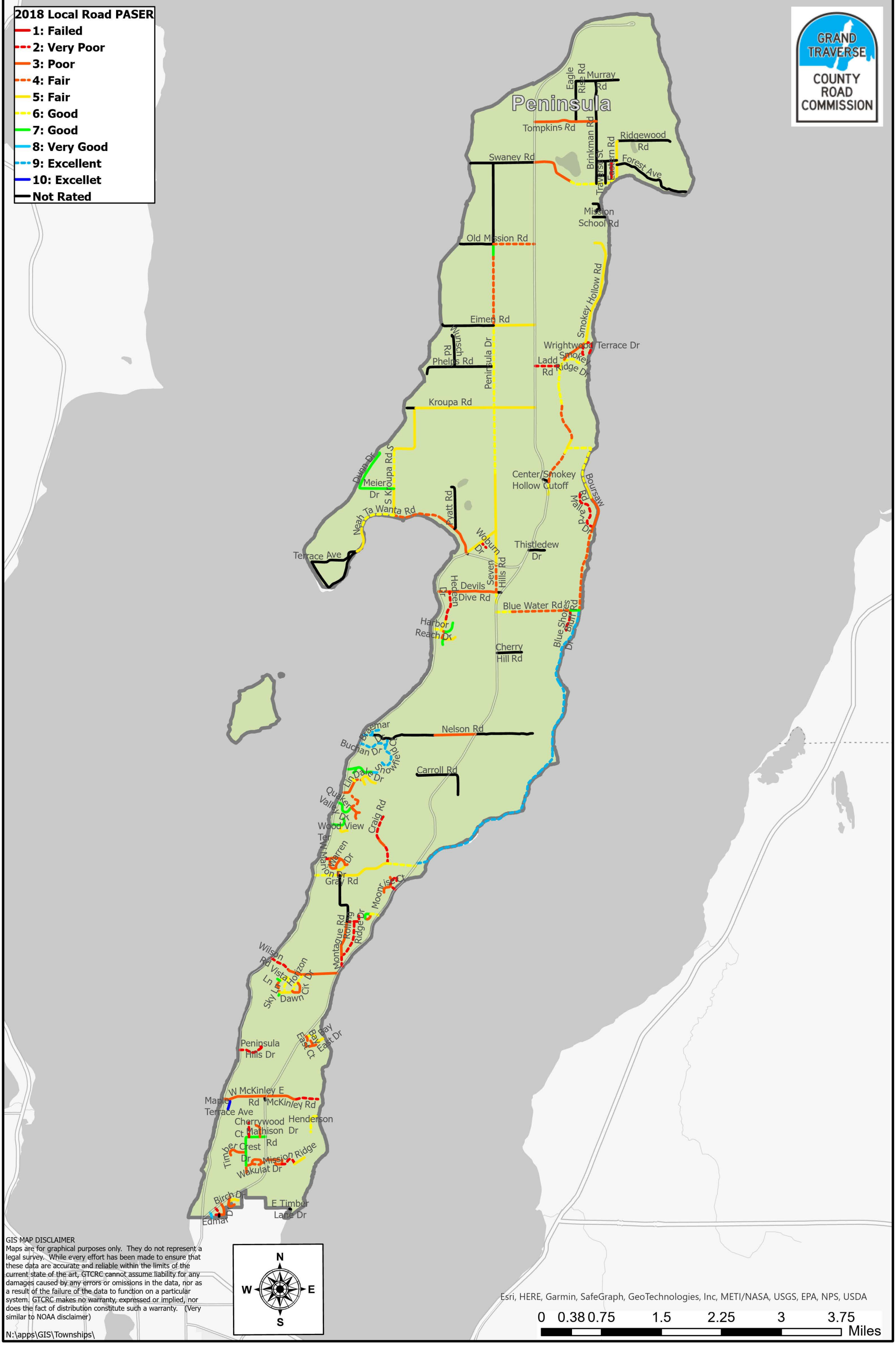
0 0.2 0.4 0.8 1.2 1.6 2 Miles

Paradise Township 2018 Local PASER



Peninsula Township 2018 Local PASER



Union Township 2018 Local PASER

2018 Local Road PASER
- 1: Failed
- 2: Very Poor
- 3: Poor
- 4: Fair
- 5: Fair
- 6: Good
- 7: Good
- 8: Very Good
- 9: Excellent
- 10: Excellet
- Not Rated

GRAND TRAVERSE COUNTY ROAD COMMISSION

North Branch Rd
S Broomhead Rd
Martuch Rd
Fife Lake Rd
Unnamed
Rennie Lake Rd
Rennie View Rd
S Munuscong Lake Rd
N Muncie Lake Rd
Jackpine Rd
Brown Bridge Rd
Unnamed Road
Blanke Rd
Carpenter Creek Rd
Union
Scharmen Rd
Boardman Rd
Lake Rd
Mayfield Rd
Grand Kal Rd
Hodge Rd
Unknown 28 1
Unknown 30 1
Cedar Creek Rd
Knight Rd
Hager Rd

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N W E S

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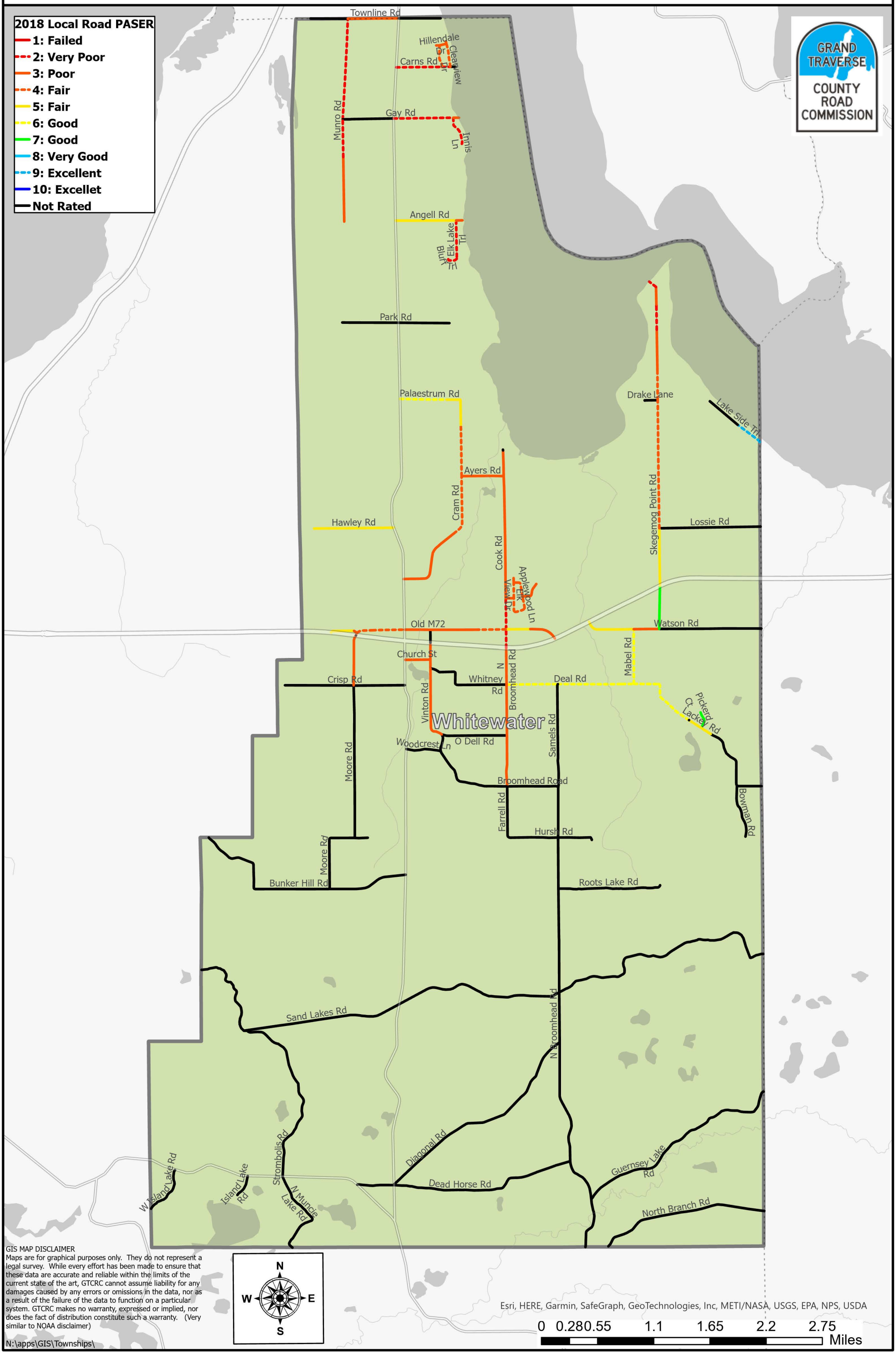
0 0.2 0.4 0.8 1.2 1.6 2 Miles

Whitewater Township 2018 Local PASER



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Appendix B: Local Road Match Policy

Policy Number Section VII-2	**LOCAL MATCH CONTRIBUTIONS**	Adopted: 11-03-93 Revised: 05-20-94 Revised: 12-05-07 Revised: 12-16-09 Revised: 11-29-12 Revised: 02-28-13 Revised: 01-30-14 Revised: 07-24-14 Revised: 03-03-16 Revised: 05-26-16 Revised: 04-26-18 Revised: 06-28-18 Revised: 08-20-19 *Revised: 12-16-21*

A township match of 50% is required for all local road improvements including reconstruction, overlays, gravel roads, etc. The following are the cost sharing matches for typical right-of-way improvements:

A. Local roads (except for those covered under section C and E) that are reconstructed will be incorporated into GTCRC's asset management plan and GTCRC will be responsible for future capital preventive maintenance treatments (i.e. crack sealing, chip sealing, etc.).

When a road has deteriorated beyond GTCRC standards for maintenance, the capital preventive maintenance treatments will cease and the road will require another reconstruct with local match.

B. Brining is 50% for up to two applications. Third application requires 100%. Seasonal Roads are 100% for all applications.

C. Subdivision, site developments, PUD's, residential roads, etc. will require 100% funding from township and/or special assessment district. GTCRC will contribute in-kind engineering services limited to staff availability.

Necessary repairs to rehabilitated, reconstructed or newly constructed roads will be performed at a no-cost match for a period of up to 5 (five) years. Repairs include structural failures of the subgrade, base and wearing hard surface.

D. Improvements which are not part of GTCRC's asset management plan will be evaluated and if approved, will require at least a 50% match.

E. Seasonal road improvements are 100%.

F. Local matches on culvert replacements will vary depending on the cause for replacement and alternate sources of funding.

G. Installation, materials and maintenance of a traffic control device that does not meet warrants and is requested by a township shall be reviewed by GTCRC Engineering and if permitted, will require 100% funding.

Appendix C: NCPP Method and Overview

A Quick Check of Your Highway Network Health

By Larry Galehouse, Director, National Center for Pavement Preservation and Jim Sorenson, Team Leader, FHWA Office of Asset Management

Historically, many highway agency managers and administrators have tended to view their highway systems as simply a collection of projects. By viewing the network in this manner, there is a certain comfort derived from the ability to match pavement actions with their physical/functional needs. However, by only focusing on projects, opportunities for strategically managing entire road networks and asset needs are overlooked. While the "bottom up" approach is analytically possible, managing networks this way can be a daunting prospect. Instead, road agency administrators have tackled the network problem from the "top down" by allocating budgets and resources based on historical estimates of need. Implicit in this approach, is a belief that the allocated resources will be wisely used and prove adequate to achieve desirable network service levels.

Using a quick checkup tool, road agency managers and administrators can assess the needs of their network and other highway assets and determine the adequacy of their resource allocation effort. A quick checkup is readily available and can be usefully applied with minimum calculations.

It is essential to know whether present and planned program actions (reconstruction, rehabilitation, and preservation) will produce a net improvement in the condition of the network. However, before the effects of any planned actions on the highway network can be analyzed, some basic concepts should be considered.

Assume every lane-mile segment of road in the network was rated by the number of years remaining until the end of life (terminal condition). Remember that terminal condition does not mean a failed road. Rather, it is the level of deterioration that management has set as a minimum operating condition for that road or network. Consider the rated result of the current network condition as shown in Figure 1.

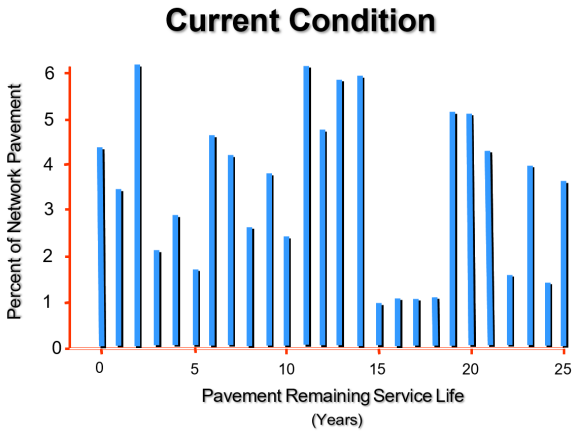


Figure 1 – Current Condition

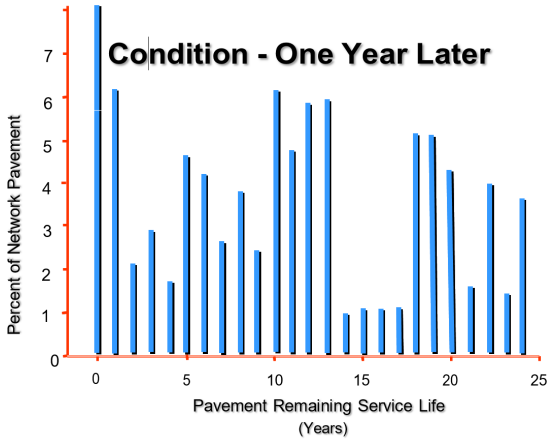


Figure 2 – Condition One Year Later

If no improvements are made for one year, then the number of years remaining until the end of life will decrease by one year for each road segment, except for those stacked at zero. The zero-stack will increase significantly because it maintains its previous balance and also becomes the recipient of those roads having previously been stacked with one year remaining. Thus, the entire network will age one year to the condition shown in Figure 2, with the net lane-miles in the zero-stack raised from 4% to 8% of the network.

Some highway agencies still subscribe to the old practice of assigning their highest priorities to the reconstruction or rehabilitation of the worst roads. This practice of "worst first" (i.e., continually addressing only those roads in the zero-stack) is a proven death spiral strategy because reconstruction and rehabilitation are the most expensive ways to maintain or restore serviceability. Rarely does sufficient funding exist to sustain such a strategy.

The measurable loss of pavement life can be thought of as the network's total lane-miles multiplied by 1 year, i.e., lane-mile-years. Consider the following quantitative illustration. Suppose your agency's highway network consisted of 4,356 lane-miles. Figure 3 shows that without intervention, it will lose 4,356 lane-mile-years per year.

Agency Highway Network = 4,356 lane miles
Each year the network will lose
4,356 lane-mile-years

Figure 3 – Network Lane Miles

To offset this amount of deterioration over the entire network, the agency would need to annually perform a quantity of work equal to the total number of lane-mile-years lost just to maintain the status quo. Performing work which produces fewer than 4,356 lane-mile-years would lessen the natural decline of the overall network, but still fall short of maintaining the status quo. However, if the agency produces more than 4,356 lane-mile-years, it will improve the network.

In the following example, an agency can easily identify the effect of an annual program consisting of reconstruction, rehabilitation, and preservation projects on its network. This assessment involves knowing the only two components for reconstruction and rehabilitation projects: lane-miles and design life of each project fix. Figure 4 displays the agency's programmed activities for reconstruction and Figure 5 displays it for rehabilitation.

Reconstruction Evaluation
Projects this Year = 2

Project	Design Life	Lane Miles	Lane-Mile - Years	Lane-Mile Cost	Total Cost
No. 1	25 years	22	550	$463,425	$10,195,350
No. 2	30 years	18	540	$556,110	$10,009,980
Total =			**1,090**		$20,205,330

Figure 4 - Reconstruction

Rehabilitation Evaluation
Projects this Year = 3

Project	Design Life	Lane Miles	Lane-Mile - Years	Lane-Mile Cost	Total Cost
No. 10	18 years	22	396	$263,268	$5,791,896
No. 11	15 years	28	420	$219,390	$6,142,920
No. 12	12 years	32	384	$115,848	$3,707,136
Total =			**1,200**		$15,641,952

Figure 5 – Rehabilitation

When evaluating pavement preservation treatments in this analysis, it is appropriate to think in terms of "extended life" rather than design life. The term design life, as used in the reconstruction and rehabilitation tables, relates better to the new pavement's structural adequacy to handle repetitive loadings and environmental factors. This is not the goal of pavement preservation. Each type of treatment/repair has unique benefits that should be targeted to the specific mode of pavement deterioration. This means that life extension depends on factors such as type and severity of distress, traffic volume, environment, etc. Figure 6 exhibits the agency's programmed activities for preservation.

Preservation Evaluation

Project	Life Extension	Lane Miles	Lane-Mile-Years	Lane-Mile Cost	Total Cost
No. 101	2 years	12	24	$2,562	$30,744
No. 102	3 years	22	66	$7,743	$170,346
No. 103	5 years	26	130	$13,980	$363,480
No. 104	7 years	16	112	$29,750	$476,000
No. 105	10 years	8	80	$54,410	$435,280
Total		=	**412**		$1,475,850

Figure 6 – Preservation

To satisfy the needs of its highway network, the agency must accomplish 4,356 lane-mile-years of work per year. The agency's program will derive 1,090 lane-mile-years from reconstruction, 1,200 lane-mile-years from rehabilitation, and 412 lane-mile-years from pavement preservation, for a total of 2,702 lane-mile-years. Thus, these programmed activities fall short of the minimum required to maintain the status quo, and hence would contribute to a net loss in network pavement condition of 1,653 lane-mile-years. The agency's programmed tally is shown in Figure 7.

Network Trend

Programmed Activity	Lane-Mile-Years	Total Cost
Reconstruction	1,090	$20,205,330
Rehabilitation	1,200	$15,641,952
Preservation	412	$1,475,850
Total	**2,702**	**$37,323,132**
Network Needs (Loss)	(-) 4,356	
Deficit =	**- 1,654**	

Figure 7 – Programmed Tally

This exercise can be performed for any pavement network to benchmark its current trend. Using this approach, it is possible to see how various long-term strategies could be devised and evaluated against a policy objective related to total-network condition.

Once the pavement network is benchmarked, an opportunity exists to correct any shortcomings in the programmed tally. A decision must first be made whether to improve the network condition or just to maintain the status quo. This is a management decision and system goal.

Continuing with the previous example, a strategy will be proposed to prevent further network deterioration until additional funding is secured.

The first step is to modify the reconstruction and rehabilitation (R&R) programs. An agonizing decision must be made about which projects to defer, eliminate, or phase differently with multi-year activity. In Figure 8, reductions are made in the R&R programs to recover funds for less costly treatments in the pavement preservation program. The result of this decision recovered slightly over $6 million.

Program Modification

Programmed Activity		Lane-Mile-Years	Cost Savings
Reconstruction	***31 lane miles*** ~~(40 lane-miles)~~	***820*** ~~(1,090)~~	**$5,004,990**
Rehabilitation	***77 lane miles*** ~~(82 lane-miles)~~	***1,125*** ~~(1,200)~~	**$1,096,950**
Pavement Preservation	(84 lane-miles)	(412)	**0**
Total =		***2,357*** **(2,702)**	**$6,101,940**

Figure 8 – Revised R and R Programs

Modifying the reconstruction and rehabilitation programs has reduced the number of lane-mile-years added to the network from 2,702 to 2,357 lane-mile-years. However, using less costly treatments elsewhere in the network to address roads in better condition will increase the number of lane-mile-years added to the network. A palette of pavement preservation treatments, or mix of fixes, is available to address the network needs at a much lower cost than traditional methods.

Preservation treatments are only suitable if the right treatment is used on the right road at the right time. In Figure 9, the added treatments used include concrete joint resealing, thin hot-mix asphalt (HMA) overlay (≤ 1.5”), microsurfacing, chip seal, and crack seal. By knowing the cost per lane-mile and the treatment life-extension, it is possible to create a new strategy (costing $36,781,144) that satisfies the network need. In this example, the agency saved in excess of $500,000 from traditional methods (costing $37,323,132), while erasing the 1,653 lane-mile-year deficit produced by the initial program tally.

Programmed Activity		**Lane-Mile -Years**	**Total Cost**
Reconstruction	(31 lane-miles)	820	$15,200,340
Rehabilitation	(77 lane-miles)	1,125	$14,545,002
Pavement Preservation	(84 lane-miles)	412	$1,475,850
Concrete Resealing	(4 years x 31 lane-miles)	124	$979,600
Thin HMA Overlay	(10 years x 16 lane-miles)	160	$870,560
Microsurfacing	(7 years x 44 lane-miles)	308	$1,309,000
Chip Seal	(5 years x 79 lane-miles)	395	$1,104,420
Crack Seal	(2 years x 506 lane-miles)	1,012	$1,296,372
	Total =	4,356	$36,781,144

Figure 9 – New Program Tally

In a real-world situation, the highway agency would program its budget to achieve the greatest impact on its network condition. Funds allocated for reconstruction and rehabilitation projects must be viewed as investments in the infrastructure. Conversely, funds directed for preservation projects must be regarded as protecting and preserving past infrastructure investments.

Integrating reconstruction, rehabilitation, and preservation in the proper proportions will substantially improve network conditions for the taxpayer while safeguarding the highway investment.

Appendix D: Planned Projects Maps

Project Map Report

Asphalt-Standard **Heavy CPM (R$Model)**

Start Date: 4/15/2023

Finish Date: 10/1/2023

Status: Scheduled

Project Number/ Description	Location	Memo	Reset Rating	Source of Funds	Estimated Costs	Total Costs
2023 Crack&Chip	GTCRC		8		$0	$0

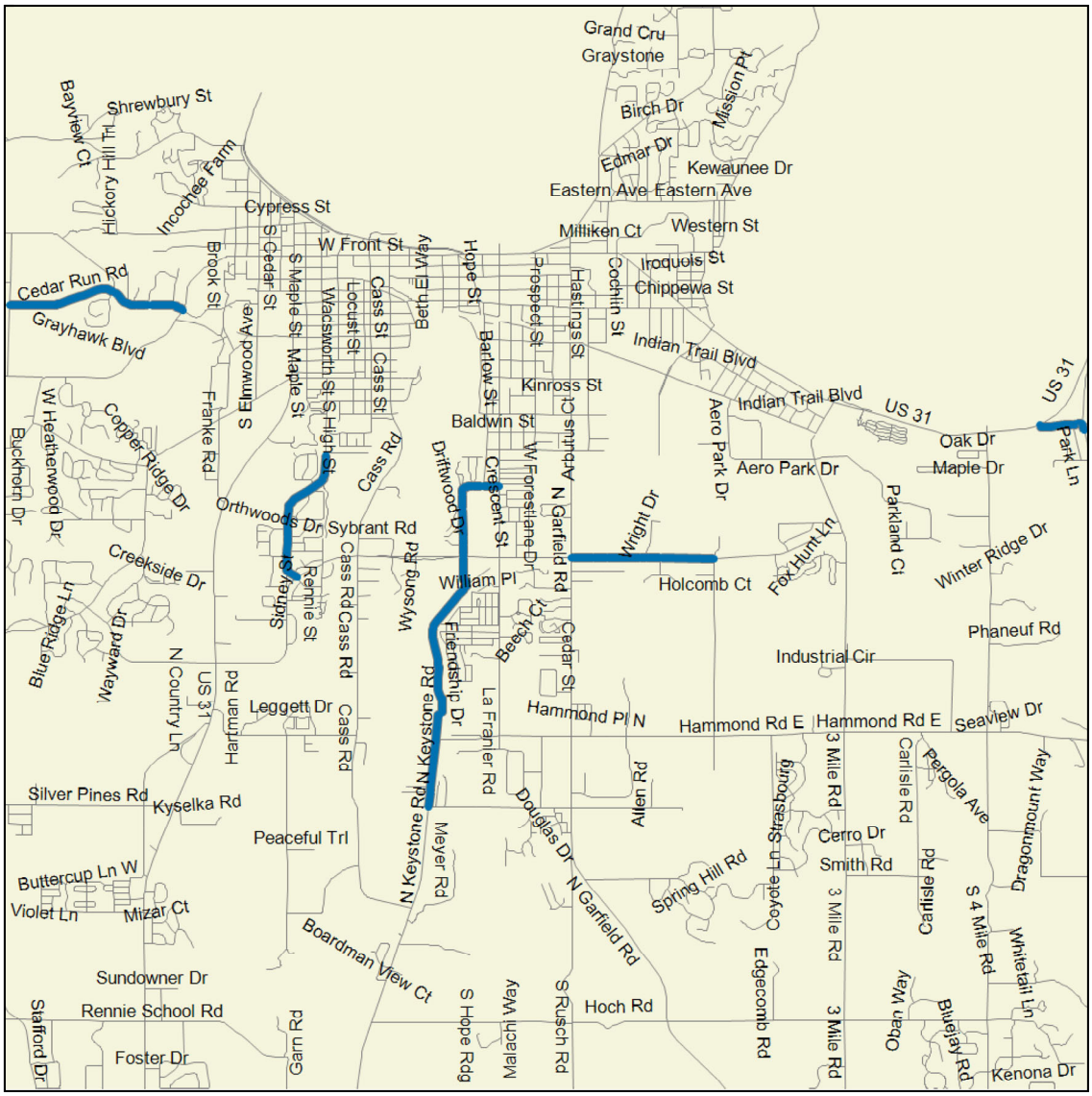
Project Map Report

Asphalt-Standard **Rehabilitation (R$Model)**

Start Date: 4/15/2023

Finish Date: 10/1/2023

Status: Scheduled



Project Number/ Description	Location	Memo	Reset Rating	Source of Funds	Estimated Costs	Total Costs
2023 Overlays	GTCRC		9		$0	$0

Project Map Report

Asphalt-Standard **Post Recon Chip Seal with Fog Seal (R$Model)**

Start Date: 4/15/2023

Finish Date: 10/1/2023

Status: Scheduled

Project Number/ Description	Location	Memo	Reset Rating	Source of Funds	Estimated Costs	Total Costs
2023 Post Recon Chip	GTCRC		9		$0	$0

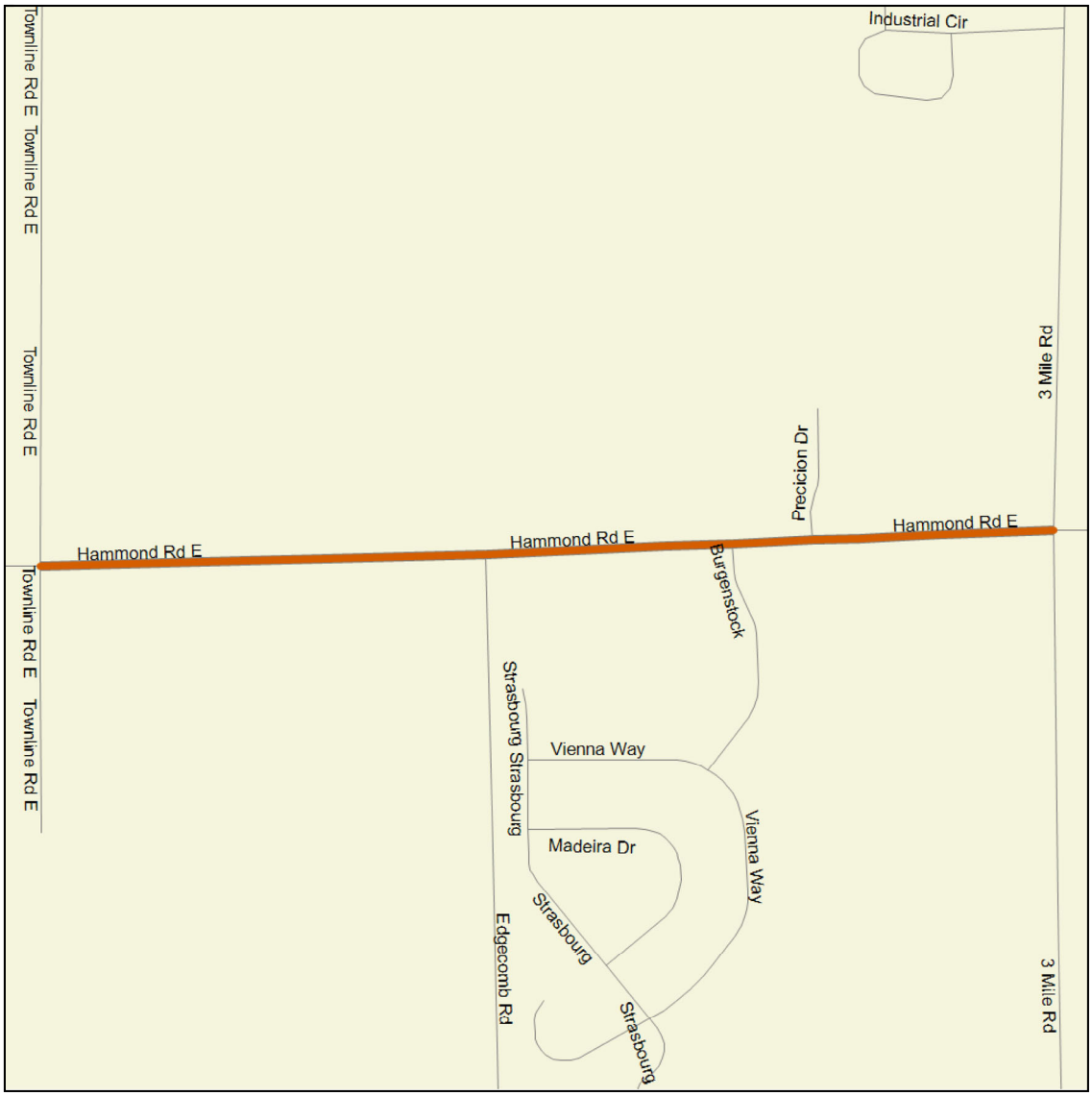
Project Map Report

Asphalt-Standard **Reconstruction (R$Model)**

Start Date: 4/15/2023

Finish Date: 10/1/2023

Status: Scheduled



Project Number/ Description	Location	Memo	Reset Rating	Source of Funds	Estimated Costs	Total Costs
2023 Recon	GTCRC		10		$0	$0

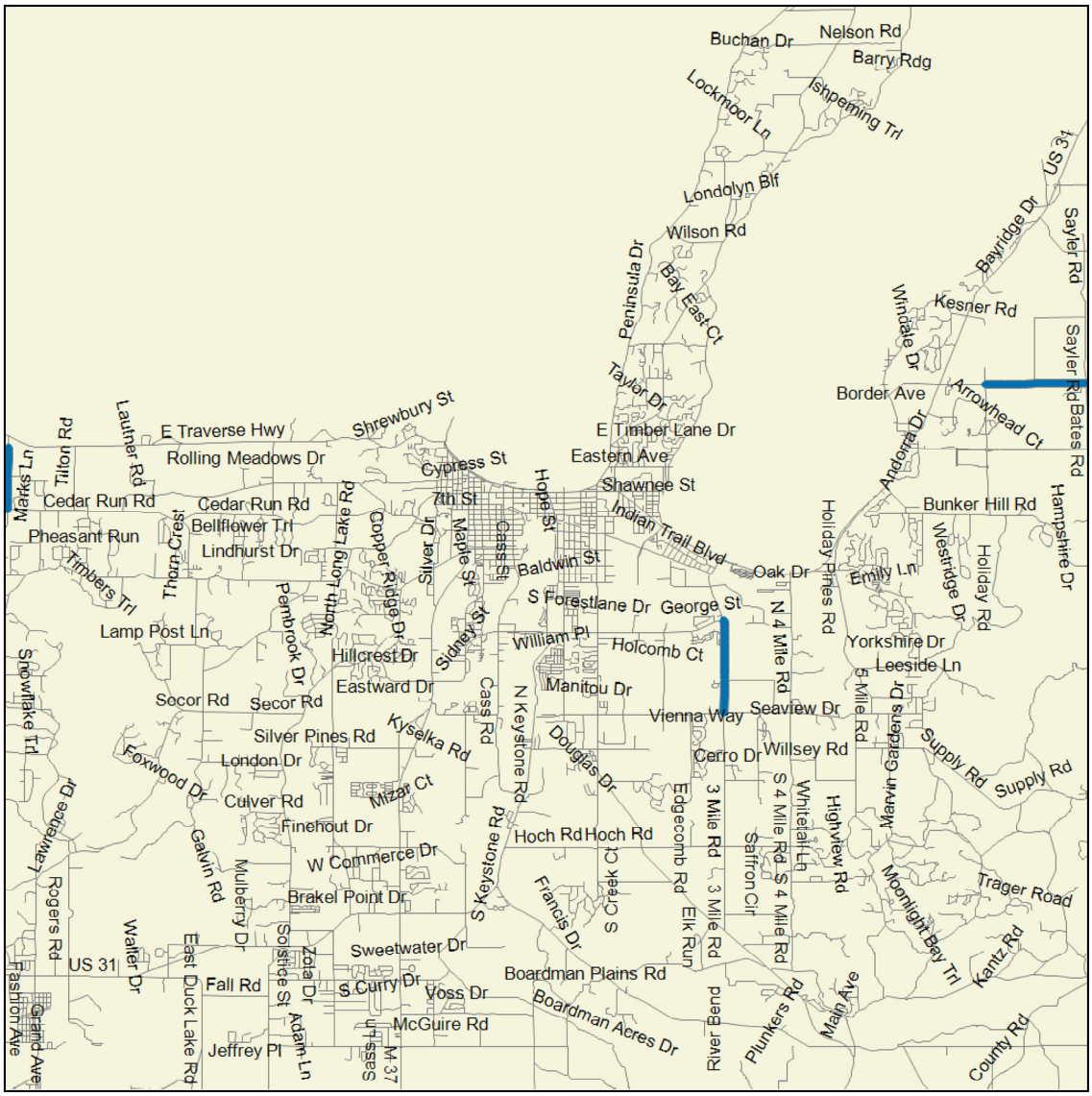
Project Map Report

Asphalt-Standard **Rehabilitation Heavy (R$Model)**

Start Date: 4/17/2023

Finish Date: 10/1/2023

Status: Scheduled



Project Number/ Description	Location	Memo	Reset Rating	Source of Funds	Estimated Costs	Total Costs
2023 Crush&Shape	GTCRC		10		$0	$0

Project Map Report

Asphalt-Standard **Heavy CPM (R$Model)**

Start Date: 4/15/2024

Finish Date: 10/4/2024

Status: Scheduled

Project Number/ Description	Location	Memo	Reset Rating	Source of Funds	Estimated Costs	Total Costs
2024 Crack&Chip	GTCRC		8		$0	$0

Project Map Report

Asphalt-Standard **Rehabilitation Heavy (R$Model)**

Start Date: 4/15/2024

Finish Date: 10/4/2024

Status: Scheduled

Project Number/ Description	Location	Memo	Reset Rating	Source of Funds	Estimated Costs	Total Costs
2024 Crush&Shape	GTCRC		10		$0	$0

Project Map Report

Asphalt-Standard **Rehabilitation (R$Model)**

Start Date: 4/15/2024

Finish Date: 10/4/2024

Status: Scheduled

Project Number/ Description	Location	Memo	Reset Rating	Source of Funds	Estimated Costs	Total Costs
2024 Overlays	GTCRC		9		$0	$0

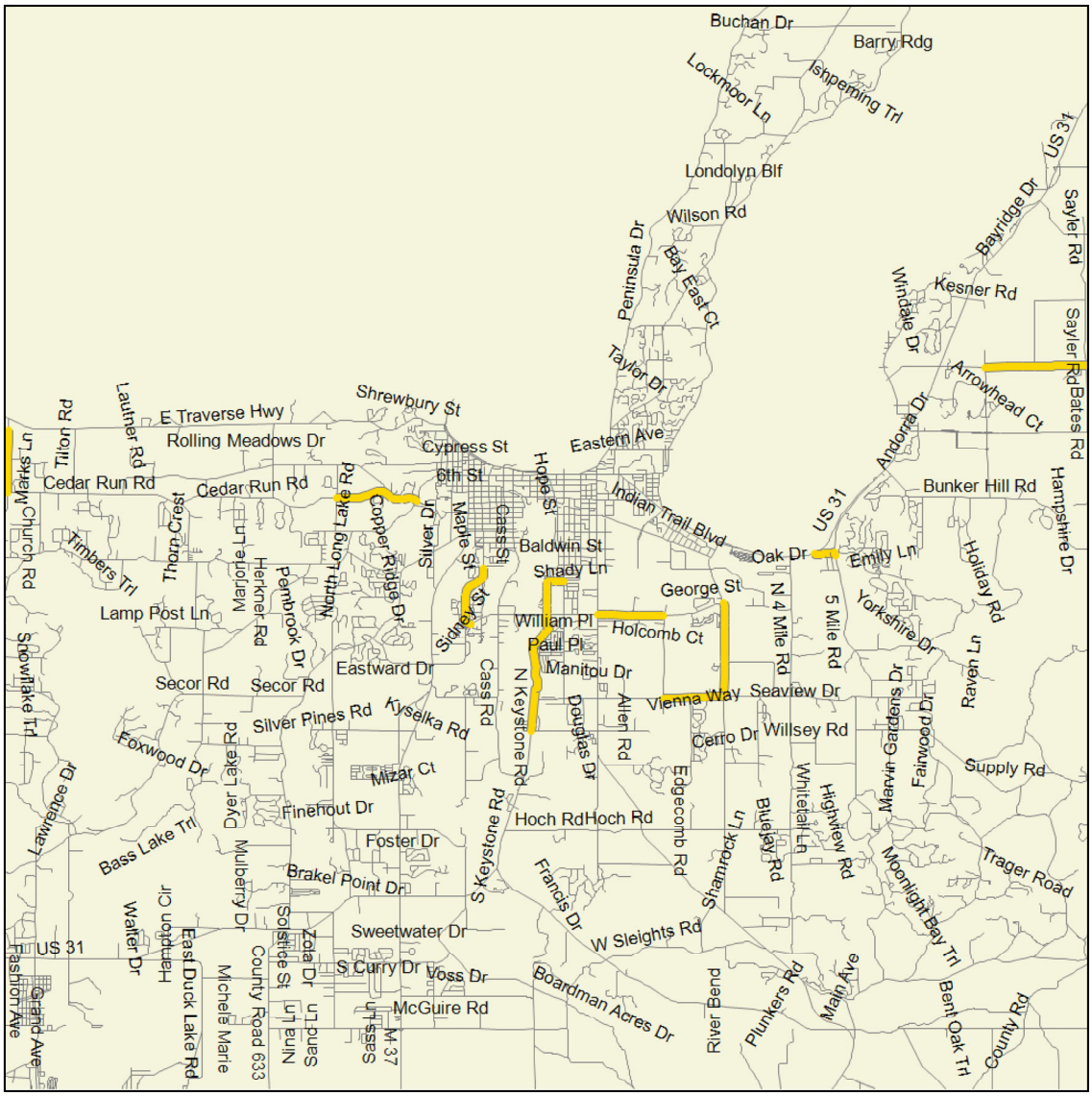
Project Map Report

Asphalt-Standard **Post Recon Chip Seal with Fog Seal (R$Model)**

Start Date: 4/15/2024

Finish Date: 10/4/2024

Status: Scheduled



Project Number/ Description	Location	Memo	Reset Rating	Source of Funds	Estimated Costs	Total Costs
2024 Post Recon Chip	GTCRC		9		$0	$0

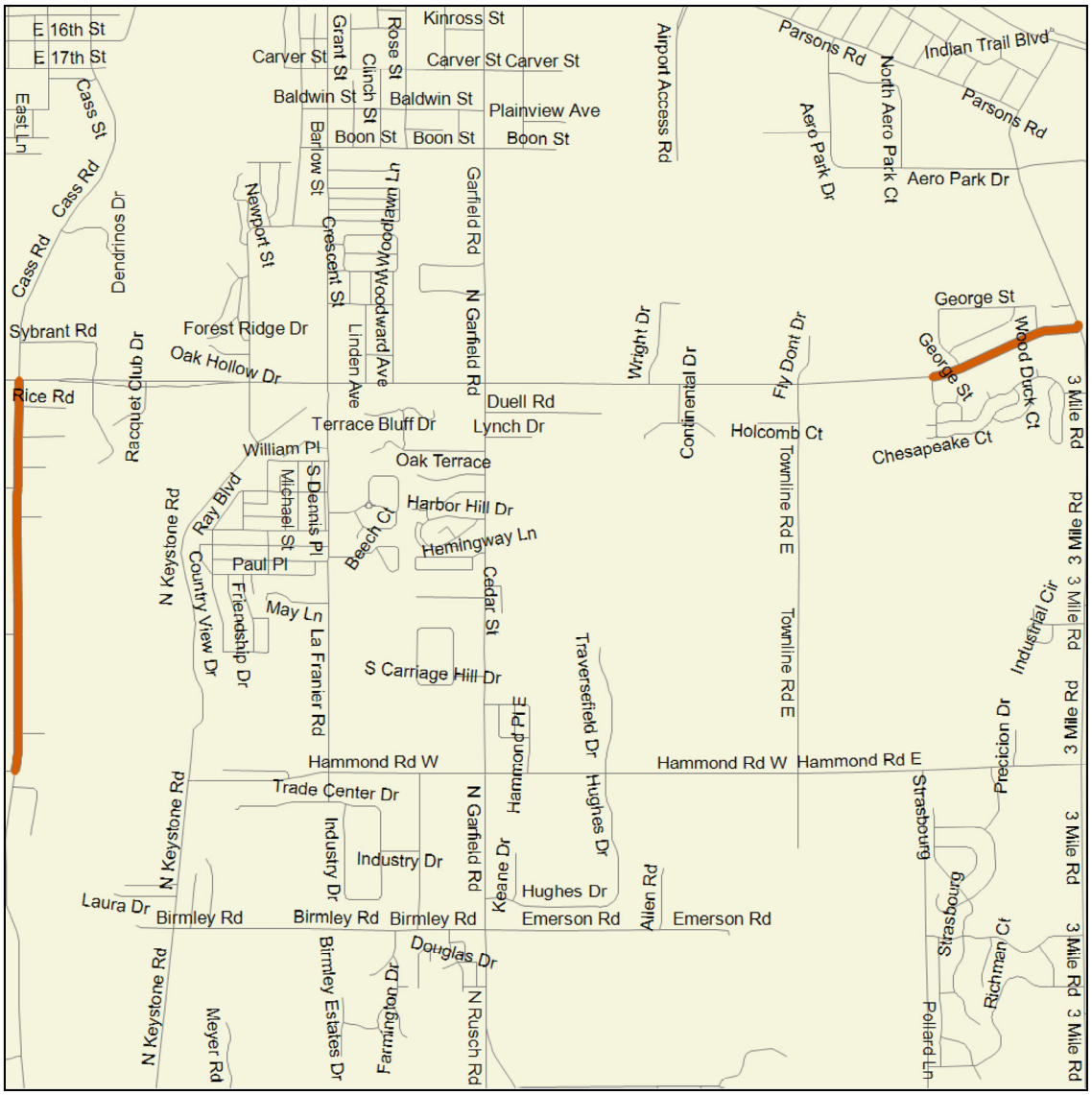
Project Map Report

Asphalt-Standard **Reconstruction (R$Model)**

Start Date: 4/15/2024

Finish Date: 10/4/2024

Status: Scheduled



Project Number/ Description	Location	Memo	Reset Rating	Source of Funds	Estimated Costs	Total Costs
2024 Recon	GTCRC		10		$0	$0

Project Map Report

Asphalt-Standard **Heavy CPM (R$Model)**

Start Date: 4/15/2025

Finish Date: 10/4/2025

Status: Scheduled

Project Number/ Description	Location	Memo	Reset Rating	Source of Funds	Estimated Costs	Total Costs
2025 Crack&Chip	GTCRC		8		$0	$0

Project Map Report

Asphalt-Standard **Rehabilitation Heavy (R$Model)**

Start Date: 4/15/2025

Finish Date: 10/4/2025

Status: Scheduled

Project Number/ Description	Location	Memo	Reset Rating	Source of Funds	Estimated Costs	Total Costs
2025 Crush&Shape	GTCRC		10		$0	$0

Project Map Report

Asphalt-Standard **Rehabilitation (R$Model)**

Start Date: 4/15/2025

Finish Date: 10/4/2025

Status: Scheduled

Project Number/ Description	Location	Memo	Reset Rating	Source of Funds	Estimated Costs	Total Costs
2025 Overlays	GTCRC		9		$0	$0

Project Map Report

Asphalt-Standard **Post Recon Chip Seal with Fog Seal (R$Model)**

Start Date: 4/15/2025

Finish Date: 10/4/2025

Status: Scheduled

Project Number/ Description	Location	Memo	Reset Rating	Source of Funds	Estimated Costs	Total Costs
2025 Post Recon Chip	GTCRC		9		$0	$0

Appendix E: RoadSoft Strategy Reports

Grand Traverse County Road Commission

2022 Asset Managment Plan

2022 Asset Plan Strategy

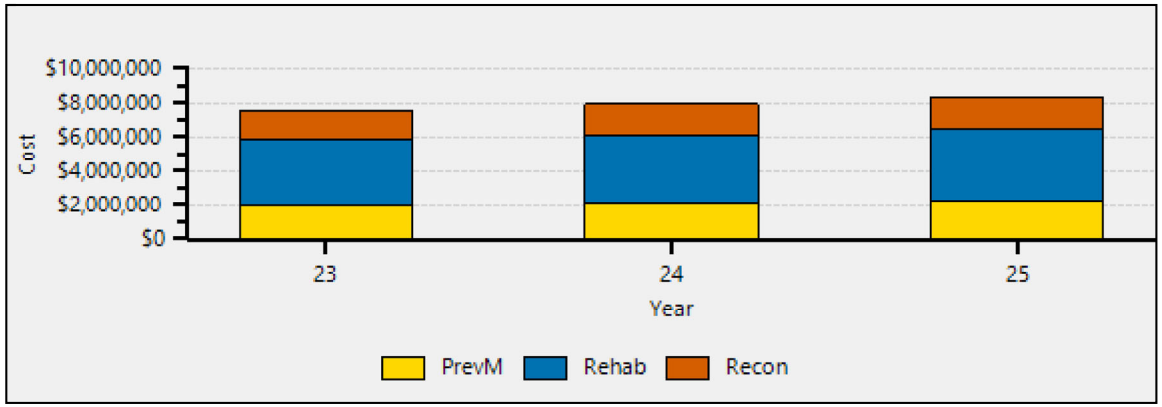
Base Year	2023
Percent Inflation	5
Number of Years	3
Optimized	No
Current Filter	GTCRC_Primary and Major Local Maintained by GTCRC

Subtype	Treatment	Trigger	Reset	Cost/Ln Mile	Budget	Lane Miles	Year
Asphalt-Standard	RC (SI) Reconstruction (R$Model)	1 - 3	10	$424,864.00			
					$1,699,456	4.000	2023
					$1,784,429	4.000	2024
					$1,873,650	4.000	2025
	RH (SI) Rehabilitation (R$Model)	4 - 6	9	$99,733.33			
					$1,496,000	15.000	2023
					$1,570,800	15.000	2024
					$1,649,340	15.000	2025
	RH (SI) Rehabilitation Heavy (R$Model)	2 - 4	10	$299,200.00			
					$2,393,600	8.000	2023
					$2,513,280	8.000	2024
					$2,638,944	8.000	2025
	PM (CPM) Heavy CPM (R$Model)	5 - 7	8	$29,920.00			
					$1,496,000	50.000	2023
					$1,570,800	50.000	2024
					$1,649,340	50.000	2025
	PM (CPM) Light CPM (R$Model)	6 - 7	7	$4,288.53			
					$150,099	35.000	2023
					$157,603	35.000	2024
					$165,484	35.000	2025
	PM (CPM) Post Recon Chip Seal with Fog Seal (R$Model)	8 - 9	9	$27,925.33			
					$335,104	12.000	2023
					$351,859	12.000	2024
					$369,452	12.000	2025

Cost Distribution

Grand Traverse County Road Commission

2022 Asset Managment Plan



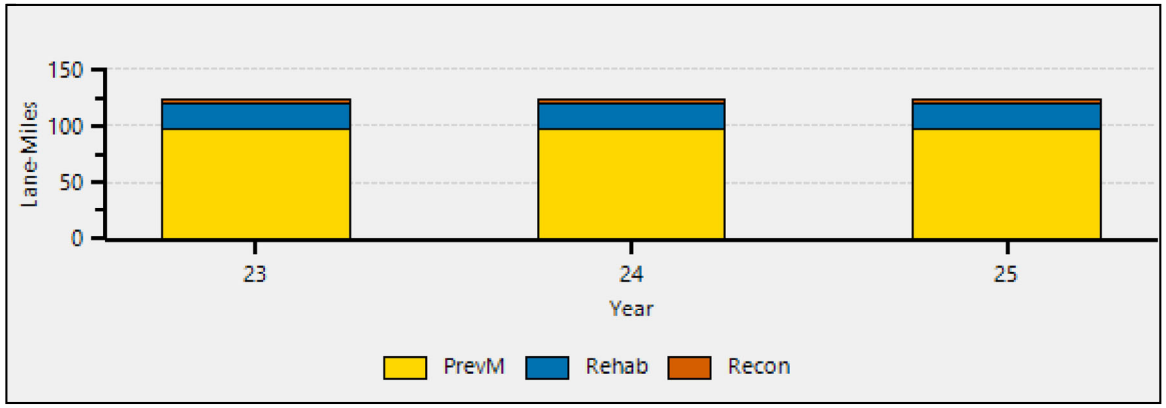
2022 Asset Plan Strategy

Maintenance Type	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Prev Maint	$1,981,203	$2,080,263	$2,184,276							
Rehab	$3,889,600	$4,084,080	$4,288,284							
Recon	$1,699,456	$1,784,429	$1,873,650							
Total	$7,570,259	$7,948,772	$8,346,210							

Grand Traverse County Road Commission

2022 Asset Managment Plan

Maintenance Performed



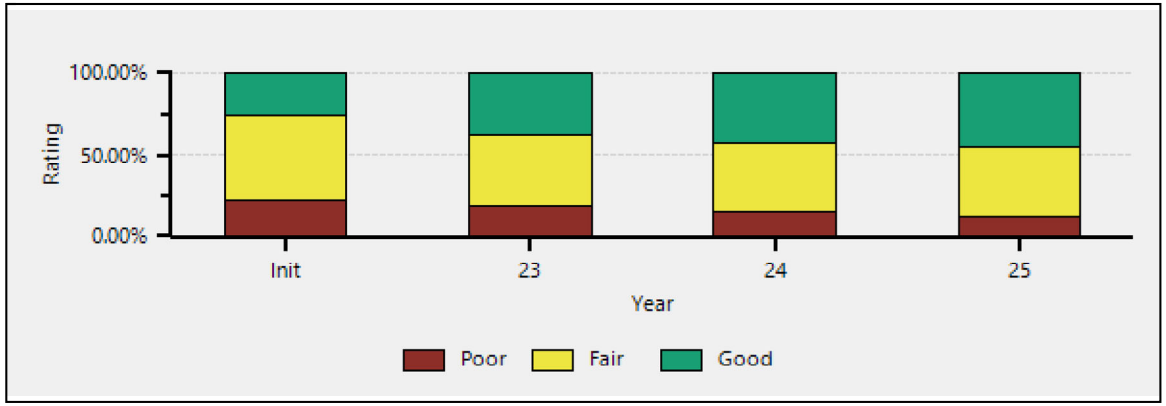
2022 Asset Plan Strategy

Maintenance Type in Lane Miles	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Prev Maint	97.000	97.000	97.000							
Rehab	23.000	23.000	23.000							
Recon	4.000	4.000	4.000							
Total	124.000	124.000	124.000							

Grand Traverse County Road Commission

2022 Asset Managment Plan

Rating Distribution



2022 Asset Plan Strategy

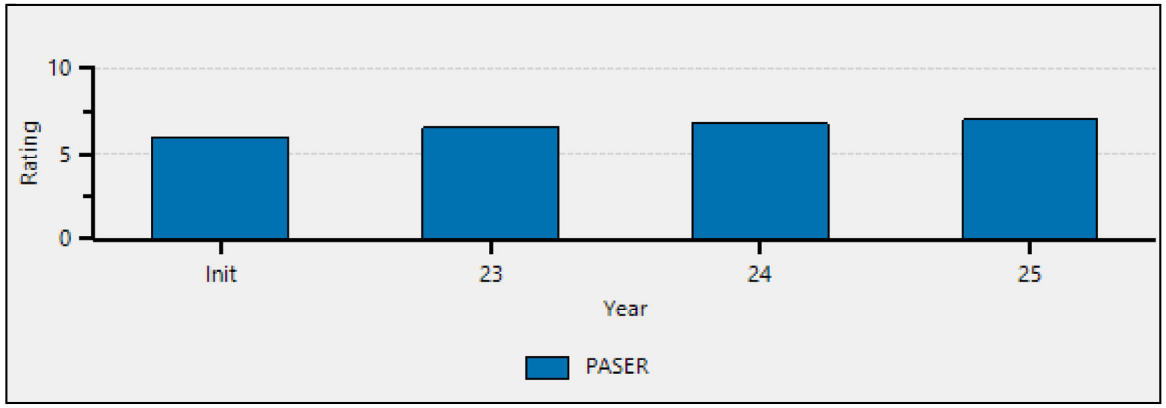
Initial Values

Lane Miles	%	Rating	2023		2024		2025		2026	2027	2028	2029	2030	2031	2032
182.418	26.1	Good	259.418	37.2	294.702	42.2	309.263	44.3							
355.901	51.0	Fair	305.901	43.8	297.617	42.6	310.056	44.4							
159.698	22.9	Poor	132.698	19.0	105.698	15.1	78.698	11.3							
698.017	100.0	Total													

Grand Traverse County Road Commission

2022 Asset Managment Plan

PASER Distribution



2022 Asset Plan Strategy

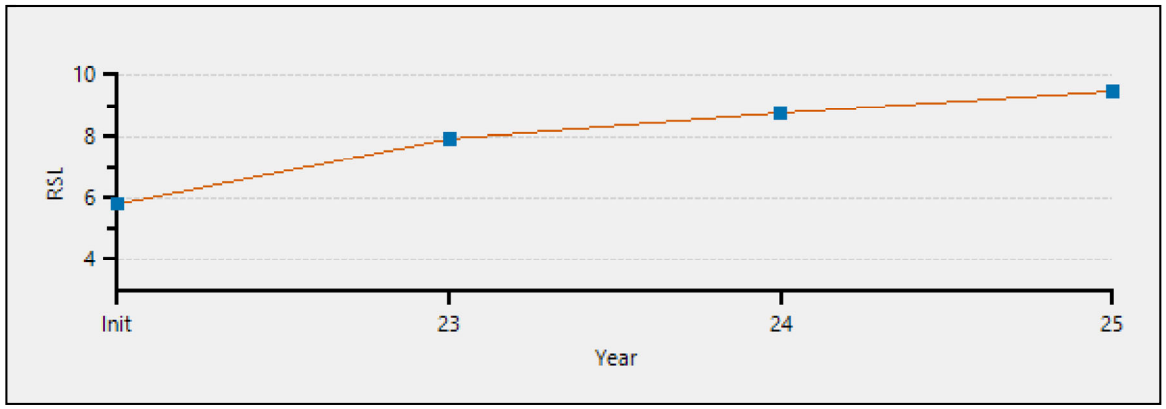
Initial Value

Lane Miles	PASER	2023	2024	2025
0.000	10	12.000	12.000	12.000
23.166	9	50.166	66.802	64.500
159.252	8	197.252	215.900	232.763
187.220	7	222.220	234.386	278.906
117.580	6	82.580	63.231	31.150
51.101	5	1.101	0.000	0.000
60.497	4	45.497	25.784	10.784
41.191	3	41.191	37.132	29.514
29.363	2	21.363	22.135	21.125
28.647	1	24.647	20.647	17.275
6.027	Average	6.560	6.802	7.010

Grand Traverse County Road Commission

2022 Asset Managment Plan

RSL Distribution



2022 Asset Plan Strategy

Initial Value

Lane Miles	RSL	2023	2024	2025
0.000	**18**	12.000	12.000	12.000
14.302	**17**	27.802	25.500	25.500
8.864	**16**	22.364	41.302	39.000
57.143	**15**	69.643	34.864	53.802
11.454	**14**	23.954	82.143	47.364
49.439	**13**	61.939	36.454	94.643
41.216	**12**	41.716	62.439	36.954
50.642	**11**	59.392	50.466	71.189
45.321	**10**	54.071	68.142	59.216
35.457	**9**	44.207	62.821	76.892
55.800	**8**	64.550	52.957	71.571
53.703	**7**	53.703	63.231	31.188
9.293	**6**	9.293	0.000	0.000
17.902	**5**	17.902	0.000	0.000
36.682	**4**	1.682	0.000	0.000
14.629	**3**	1.101	0.000	0.000
16.318	**2**	0.000	0.000	0.000
20.154	**1**	0.000	0.000	0.000
24.980	**0**	24.980	0.000	0.000
6.932	**-1**	6.932	24.980	0.000
9.464	**-2**	9.464	0.804	10.784
19.121	**-3**	4.121	0.592	0.000
14.460	**-4**	14.460	4.121	0.592
10.561	**-5**	10.561	14.460	4.121
7.618	**-6**	7.618	10.561	14.460

Grand Traverse County Road Commission

2022 Asset Managment Plan

8.552	**-7**	8.552	7.618	10.561
5.988	**-8**	5.988	8.552	7.618
4.610	**-9**	4.610	5.988	8.552
6.926	**-10**	6.926	4.610	4.735
8.063	**-11**	3.839	2.765	0.628
3.776	**-12**	0.000	0.000	0.000
7.310	**-13**	7.310	0.000	0.000
4.529	**-14**	4.529	7.310	0.000
4.182	**-15**	4.182	4.529	7.310
1.432	**-16**	1.432	4.182	4.529
3.098	**-17**	3.098	1.432	4.182
6.932	**-18**	4.096	3.098	0.626
0.004	**-19**	0.000	0.096	0.000
5.792	Average	7.945	8.772	9.475

Grand Traverse County Road Commission

2022 Asset Managment Plan

2022 Asset Plan Primary - from master plan

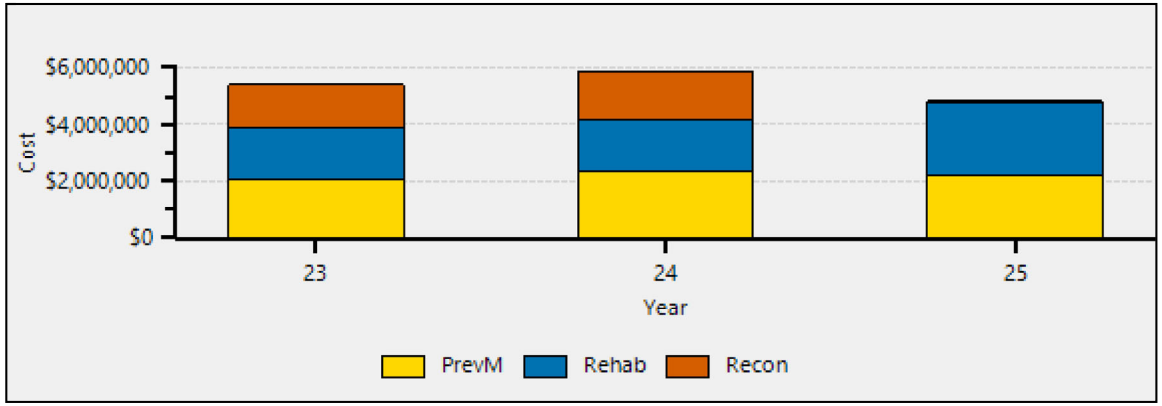
Base Year	2023
Percent Inflation	5
Number of Years	3
Optimized	No
Current Filter	AM Plan Base (County) + Paved: Primary

Subtype	Treatment	Trigger	Reset	Cost/Ln Mile	Budget	Lane Miles	Year
Asphalt-Standard	RC (SI) Reconstruction (R$Model)	1 - 3	10	$424,864.00			
					$1,539,707	3.624	2023
					$1,650,597	3.700	2024
	RH (SI) Rehabilitation (R$Model)	4 - 6	9	$99,733.33			
					$943,976	9.465	2023
					$66,811	0.638	2024
					$925,720	8.419	2025
	RH (SI) Rehabilitation Heavy (R$Model)	2 - 4	10	$299,200.00			
					$844,941	2.824	2023
					$1,769,349	5.632	2024
					$1,711,025	5.187	2025
	PM (CPM) Heavy CPM (R$Model)	5 - 7	8	$29,920.00			
					$982,932	32.852	2023
					$1,882,164	59.911	2024
					$1,950,575	59.132	2025
	PM (CPM) Post Recon Chip Seal with Fog Seal (R$Model)	8 - 9	9	$27,925.33			
					$1,096,404	39.262	2023
					$466,595	15.913	2024
					$254,737	8.274	2025

Cost Distribution

Grand Traverse County Road Commission

2022 Asset Managment Plan



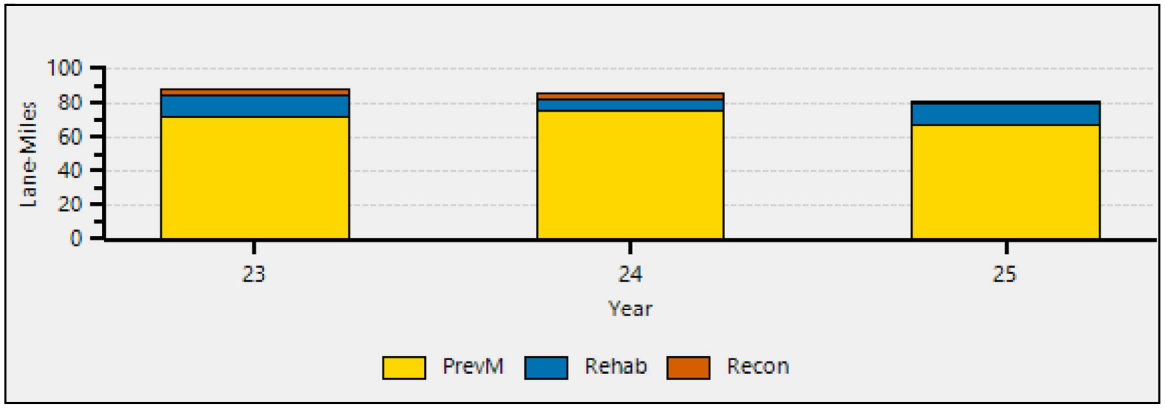
2022 Asset Plan Primary - from master plan

Maintenance Type	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Prev Maint	$2,079,336	$2,348,759	$2,205,313							
Rehab	$1,788,917	$1,836,160	$2,636,745							
Recon	$1,539,707	$1,650,597	$0							
Total	$5,407,960	$5,835,516	$4,842,058							

Grand Traverse County Road Commission

2022 Asset Managment Plan

Maintenance Performed



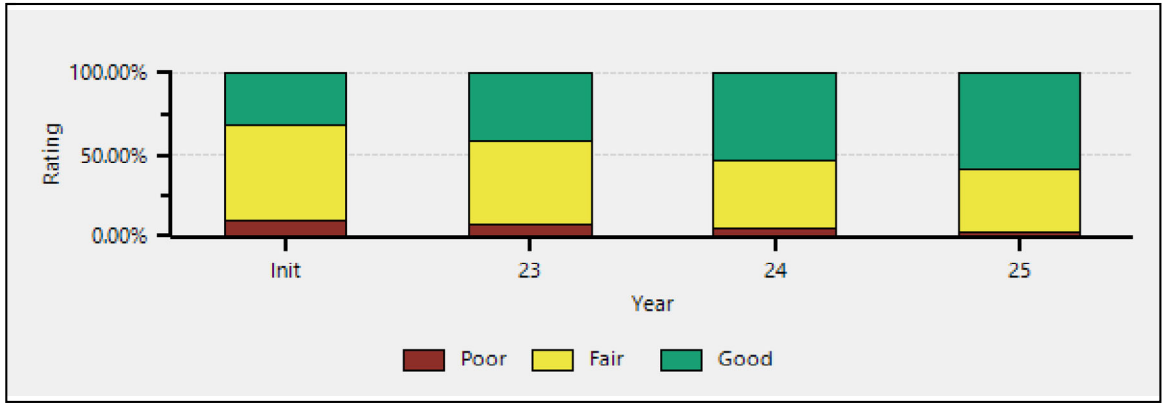
2022 Asset Plan Primary - from master plan

Maintenance Type in Lane Miles	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Prev Maint	72.114	75.824	67.406							
Rehab	12.289	6.270	13.606							
Recon	3.624	3.700	0.000							
Total	88.027	85.794	81.012							

Grand Traverse County Road Commission

2022 Asset Managment Plan

Rating Distribution



2022 Asset Plan Primary - from master plan

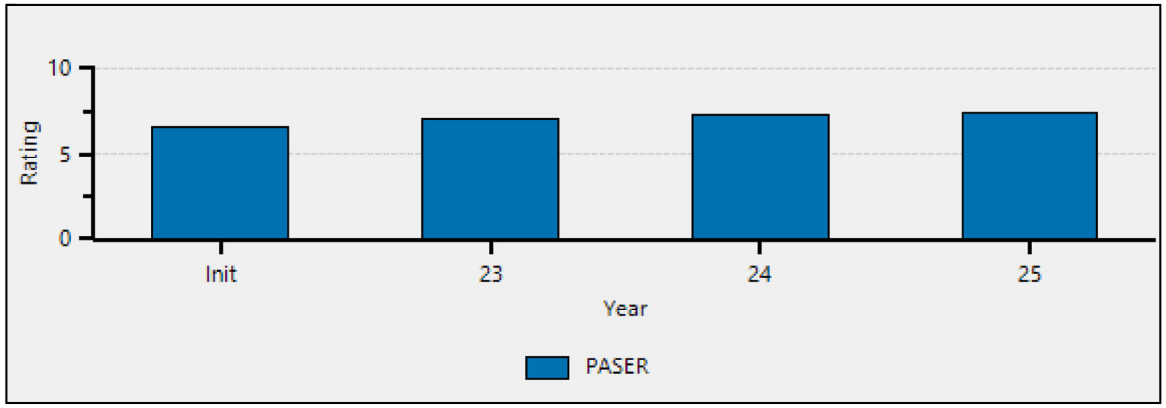
Initial Values

Lane Miles	%	Rating	2023		2024		2025		2026	2027	2028	2029	2030	2031	2032
169.202	31.8	Good	217.966	41.0	279.634	52.6	309.635	58.3							
310.148	58.4	Fair	277.296	52.2	225.598	42.5	209.204	39.4							
52.055	9.8	Poor	36.142	6.8	26.172	4.9	12.566	2.4							
531.405	100.0	Total													

Grand Traverse County Road Commission

2022 Asset Managment Plan

PASER Distribution



2022 Asset Plan Primary - from master plan

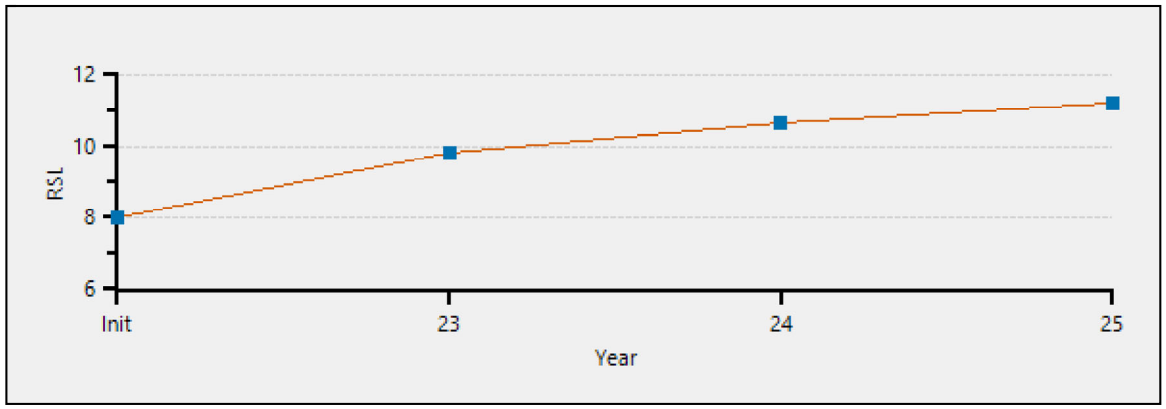
Initial Value

Lane Miles	PASER	2023	2024	2025
0.000	10	6.448	9.332	5.187
22.210	9	70.936	60.707	40.749
146.992	8	140.582	209.595	263.699
158.984	7	158.984	116.029	128.822
113.670	6	113.670	109.569	80.382
37.494	5	4.642	0.000	0.000
22.557	4	13.092	12.454	4.035
12.736	3	12.736	9.504	4.713
5.620	2	2.796	0.396	0.000
11.142	1	7.518	3.818	3.818
6.603	Average	7.056	7.281	7.426

Grand Traverse County Road Commission

2022 Asset Managment Plan

RSL Distribution



2022 Asset Plan Primary - from master plan

Initial Value

Lane Miles	RSL	2023	2024	2025
0.000	**18**	6.448	9.332	5.187
13.346	**17**	37.709	14.723	17.679
8.864	**16**	33.227	45.984	23.070
60.816	**15**	69.029	48.205	60.767
11.454	**14**	19.667	84.007	62.988
38.544	**13**	43.673	34.645	98.790
36.178	**12**	8.213	42.738	41.154
38.743	**11**	38.743	8.213	42.738
39.128	**10**	39.128	38.743	8.213
29.945	**9**	29.945	39.128	38.743
51.168	**8**	51.168	29.945	39.128
52.377	**7**	52.377	51.168	29.945
8.351	**6**	8.351	52.377	50.437
18.520	**5**	18.520	6.024	0.000
34.422	**4**	34.422	0.000	0.000
12.735	**3**	4.642	0.000	0.000
12.172	**2**	0.000	0.000	0.000
12.587	**1**	0.000	0.000	0.000
14.908	**0**	13.092	0.000	0.000
2.986	**-1**	0.000	12.454	0.000
1.270	**-2**	0.000	0.000	4.035
3.393	**-3**	0.000	0.000	0.000
3.112	**-4**	3.112	0.000	0.000
3.700	**-5**	3.700	3.112	0.000
2.692	**-6**	2.692	3.700	3.112

3.232	**-7**	3.232	2.692	1.601
2.538	**-8**	2.538	0.396	0.000
0.670	**-9**	0.258	0.000	0.000
0.708	**-10**	0.000	0.000	0.000
0.840	**-11**	0.000	0.000	0.000
0.864	**-12**	0.000	0.000	0.000
4.104	**-13**	4.104	0.000	0.000
0.000	**-14**	0.000	3.818	0.000
2.106	**-15**	2.106	0.000	3.818
0.000	**-16**	0.000	0.000	0.000
2.336	**-17**	1.308	0.000	0.000
8.015	Average	9.830	10.656	11.226

Grand Traverse County Road Commission

2022 Asset Managment Plan

2022 Asset Plan Locals-from master plan

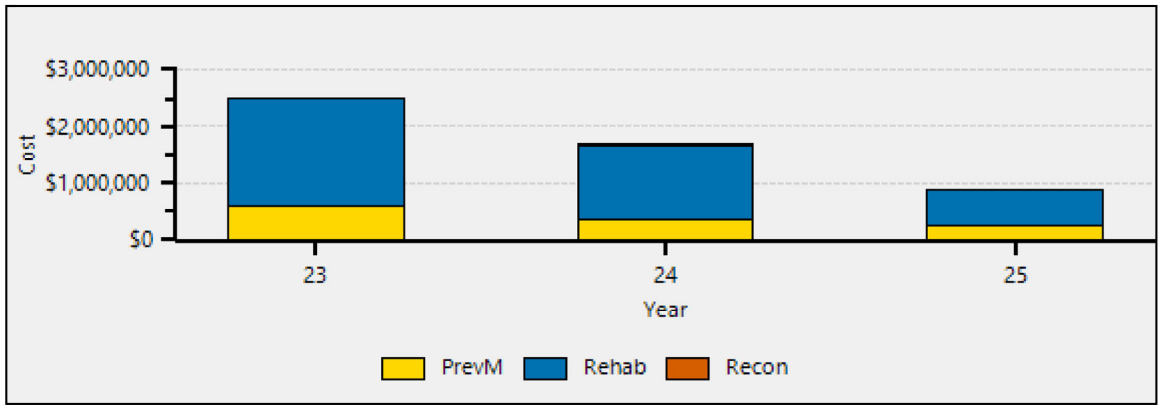
Base Year	2023
Percent Inflation	5
Number of Years	3
Optimized	No
Current Filter	AM Plan Base (County) + Paved: Local

Subtype	Treatment	Trigger	Reset	Cost/Ln Mile	Budget	Lane Miles	Year
Asphalt-Standard	RH (SI) Rehabilitation (R$Model)	4 - 6	9	$99,733.33			
					$442,617	4.438	2023
					$564,650	5.392	2024
					$660,836	6.010	2025
	RH (SI) Rehabilitation Heavy (R$Model)	2 - 4	10	$299,200.00			
					$1,479,245	4.944	2023
					$782,887	2.492	2024
	PM (CPM) Heavy CPM (R$Model)	5 - 7	8	$29,920.00			
					$517,137	17.284	2023
					$63,837	2.032	2024
					$81,873	2.482	2025
	PM (CPM) Post Recon Chip Seal with Fog Seal (R$Model)	8 - 9	9	$27,925.33			
					$67,970	2.434	2023
					$275,095	9.382	2024
					$157,140	5.104	2025

Cost Distribution

Grand Traverse County Road Commission

2022 Asset Managment Plan



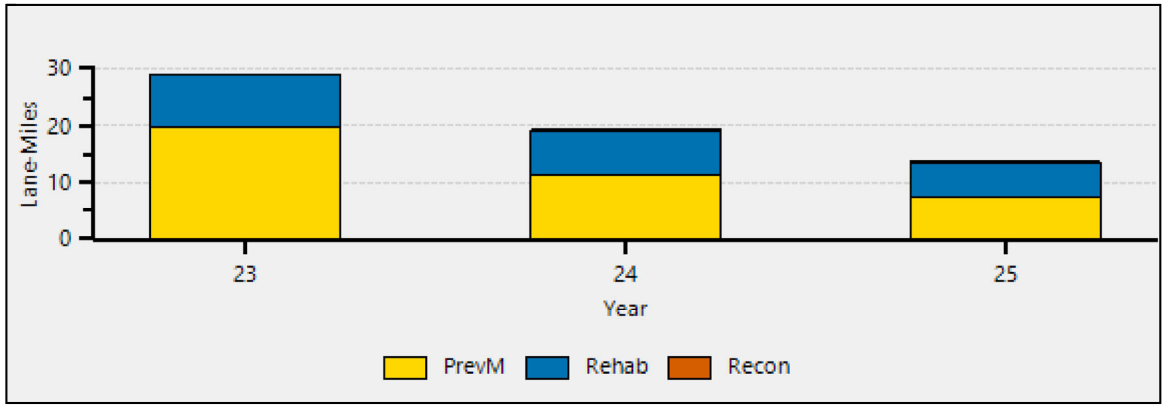
2022 Asset Plan Locals-from master plan

Maintenance Type	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Prev Maint	$585,108	$338,933	$239,014							
Rehab	$1,921,861	$1,347,537	$660,836							
Recon	$0	$0	$0							
Total	$2,506,969	$1,686,470	$899,850							

Grand Traverse County Road Commission

2022 Asset Managment Plan

Maintenance Performed



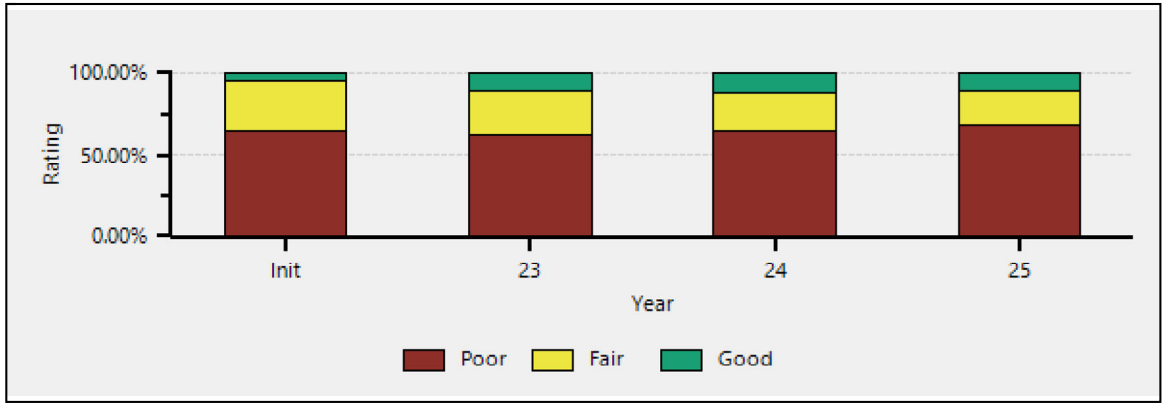
2022 Asset Plan Locals-from master plan

Maintenance Type in Lane Miles	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Prev Maint	19.718	11.414	7.586							
Rehab	9.382	7.884	6.010							
Recon	0.000	0.000	0.000							
Total	29.100	19.298	13.596							

Grand Traverse County Road Commission

2022 Asset Managment Plan

Rating Distribution



2022 Asset Plan Locals-from master plan

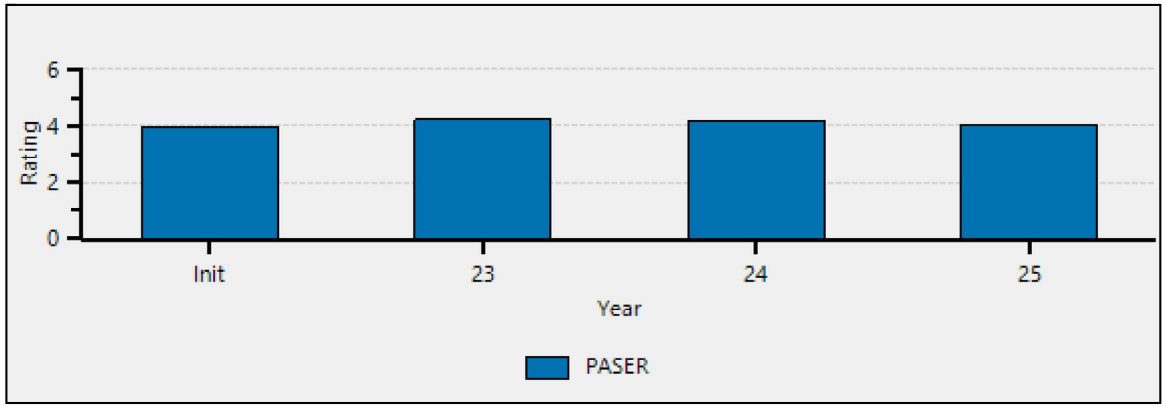
Initial Values

Lane Miles	%	Rating	2023		2024		2025		2026	2027	2028	2029	2030	2031	2032
23.593	4.9	Good	50.259	10.5	55.854	11.7	51.444	10.7							
147.143	30.7	Fair	129.859	27.1	111.747	23.3	100.415	21.0							
308.283	64.4	Poor	298.901	62.4	311.418	65.0	327.158	68.3							
479.019	100.0	Total													

Grand Traverse County Road Commission

2022 Asset Managment Plan

PASER Distribution



2022 Asset Plan Locals-from master plan

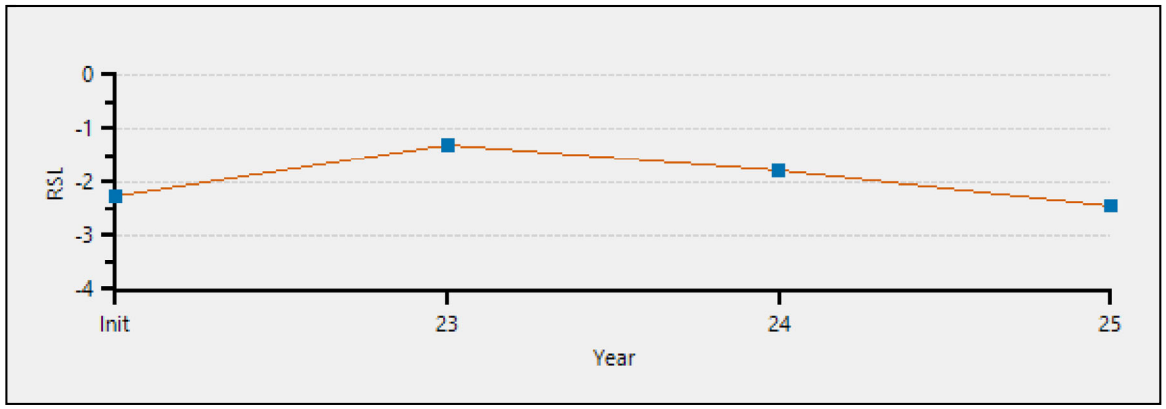
Initial Value

Lane Miles	PASER	2023	2024	2025
0.000	10	4.944	2.492	0.000
1.830	9	8.702	23.154	25.937
21.763	8	36.613	30.208	25.507
34.667	7	34.667	35.928	42.612
38.055	6	38.055	21.716	24.020
74.421	5	57.137	54.103	33.783
130.019	4	125.581	113.766	108.580
65.595	3	65.595	81.471	86.705
42.635	2	37.691	46.147	49.784
70.034	1	70.034	70.034	82.089
3.979	Average	4.221	4.152	4.018

Grand Traverse County Road Commission

2022 Asset Managment Plan

RSL Distribution



2022 Asset Plan Locals-from master plan

Initial Value

Lane Miles	RSL	2023	2024	2025
0.000	**18**	4.944	2.492	0.000
0.000	**17**	3.436	12.331	8.049
1.830	**16**	5.266	10.823	17.888
1.876	**15**	6.197	5.774	11.443
0.000	**14**	4.321	6.705	6.394
17.671	**13**	21.774	4.829	7.050
2.216	**12**	4.321	12.900	0.620
13.588	**11**	13.588	4.321	12.900
11.803	**10**	11.803	13.588	4.321
6.216	**9**	6.216	11.803	13.588
3.060	**8**	3.060	6.216	11.803
10.590	**7**	10.590	3.060	6.216
4.154	**6**	4.154	10.590	3.060
3.912	**5**	3.912	4.154	10.590
19.399	**4**	19.399	3.912	4.154
12.954	**3**	12.954	19.399	3.912
23.782	**2**	23.782	12.954	19.399
37.685	**1**	20.401	21.750	10.472
53.935	**0**	53.935	20.401	21.750
18.504	**-1**	18.504	53.935	20.401
26.910	**-2**	26.910	18.504	53.935
30.670	**-3**	26.232	21.518	12.494
23.594	**-4**	23.594	26.232	21.518
15.581	**-5**	15.581	23.594	26.232
15.692	**-6**	15.692	15.581	23.594

Grand Traverse County Road Commission

2022 Asset Managment Plan

10.728	**-7**	10.728	15.692	15.581
7.902	**-8**	7.902	10.728	15.692
6.618	**-9**	6.618	7.902	10.728
9.252	**-10**	9.252	6.618	7.902
15.281	**-11**	13.919	9.252	6.618
3.582	**-12**	0.000	11.427	9.252
8.712	**-13**	8.712	0.000	11.427
12.861	**-14**	12.861	8.712	0.000
8.003	**-15**	8.003	12.861	8.712
10.832	**-16**	10.832	8.003	12.861
6.538	**-17**	6.538	10.832	8.003
13.106	**-18**	13.106	6.538	10.832
4.706	**-19**	4.706	13.106	6.538
4.174	**-20**	4.174	4.706	13.106
0.160	**-21**	0.160	4.174	4.706
0.240	**-22**	0.240	0.160	4.174
0.236	**-23**	0.236	0.240	0.160
0.220	**-24**	0.220	0.236	0.240
0.000	**-25**	0.000	0.220	0.236
0.000	**-26**	0.000	0.000	0.220
0.000	**-27**	0.000	0.000	0.000
0.246	**-28**	0.246	0.000	0.000
0.000	**-29**	0.000	0.246	0.000
0.000	**-30**	0.000	0.000	0.246
-2.261	Average	-1.300	-1.783	-2.427

Appendix F: Local Road GAP Analysis

Grand Traverse County Road Commission

2022 Asset Managment Plan

2022 Asset Plan Locals-Needed Funding

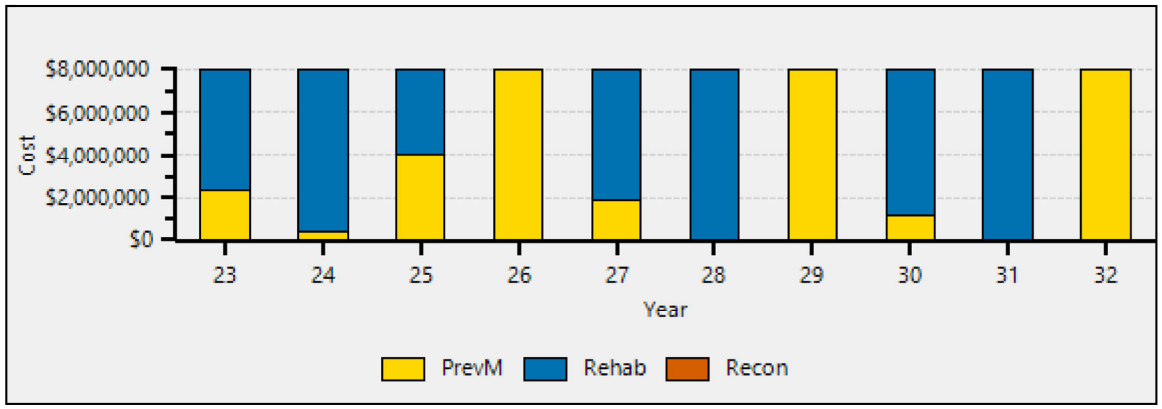
Base Year	2023
Percent Inflation	5
Number of Years	10
Optimized	Yes
Current Filter	AM Plan Base (County) + Paved: Local

Subtype	Treatment	Trigger	Reset	Cost/Ln Mile	Budget	Lane Miles	Year
Asphalt-Standard	RH (SI) Rehabilitation (R$Model)	4 - 6	9	$99,733.33			
					$5,610,124	56.251	2023
					$7,662,965	73.176	2024
	RH (SI) Rehabilitation Heavy (R$Model)	2 - 4	10	$329,868.00			
					$3,975,379	12.051	2025
					$6,119,341	16.826	2027
					$8,000,000	20.950	2028
					$6,911,451	16.417	2030
					$8,000,000	18.097	2031
	PM (CPM) Heavy CPM (R$Model)	5 - 7	8	$29,920.00			
					$2,226,676	74.421	2023
					$327,332	10.419	2024
					$4,024,621	122.007	2025
					$1,880,659	51.712	2027
					$1,088,549	25.856	2030
	PM (CPM) Light CPM (R$Model)	6 - 7	7	$4,288.53			
					$163,200	38.055	2023
					$9,703	2.155	2024
	PM (CPM) Post Recon Chip Seal with Fog Seal (R$Model)	8 - 9	9	$32,327.06			
					$8,000,000	247.471	2026
					$8,000,000	213.774	2029
					$8,000,000	184.666	2032

Cost Distribution

Grand Traverse County Road Commission

2022 Asset Managment Plan



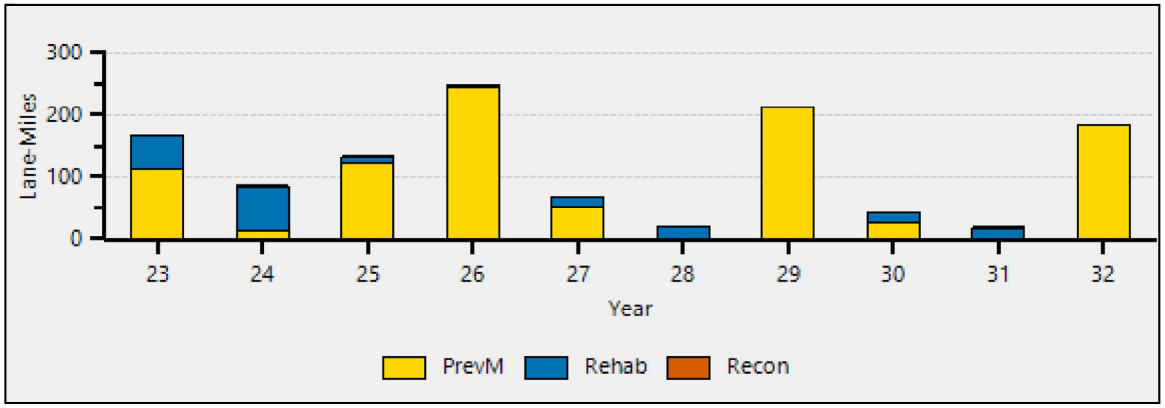
2022 Asset Plan Locals-Needed Funding

Maintenance Type	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Prev Maint	$2,389,876	$337,035	$4,024,621	$8,000,000	$1,880,659	$0	$8,000,000	$1,088,549	$0	$8,000,000
Rehab	$5,610,124	$7,662,965	$3,975,379	$0	$6,119,341	$8,000,000	$0	$6,911,451	$8,000,000	$0
Recon	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total	$8,000,000	$8,000,000	$8,000,000	$8,000,000	$8,000,000	$8,000,000	$8,000,000	$8,000,000	$8,000,000	$8,000,000

Grand Traverse County Road Commission

2022 Asset Managment Plan

Maintenance Performed



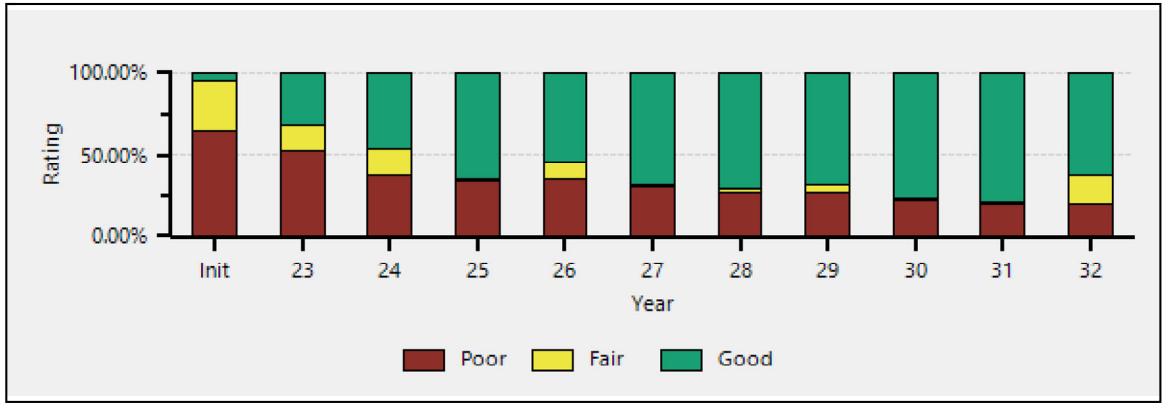
2022 Asset Plan Locals-Needed Funding

Maintenance Type in Lane Miles	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Prev Maint	112.476	12.574	122.007	247.471	51.712	0.000	213.774	25.856	0.000	184.666
Rehab	56.251	73.176	12.051	0.000	16.826	20.950	0.000	16.417	18.097	0.000
Recon	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	168.727	85.750	134.058	247.471	68.538	20.950	213.774	42.273	18.097	184.666

Grand Traverse County Road Commission

2022 Asset Managment Plan

Rating Distribution



2022 Asset Plan Locals-Needed Funding

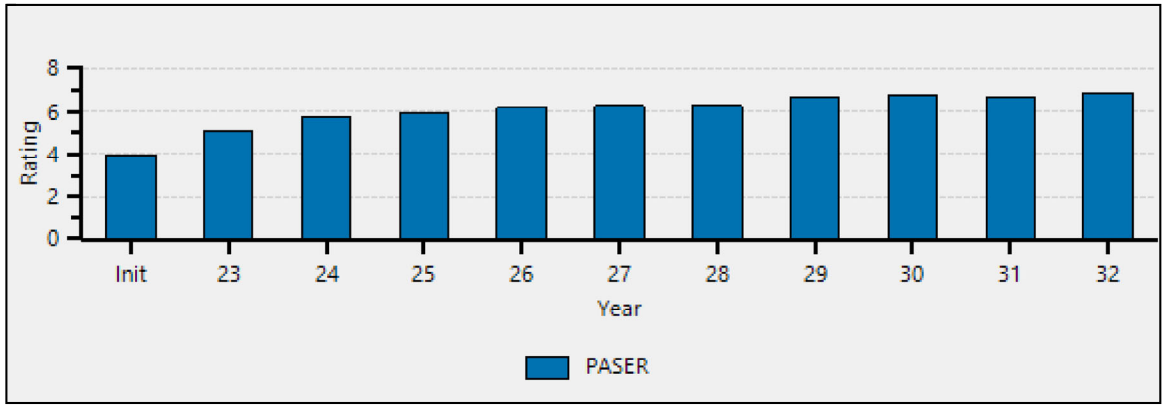
Initial Values

Lane Miles	%	Rating	2023		2024		2025		2026		2027		2028		2029		2030		2031		2032	
23.593	4.9	Good	154.265	32.2	217.040	45.3	312.218	65.2	260.505	54.4	329.043	68.7	337.065	70.4	324.137	67.7	366.410	76.5	378.043	78.9	298.992	62.4
147.143	30.7	Fair	72.723	15.2	83.126	17.4	0.000	0.0	51.712	10.8	0.000	0.0	12.928	2.7	25.856	5.4	0.000	0.0	6.464	1.4	85.515	17.9
308.283	64.4	Poor	252.032	52.6	178.856	37.3	166.805	34.8	166.805	34.8	149.978	31.3	129.028	26.9	129.028	26.9	112.612	23.5	94.515	19.7	94.515	19.7
479.019	100.0	Total																				

Grand Traverse County Road Commission

2022 Asset Managment Plan

PASER Distribution



2022 Asset Plan Locals-Needed Funding

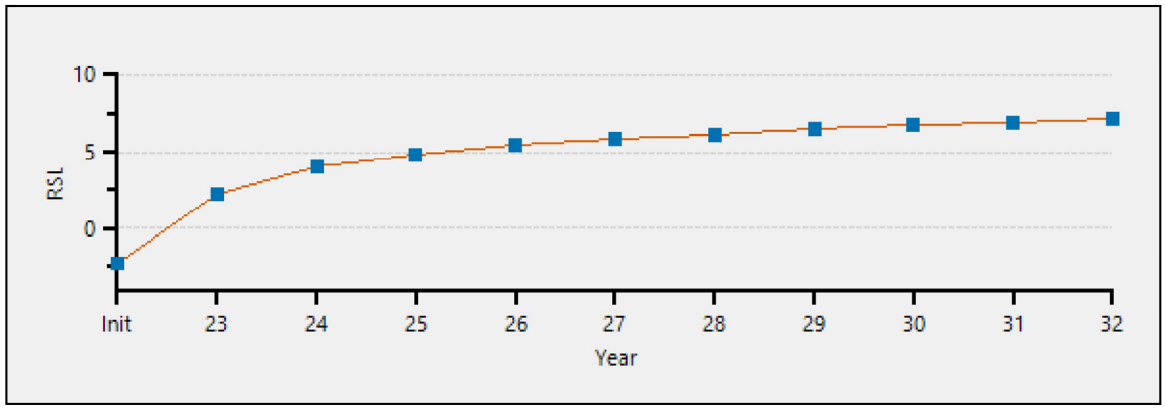
Initial Value

Lane Miles	PASER	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
0.000	10	0.000	0.000	12.051	0.000	16.826	20.950	0.000	16.417	18.097	0.000
1.830	9	58.082	101.302	36.588	259.521	135.786	16.826	251.550	127.837	16.417	219.180
21.763	8	96.183	115.738	263.579	0.984	176.431	299.289	72.587	222.156	343.529	79.812
34.667	7	72.723	83.126	0.000	51.712	0.000	12.928	25.856	0.000	6.464	85.515
38.055	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
74.421	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
130.019	4	73.768	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
65.595	3	65.595	55.239	39.547	24.186	0.000	0.000	0.000	0.000	0.000	0.000
42.635	2	42.635	50.001	37.733	53.094	57.263	36.313	35.773	19.356	1.259	0.000
70.034	1	70.034	73.616	89.525	89.525	92.716	92.716	93.256	93.256	93.256	94.515
3.979	Average	5.111	5.759	5.933	6.208	6.282	6.286	6.660	6.730	6.718	6.898

Grand Traverse County Road Commission

2022 Asset Managment Plan

RSL Distribution



2022 Asset Plan Locals-Needed Funding

Initial Value

Lane Miles	RSL	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
0.000	18	0.000	0.000	12.051	0.000	16.826	20.950	0.000	16.417	18.097	0.000
0.000	17	28.126	36.588	0.000	135.786	0.000	16.826	127.837	0.000	16.417	110.430
1.830	16	29.956	64.714	36.588	123.735	135.786	0.000	123.713	127.837	0.000	108.750
1.876	15	20.481	32.561	95.216	0.984	136.663	135.786	0.000	130.177	127.837	0.000
0.000	14	18.605	23.086	63.063	0.000	13.912	136.663	72.587	6.464	130.177	79.812
17.671	13	36.276	21.210	53.588	0.000	12.928	13.912	0.000	79.051	6.464	0.000
2.216	12	20.821	38.881	51.712	0.000	12.928	12.928	0.000	6.464	79.051	0.000
13.588	11	23.102	21.360	0.000	51.712	0.000	12.928	12.928	0.000	6.464	79.051
11.803	10	21.317	23.641	0.000	0.000	0.000	0.000	12.928	0.000	0.000	6.464
6.216	9	15.730	21.856	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3.060	8	12.574	16.269	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10.590	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4.154	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3.912	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
19.399	4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12.954	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
23.782	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
37.685	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
53.935	0	53.935	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18.504	-1	18.504	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
26.910	-2	1.329	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30.670	-3	0.000	0.592	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
23.594	-4	23.594	0.000	0.592	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15.581	-5	15.581	23.594	0.000	0.592	0.000	0.000	0.000	0.000	0.000	0.000
15.692	-6	15.692	15.581	23.594	0.000	0.592	0.000	0.000	0.000	0.000	0.000

Grand Traverse County Road Commission

2022 Asset Managment Plan

10.728	**-7**	10.728	15.692	15.581	23.594	0.000	0.592	0.000	0.000	0.000	0.000
7.902	**-8**	7.902	10.728	15.692	15.581	23.594	0.000	0.592	0.000	0.000	0.000
6.618	**-9**	6.618	7.902	10.728	15.692	15.581	23.594	0.000	0.592	0.000	0.000
9.252	**-10**	9.252	6.618	7.902	10.728	15.692	11.807	23.594	0.000	0.592	0.000
15.281	**-11**	15.281	9.252	3.819	7.902	1.804	0.000	11.807	18.764	0.000	0.592
3.582	**-12**	3.582	15.281	0.000	3.819	0.000	0.320	0.000	0.220	0.667	0.000
8.712	**-13**	8.712	3.582	15.281	0.000	3.819	0.000	0.320	0.000	0.220	0.667
12.861	**-14**	12.861	8.712	3.582	15.281	0.000	3.819	0.000	0.320	0.000	0.220
8.003	**-15**	8.003	12.861	8.712	3.582	15.281	0.000	3.819	0.000	0.320	0.000
10.832	**-16**	10.832	8.003	12.861	8.712	3.582	15.281	0.000	3.819	0.000	0.320
6.538	**-17**	6.538	10.832	8.003	12.861	8.712	3.582	15.281	0.000	3.819	0.000
13.106	**-18**	13.106	6.538	10.832	8.003	12.861	8.712	3.582	15.281	0.000	3.819
4.706	**-19**	4.706	13.106	6.538	10.832	8.003	12.861	8.712	3.582	15.281	0.000
4.174	**-20**	4.174	4.706	13.106	6.538	10.832	8.003	12.861	8.712	3.582	15.281
0.160	**-21**	0.160	4.174	4.706	13.106	6.538	10.832	8.003	12.861	8.712	3.582
0.240	**-22**	0.240	0.160	4.174	4.706	13.106	6.538	10.832	8.003	12.861	8.712
0.236	**-23**	0.236	0.240	0.160	4.174	4.706	13.106	6.538	10.832	8.003	12.861
0.220	**-24**	0.220	0.236	0.240	0.160	4.174	4.706	13.106	6.538	10.832	8.003
0.000	**-25**	0.000	0.220	0.236	0.240	0.160	4.174	4.706	13.106	6.538	10.832
0.000	**-26**	0.000	0.000	0.220	0.236	0.240	0.160	4.174	4.706	13.106	6.538
0.000	**-27**	0.000	0.000	0.000	0.220	0.236	0.240	0.160	4.174	4.706	13.106
0.246	**-28**	0.246	0.000	0.000	0.000	0.220	0.236	0.240	0.160	4.174	4.706
0.000	**-29**	0.000	0.246	0.000	0.000	0.000	0.220	0.236	0.240	0.160	4.174
0.000	**-30**	0.000	0.000	0.246	0.000	0.000	0.000	0.220	0.236	0.240	0.160
0.000	**-31**	0.000	0.000	0.000	0.246	0.000	0.000	0.000	0.220	0.236	0.240
0.000	**-32**	0.000	0.000	0.000	0.000	0.246	0.000	0.000	0.000	0.220	0.236
0.000	**-33**	0.000	0.000	0.000	0.000	0.000	0.246	0.000	0.000	0.000	0.220
0.000	**-34**	0.000	0.000	0.000	0.000	0.000	0.000	0.246	0.000	0.000	0.000
0.000	**-35**	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.246	0.000	0.000
0.000	**-36**	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.246	0.000
0.000	**-37**	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.246
-2.261	Average	2.159	4.026	4.828	5.401	5.814	6.077	6.536	6.770	6.904	7.166

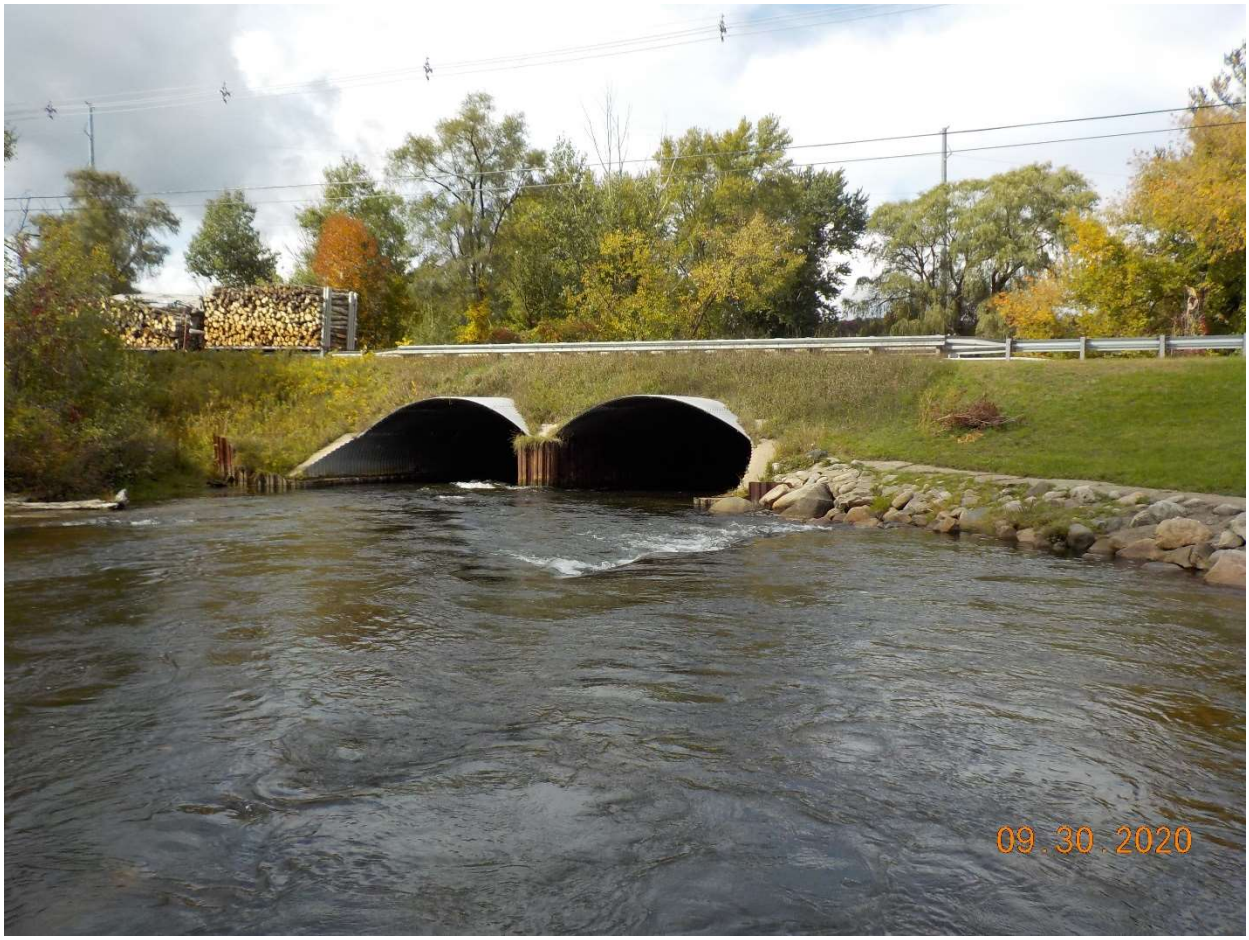
Appendix G: 2020 Bridge Inspection Summary

ARCHITECTS. ENGINEERS. PLANNERS.

OHM Advancing Communities℠

Grand Traverse County Road Commission

2020 Bridge Inspections



OHM Advisors File 7371-20-0040

April 16, 2021

Grand Traverse County Road Commission

2020 Bridge Inspections

The Grand Traverse County Road Commission (GTCRC) has 21 structures on the MDOT MiBridge inventory, including 20 that classify as NBI bridges and 1 structure that is Non-NBI (less than 20 feet). Since the last report two structures have been added to the inventory. East Duck Lake Road (SN14137) over Mason Creek is a timber bridge constructed in 2019 that replaced a small culvert. Old M-137 (SN3053) over Duck Lake Drain, south of Interlochen, is a concrete slab structure that was widened with steel beams and deck on each side. The roadway and bridge has been turned over to GTCRC from MDOT. The structure has a clear span of about 16 feet and is the Non-NBI structure in the inventory.

Bridge inspections for 2020 were completed in March of 2020 on bridges that required annual inspection and on the new East Duck Lake Road bridge. The remaining bridges were inspected in September 2020 and the annual inspections were performed again in September 2020. These inspections were done earlier than required to put them in a better month for inspecting. The March inspections were difficult due to ice and snow still on the ground and higher flows due to spring runoff in the rivers. Moving the inspections allows for safer inspections and better observation of the bridge conditions.

The bridge inspection reports for the 21 structures were updated into MDOT's MiBridge system online. For these inspections, Alan Halbeisen, PE served as the Qualified Team Leader and input the reports. QC review of the bridge inspection reports for the calendar year 2020 were completed in January 2021 by Jim Rintalla and are included with the OHM QC Program and inspection qualifications for Alan.

MDOT Bridge Advisory BA-2019-03 requires that existing plans or sketches and load rating calculations or models be uploaded to MiBridge. OHM gathered plan information and existing load ratings from GTCRC to compile this information and upload to MiBridge. Some structures did not have load rating information available and required the ratings to be generated or updated. We prepared, check and uploaded load ratings to MiBridge for the following bridges;

- SN3058 Diamond Park Road - updated load rating due to increased deterioration of strands
- SN3059 Beitner Road- updated to answer MDOT load rating review vs. condition of structure
- SN 3062 Scharmen Road – new load rating for steel culverts
- SN 3063 Brown Bridge Road – new load rating for steel culverts
- SN 3064 Brown Bridge Road – new load rating for timber panel bridge
- SN 3065 Supply Road – new load rating for steel culverts
- SN3069 Co Road 611 (Garfield) – updated based on detailed inspection and weight limits posted
- SN 13287 Business Park Drive – prepared judgement rating for precast concrete arch
- SN 14353 East Duck Lake Road – input load ratings based on timber manufacturer design

Applications for MDOT Local Agency Bridge funding for both Beitner Road and Diamond Park were prepared and submitted in April 2020 and updated and resubmitted in March 2021. Beitner Road due to it's high cost has to go to the Large Bridge Advisory committee. To gain interest from this committee the GTCRC agreed to raise the local share commitment above the minimum 5%, hoping to get part of the funding from the MDOT North Region that will help to lessen the amount needed from the Large Bridge committee.

The GTCRC bridge inventory consists of the following types of bridges.

Steel Pipe Culverts

Grand Traverse County Road Commission has a large number of twin pipe culverts that "classify" as bridges per the FHWA definition with a combination of pipe span and fill between pipes greater than 20 feet. These structures do not have the same types of maintenance items, but do suffer from the same deterioration causes, salt and moisture. As the age of these structures is increasing there is a need to look at replacements or rehabilitation. These structures, primarily located on the Boardman River and it's branches, also need to be considered for their hydraulic capacity and recreational value. Ongoing efforts to improve the environmental conditions on the Boardman River, such as removing dams, will put more emphasis on replacing these.

There are a total of eight structures that consist of twin corrugated metal pipe (CMP) culverts with a combined length greater than 20 feet. Most of these structures were built in the 1950's and 1960's, and are in fair to good condition overall. While minor maintenance items are needed for most of them, their long term replacement costs will be very significant once their galvanization is compromised and corrosion sets in.

The twin pipe culverts at **Beitner Road over the Boardman River** are corroding in a critical location at the base of the arches at the center pier support, which consists of steel sheet piling that is also corroding. The condition rating has been reduced to poor condition and application for replacement funding has been submitted to MDOT. Due to the anticipated length and width of this bridge the replacement cost puts it in the Large Bridge category for funding in the North Region.

The **South Airport Road over the Boardman River** culverts are in fair condition and are critical to the area road network. There are two sets of twin pipe culverts, one for eastbound traffic and one for westbound, so there are technically two bridges at this location. The slopes at each end of these culverts are very steep and subject to erosion. The erosion affects the embedment of guardrail posts. The South Airport Road culverts are located at the south end of Boardman Lake, whose water level is controlled by a dam. However, there is still has a relatively strong current and a consistently high water level. Corrosion inside of the culverts is hard to monitor due to the fast velocities and high water levels.

Replacement of the South Airport Road culverts with a longer clear span structure would benefit the river and master plans for land and water trails. The replacement could possibly be located to the east of the current culvert locations where the river once was located. Currently there is a single culvert at that location that is not on the bridge inventory.

Supply Road over the Boardman River has moderate rusting at the water surface and has a higher volume of traffic than most of the remaining culverts.

The steel culverts typically have steep side slopes with slope protection issues that should be monitored or repaired. The twin culverts typically restrict the natural river flow, resulting in high velocity flow inside of the culverts.

Precast Concrete Box/Arch Structures

There are five of these type structures owned by the GTCRC. Two are 2 precast concrete arches over the GLC Railroad, and the other three are precast concrete boxes or three-sided arches over Mitchell Creek. As the age of all these structures is less than 20 years old, they are in good condition, with the exception of the Business Park Drive structure, which is in fair condition. It is not anticipated that there will be large maintenance costs for these structures over the next decade. Some work on the fascias of the Business Park Driver precast concrete arches is recommended.

Precast Concrete Beam Bridges

There are a total of four precast concrete beam bridges owned by GTCRC. Two of the bridges are located on **River Road over the Boardman River**. These two bridges in poor condition and are scheduled to have their superstructures replaced in 2021 with Local Bridge Program funds. The new bridges will have galvanized steel tub girders with concrete decks.

Diamond Park Road over the Little Betsie River is a precast concrete box beam bridge built in 1970. It is rated in fair condition and is posted for weight limits. It has deck surface and box beam deterioration issues. The condition rating has been reduced to serious condition and application for superstructure replacement funding has been submitted to MDOT.

The fourth precast concrete beam bridge is the **Cass Road bridge over the Boardman River**, constructed in 2016 and is in good condition. Preventive maintenance, including thin epoxy overlay on the deck, should be considered within 10 years to maintain this good condition.

Timber Bridges

GTCRC now owns two timber bridges, a single three span timber bridge, **Brown Bridge Road over the Boardman River** and the new single span **East Duck Lake Bridge over Mason Creek**. Brown Bridge Road was built in the 1977 and is starting to show its age. It is in fair condition, with resurfacing and waterproofing recommended to maintain it's condition.

Steel Bridges

Currently there is a single steel beam bridge owned by GTCRC, **County Road 611 (Garfield Road) over the Boardman River**. Rehabilitation with superstructure replacement with new galvanized steel beams funded by the MDOT Local Bridge Program is planned for summer 2021.

Concrete Slab Bridges

The structure on **Old M-137 over Duck Lake Drain** consists of a reinforced concrete slab structure on concrete abutments, that was widened with steel beams and deck on each side. There is some spalling on the bottom of the concrete slab that should be patched to prevent further deterioration.

Photographs (.jpeg files) of each structure are provided in folders designated with the Structure Number. A log of the photos is also provided.

Appendix H: Summary of Preservation Criteria

APPENDIX B SUMMARY OF PRESERVATION CRITERIA

Preservation Action	Bridge Selection Criteria	Expected Service Life
Replacement		
Total Replacement	- NBI Rating of 3 or less - *or* when cost of rehabilitation exceeds cost of replacement	70 years
Superstructure Replacement	- NBI Rating for superstructure of 4 or less - *or* when cost of rehabilitating superstructure and deck exceeds replacement cost	40 years
Deck Replacement • Epoxy Coated Steel • Black Steel	Use guidelines in MDOT's *Bridge Deck Preservation Matrix* - NBI Rating of 4 or for deck surface and deck bottom - *or* when deck replacement cost is competitive with rehabilitation	 70 years 40 years
Rehabilitation		
Concrete Deck Overlays • Deep • Shallow • HMA/Membrane • HMA Cap	Guidelines in MDOT's *Bridge Deck Preservation Matrix* NBI Deck Rating <5 for surface and >5 for bottom NBI Deck Rating <5 for surface and >4 for bottom NBI Deck Rating <5 for surface and >4 for bottom NBI Deck Rating <5 for surface and <4 for bottom	 25 years 12 years 8 years 3 years
Railing Retrofit/Replacement	- NBI Deck Rating greater than 5 - *or* Railing/Barrier rated less than 5 - *or* Safety Improvement is needed	
Steel Beam Repairs	- More than 25% section loss is present in an area of the beam that affects load carrying capacity - *or* in order to correct damage that impairs beam strength	
Prestressed Concrete Beam Repairs	- Repair ends of prestressed I-beams when more than 5% spalling is present - *or* repair areas to correct impact damage that impairs beam strength or exposes prestressing strands	
Repair/Replace Culvert	- NBI Rating of 4 or less for culvert or drainage outlet structure - *or* existence of open vertical cracks, signs of deformation, movement, or differential settlement	
Pin and Hanger Replacement	- NBI Rating for elements is 4 or lower; presence of excessive section loss, severe pack rust, or out-of-plane distortion	
Substructure Concrete Patching and Repair	- NBI Rating for abutments or piers is 5 or 4 and less than 30% of the surface is spalled and delaminated - *or* in response to inspector's work recommendation for substructure patching	

APPENDIX B SUMMARY OF PRESERVATION CRITERIA

Preservation Action	Bridge Selection Criteria	Expected Service Life
Preventive Maintenance		
Repair/Replace Deck Joint	- Include when doing deep or shallow overlays - *OR* NBI Rating for joint is 4 or lower - *OR* joint is leaking heavily	
Repair/Replace Steel Bearing	- NBI Rating for girders and deck is 5 or higher and rating for bearings is 4 or lower	
Complete Painting	- NBI Rating for paint condition is 3 or lower - *OR* in response to inspector's work recommendation for complete painting	15 years
Zone Painting	- NBI Rating for paint condition is 5 or 4 - *OR* less than 15% of existing paint area has failed and remainder of paint system is in good or fair condition	10 years
HMA Overlay Cap without Membrane	- NBI Rating of 3 or less for deck surface and deck bottom; temporary holdover to improve ride quality for a bridge in the 5-year plan for rehab/replacement	3 years
Concrete Deck Patching	- Deck Surface Rating of 5, 6, or 7 with minor delamination and spalling - *OR* in response to inspector's work recommendation	5 years
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	- Structure is categorized as scour critical and is not scheduled for replacement; NBI comments in abutment and pier ratings indicate presence of scour holes	

APPENDIX B 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 - *OR* in response to inspector's work recommendation	2 years
Vegetation Control	- When vegetation traps moisture on structural elements or is growing from joints or cracks - *OR* in response to inspector's work recommendation for brush cut	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
Drainage System Clean-Out/Repair	- When drainage system is clogged with debris or drainage elements are broken, deteriorated, or damaged	2 years
Spot Painting	For zinc-based paint systems only - In response to inspector's work recommendation	5 years
Seal Concrete Cracks/Joints	- Concrete is in good or fair condition, and cracks extend to the depth of the reinforcement - *OR* in response to inspector's work recommendation	5 years
Repair/Replace HMA Surface	- 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	
Minor Concrete Patching	- Repair minor delaminations and spalling - *OR* in response to inspector's work recommendation	
Timber Repairs	- NBI Rating of 4 or less for timber members - *OR* to repair extensive rot, checking, or insect infestation	
Repair/Replace Guard Rail	- Guard rail missing or damaged - *OR* safety improvement is needed	
Repave Approaches	- HMA is in poor condition - *OR* in response to inspector's work recommendation	
Repair Slopes	- NBI Rating is 5 or lower - *OR* when slope is degraded or sloughed - *OR* slope paving has significant areas of distress, failure, or has settled	
Install Riprap	To protect surface when erosion threatens the stability of side slopes of channel banks	

Appendix I: Glossary and 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.[1]

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".[2]

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.

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.

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[1] https://en.wikipedia.org/wiki/Crocodile_cracking

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

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.[3]

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.

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 buildup 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.[4]

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".[5] Roads that are part of the federal-aid network are eligible for federal gas-tax monies.

FHWA: See *Federal Highway Administration.*

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[3] Adapted from Inventory-based Rating System for Gravel Roads: Training Manual
[4] Federal Highway Administration webpage https://www.fhwa.dot.gov/
[5] Inventory-based Rating System for Gravel Roads: Training Manual

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 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.[6]

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.[7]

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.[8]

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[6] Inventory-based Rating System for Gravel Roads: Training Manual
[7] Inventory-based Rating System for Gravel Roads: Training Manual
[8] https://www.fhwa.dot.gov/interstate/faq.cfm#question3

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.[9]

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.

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.

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

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 Public Act 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.[10]

Michigan Public Act 325 of 2018: Also known as Public Act 325, this legislation modified Public Act 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.[11]

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 council reports directly to the Michigan Infrastructure Council.[12] 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*.

[10] Inventory-based Rating System for Gravel Roads: Training Manual
[11] Inventory-based Rating System for Gravel Roads: Training Manual
[12] Inventory-based Rating System for Gravel Roads: Training Manual

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.[13]

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.

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.

[13] https://www.fhwa.dot.gov/bridge/nbis/

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.[14]

Pothole: A defect in a road that produces a localized depression.[15]

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*.

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.[16]

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.[17]

Ruts/rutting: Deformation of a road that usually forms as a permanent depression concentrated under the wheel path parallel to the direction of travel.[18]

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[14] Adapted from Inventory-based Rating System for Gravel Roads: Training Manual
[15] Inventory-based Rating System for Gravel Roads: Training Manual
[16] Inventory-based Rating System for Gravel Roads: Training Manual
[17] Inventory-based Rating System for Gravel Roads: Training Manual
[18] Paving Class Glossary

Scheduled maintenance: Low-cost, day-to-day activities applied to bridges on a scheduled basis that mitigates deterioration.[19]

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).[20]

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 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.[21]

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.

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[19] Inventory-based Rating System for Gravel Roads: Training Manual
[20] Inventory-based Rating System for Gravel Roads: Training Manual
[21] [second sentence] http://www.kentcountyroads.net/road-work/road-treatments/ultra-thin-overlay

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.[22]

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.[23]

Washboarding: Ripples in the road surface that are perpendicular to the direction of travel.[24]

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

AMP: Asset Management Plan
CPM: Capital preventive maintenance
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

[22] https://en.wikipedia.org/wiki/Trunk_road
[23] https://en.wikipedia.org/wiki/Trunk_road
[24] Inventory-based Rating System for Gravel Roads: Training Manual

Appendix J: Resolution of Acceptance

MINUTES
FOR THE BOARD OF COUNTY ROAD COMMISSIONERS OF
GRAND TRAVERSE COUNTY
REGULAR BOARD MEETING OF
THURSDAY, OCTOBER 27, 2022 – 7:00 P.M.
1881 LAFRANIER ROAD, TRAVERSE CITY MI 49696

1. PLEDGE OF ALLEGIANCE
Underwood led in the Pledge of Allegiance.

2. ROLL CALL
Jason Gillman - Present
Carl J. Brown – Present
Haider Kazim – Absent and Excused
Alan Leman - Present
Joe Underwood - Present

3. APPROVAL OF AGENDA
Motion by Underwood, seconded by Brown, to approve the agenda.

CARRIED Unanimously

4. CONFLICT OF INTEREST
No conflict of interest was offered at this time.

5. PUBLIC COMMENT
No Public Comment was offered at this time.

6. ACTION ITEMS
A. Appointments
7:05 PM – Dan Olsen questioned the decertification of Bluff Road and would like more information on that. He is concerned that decertifying Bluff Road would impact any AARP Funds, Storm Grants, etc.

He asked that the shoreline stabilization still take place to prevent any further issues with Bluff Road. He also asked staff to then work on getting permits for contractors to do the stabilization.

Lastly, he asked that the money going to purchase the vacuum equipment be used instead on Bluff Road.

Kluczynski stated that the decertification would happen in March, which would allow time to still work towards grants.

7:15 PM – Josh Francis gave an update to commissioners. He stated that he has spoken with the two township supervisors. He also spoke with Schiffer and the residents are leaning towards widening and ditching. He will be meeting with Schiffer again to create a plan to proceed with an SAD.

B. Consent Calendar
Motion by Brown, seconded by Leman, to approve the Consent Calendar.

1. Minutes
   The Board approves the minutes of Regular Meeting of September 22, 2022.

2. Payroll
   The Board approves Payroll #22-19 and #22-20 for $134,120.08 and $144,645.57, respectively.

3. Accounts Payable
   The Board approves Accounts Payable in the amounts of $1,202,291.49, $1,687,285.79, and $800,162.57.

4. Financial Reports
   The Board accepts the October 2022 MTF and September Financial Statements.

5. Reports and Communications
   The Board directs staff to receive, file and respond to communications, as necessary.

ROLL CALL VOTE:
YEAS: Leman, Underwood, Brown, Gillman
NAYS: None
ABSENT: Kazim
CARRIED Unanimously

C. Items Removed From The Consent Calendar
No items were removed from the Consent Calendar.

D. NEPA
Kluczynski stated this is the next process for the actual build and permitting. It is a very large bridge and a very high bridge. This portion will look into property acquisition, construction, funding, etc. Bill Zipp has put together a proposal for this next step with documentation of cost changes due to inflation and findings from the previous study.

Zipp stated that the PEL Process went well, and the next phase is NEPA, National Environmental Policy Act. This is a federal aid document. The PEL identified elements of the project, risks, and discovery (long/high bridge to minimize impact, TSL (Type, Size, Location), etc.). The PEL process also determined if a new crossing was needed and where it would go. Finally, reconstruction of South Airport Road. Resource Agencies want to look at anything that could be done to South Airport, as an option. So, this will be looked into.

Gillman stated that this process can be frustrating. All this money and studies to basically determine what we all knew.

Brown questioned how long the South Airport process would take.

Zipp stated it should not take that long and will coincide with other work being done.

Zipp then went to discuss a time frame for the three categories of NEPA. First, Environmental Impact Statement. Second, Categorical Exclusion. Third, Environmental Assessment. The Environmental Assessment must be done within 12 months. Looking at 14-15 months for the process. The Feds, if happy with our information, would then issue a FONSI. (Finding of No Significant Impact) It will need to be on a STIP (State Transportation Improvement Program) and need to prove it is a real project.

Funding for the next phase would need to be in place. The next phase is ROW Acquisition and/or Design. The Road Commission cannot start acquiring property until the FONSI is in place.

Gillman asked if they have spoken to Garfield Township regarding their Master Plan.

Zipp stated that we are consistent with their master plan.

Zipp then stated that the design phase is roughly a 2-year process (2026). Construction could then start in 2027. After FONSI is issued, there is a 5-year time period to move forward. If this doesn't happen, another study would have to take place.

Motion by Underwood, seconded by Brown to approve OHM to move forward with the NEPA phase in the amount of $1,800,000.00, more or less.

ROLL CALL VOTE:
YEAS: Underwood, Brown, Leman, Gillman
NAYS: None
ABSENT: Kazim
CARRIED Unanimously

E. Systematic Signal Infrastructure Inspection
Schoonover stated that 2 bids were received. They had a follow up with both bidders. One of the bidders had more experience in this area.

Gillman stated the difference was quite significant, is the other bidder not qualified.

Schoonover stated that he had asked the lower bidder if they would be bringing up another team to do the project. It would be a local team that doesn't have the experience yet.

Motion by Brown, seconded by Leman to approve J. Ranck for the Systematic Signal Infrastructure Inspection in the amount of $54,400.00, more or less.

ROLL CALL VOTE:
YEAS: Brown, Leman, Underwood, Gillman
NAYS: None
ABSENT: Kazim
CARRIED Unanimously

F. Traffic Signal Pedestrian Detection Project
Schoonover stated that there are several intersections with partial detection. These intersections must wait for a crosswalk to expire, even when no pedestrian is around.

Motion by Underwood, seconded by Brown to approve Windemuller for the Traffic Signal Pedestrian Detection Project in the amount of $58,112.89, more or less.

ROLL CALL VOTE:
YEAS: Leman, Underwood, Brown, Gillman
NAYS: None
ABSENT: Kazim
CARRIED Unanimously

G. Timber Hills SAD Agreement

Schoonover stated that this is the final process for East Bay Township. This project estimated cost is $151,721.95. East Bay Township will re-imburse GTCRC for the project costs in the amount of 70% of total actual costs, which is estimated to be $106,205.37.

Motion by Leman, seconded by Brown to authorize the necessary signers to sign the Special Assessment District Agreement for Timber Hills.

ROLL CALL VOTE:
YEAS: Leman, Underwood, Brown, Gillman
NAYS: None
ABSENT: Kazim
CARRIED Unanimously

H. MDOT Cost Participation Agreement for Voice Road HMA Overlay w/Chip Seal Interlay

Schoonover stated this is a standard MDOT Cost Participation Agreement for Federal Aid Projects. This project is from Garfield Road to Pierce. It is a hot mix asphalt overlay with Chip Seal interlayer. Work will consist of widening shoulders, concrete curb and gutter, guardrail and permanent pavement markings. The total cost of the project is $1,357,500.00.

Gillman questioned the difference between prevailing wage and if we just did it.

Schoonover stated that we are in/around 20% of project costs, getting the federal funding is worth it.

Staff is requesting the board to approve the contract with MDOT, our cost participation with them. They will have a contract with the contractor. They will pay the contractor, we will pay MDOT.

Motion by Underwood, seconded by Brown to accept the MDOT Cost Participation in the amount of $1,357,500.00, more or less.

I. 2023 Regular Board Meeting and Holiday Schedule

Kluczynski stated this is the schedule for 2023. The Organizational Meeting will be held at 6:00PM, before the Regular Board Meeting on January 26, 2022. The November Meeting is suggested to be held on the Tuesday before Thanksgiving. Lastly, the December meeting will be December 14th, 2023, to allow traveling/vacations around the Holiday.

Motion by Leman, seconded by Brown to approve the 2023 Regular Board Meeting and Holiday Schedule.

CARRIED Unanimously

J. 2022 GTCRC Asset Management Plan and submittal to TAMC

Kluczynski stated a copy of the Asset Management Plan was at each commissioner's station. He stated that we are asking for approval to turn into the state in the month of October, any minor changes can still be adjusted. This is required by the Asset Management Council.

Gillman clarified that we are doing more with preservation.

Schoonover stated that we are making our goals and now are able to focus more on local roads.

Leman questioned the contractor issue with chip seal.

Schoonover stated that a local contractor was unable to complete their work due to the weather two years ago. They were supposed to finish up the following year. We kept getting pushed back, when we should have been first, as we were a roll-over from the previous year. We have terminated the contract and these additional roads will be added to the bid for next year.

Brown asked if we could get a performance bond for a situation like this.

Schoonover stated that the contractor was good in the first year. He added that we need to strengthen our contract language to avoid issues like this.

Gillman asked if we could build into our contract a bonus type clause or additional charges if not completed on time.

Schoonover stated that our contract does have liquidated damages.

Motion by Underwood, seconded by Brown to approve the Asset Management Plan for submittal to TAMC.

ROLL CALL VOTE:
YEAS: Brown, Underwood, Gillman
NAYS: Leman
ABSENT: Kazim
CARRIED

K. Bluff Road Discussion
Leman stated that they had met in September, and it was determined that we don't have the money to fix Bluff Road. The engineered fix is the best approach at this point. At this point, the road should be closed until funding is available.

Isaiah Wunsch, supervisor for Peninsula Township, thanked all the commissioners for serving. He stated that he understands it is an expensive fix and the township is looking into funding. They are requesting a letter of recommendation from the GTCRC in support of ARPA Funds. The best interest for the residents is to keep it open.

Leman asked that staff create a letter of recommendation for ARPA Funds.

Kluczynski asked Wunsch to get him that information and it would be taken care of.

7. INFORMATIONAL ITEMS
A. Manager's Comments
Kluczynski stated that it was a good presentation at the commissioners meeting on how strategic plans should look. He asked that the commissioners review it.

He also mentioned getting back to policy updates.

Gillman stated that certain policies should go to the committees that were created.

Kluczynski also stated that the Financial Manager position has been posted.

Lastly, he stated that a Special Meeting/Work Session needs to be scheduled for discussion on the 2023 Budget.

LaCross did a presentation on Citizen Reporter where residents can directly report a problem. This can be accessed from your phone, tablet or any web-based device. This will go live on November 1st, 2022.

B. Commissioners' Comments, Questions and Future Agenda Items

Underwood stated that he had three dead deer near his house that were hit by vehicles. He added that elected officials are working on getting the DNR to pay us for deer that are picked up.

Brown, Leman and Gillman had no additional comments.

8. PUBLIC COMMENT

Dave McClary, of Mallard Drive, stated that a lot of Bluff Road issues were due to high water level. He questioned what decertifying the road would mean and what benefit does it have. He added that he feels preventative measures need to take place.

Todd Wilson, of Ne Ah Ta Wanta Road, stated that Bluff Road is used for recreational use. Stabilization needs to occur.

Mike Skurski, of Mallard Drive, stated that strategic thinking is good and to look at other things, how strategy drives policy.

Jim Raphael, Mallard Drive, thanked the commissioners for setting up the committee for Bluff Road. He feels it is very helpful. He agreed that Bluff Road is a major recreational area for residents. He believes that the utilities did cause some Bluff Roads issues.

Dan Olsen added that he has spoken with DTE, and they might assist.

9. ADJOURNMENT

Upon a motion made by Leman and seconded by Gillman, the Board adjourned at 9:02 PM.

Kylie Carpenter

Kylie Carpenter, Clerk

Jason Gillman, Chair