Huron County Road Commission 2023 Pavement Asset Management Plan

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

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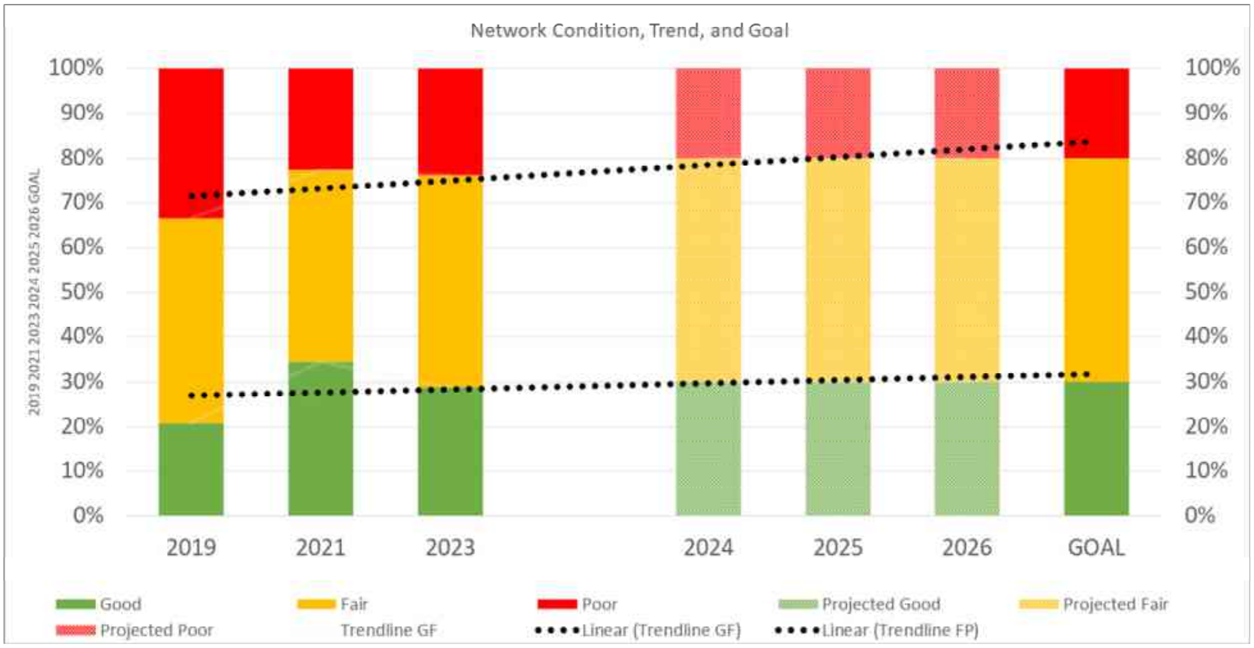
EXECUTIVE SUMMARY

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

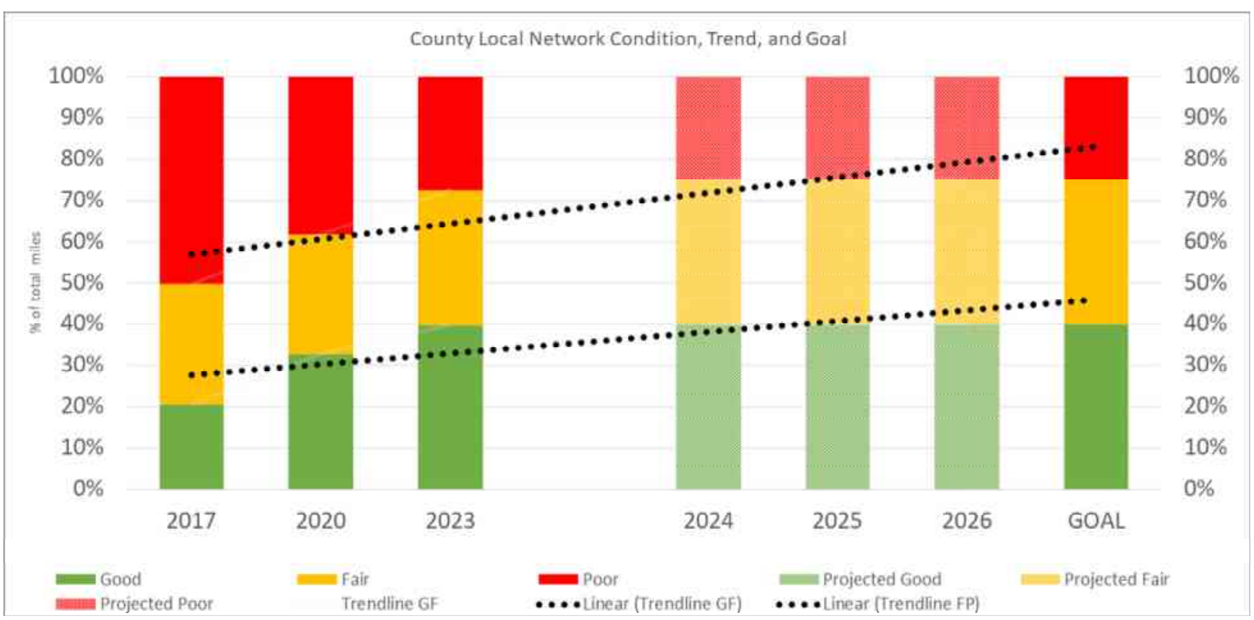
This plan overviews HCRC's road assets and condition, and explains how HCRC works to maintain and improve the overall condition of those assets. These explanations can help answer the following questions:

- What kinds of road assets HCRC has in its jurisdiction, who owns them, and the different options for maintaining these assets.
- What tools and processes HCRC uses to track and manage road assets and funds.
- What condition HCRC'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 HCRC's road assets' normal life cycle.
- What condition HCRC can expect its road assets if those assets continue to be funded at the current funding levels
- How changes in funding levels can affect the overall condition of all of HCRC's road assets.

HCRC owns and/or manages 1633.02 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 HCRC 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:

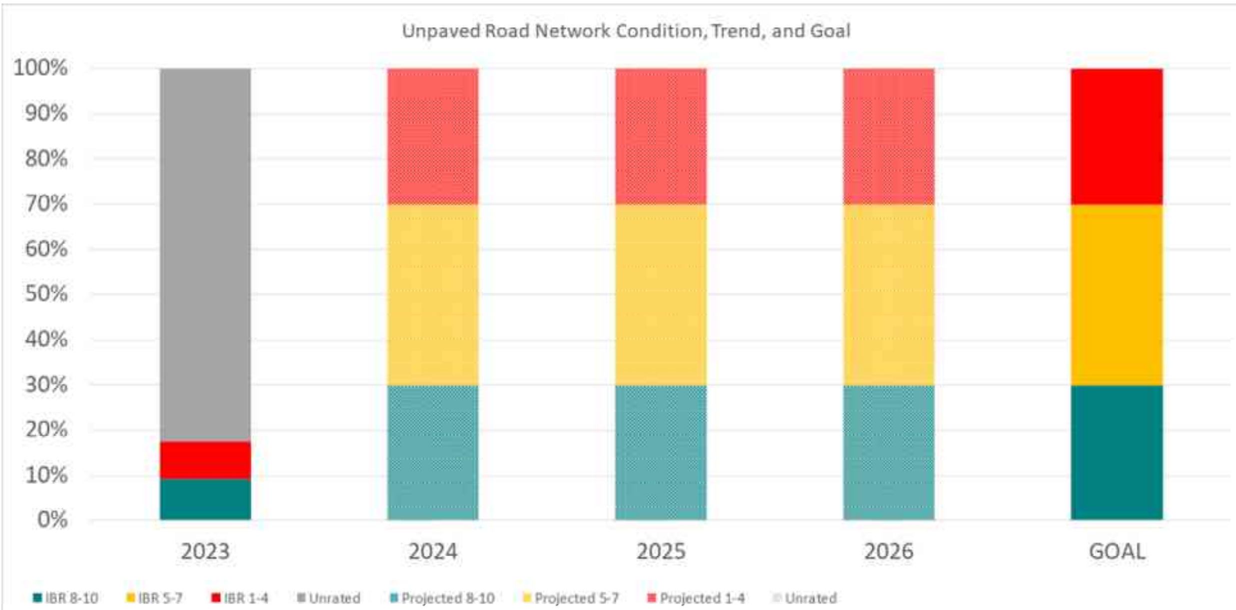


Network Condition, Trend, and Goal
2019 2021 2023 2024 2025 2026 GOAL
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2019
2021
2023
2024
2025
2026
GOAL
Good
Fair
Poor
Projected Good
Projected Fair
Projected Poor
Trendline GF
Linear (Trendline GF)
Linear (Trendline FP)



County Local Network Condition, Trend, and Goal
% of total miles
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2017
2020
2023
2024
2025
2026
GOAL
Good
Fair
Poor
Projected Good
Projected Fair
Projected Poor
Trendline GF
Linear (Trendline GF)
Linear (Trendline FP)

A summary of HCRC historical and current network conditions, projected trend and goal for the unpaved road network can be seen in the figure, below:



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

INTRODUCTION

Asset management is defined by Public Act 325 of 2018 as "an ongoing process of maintaining, preserving, upgrading, and operating physical assets cost effectively, based on a continuous physical inventory and condition assessment and investment to achieve established performance goals". In other words, asset management is a process that uses data to manage and track assets, like roads and bridges, in a cost-effective manner using a combination of engineering and business principles. This process is endorsed by leaders in municipal planning and transportation infrastructure, including the Michigan Municipal League, County Road Association of Michigan, the Michigan Department of Transportation (MDOT), and the Federal Highway Administration (FHWA). HCRC 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 Huron County Road Commission (HCRC) 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. HCRC is responsible for maintaining and operating over 1633.02 centerline of roads.

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

Questions regarding the use or content of this plan should be directed to Erik Tamlyn at 417 S Hanselman Street, Bad Axe, MI 48413 or at (989) 269-6404 and/or etamlyn@hcroads.com. hcroads.com Key terms used in this plan are defined in HCRC's comprehensive transportation asset management plan (also known as the "compliance plan") used for compliance with PA 325 or 2018.

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

Pavement Primer

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

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

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

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

Surfacing

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

Paved Surfacing

Typical benefits and tradeoffs for hard surface types include:

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

- **Composite pavements:** Composite pavement is a combination of concrete and asphalt layers. Typically, composite pavements are old concrete pavements exhibiting ride-related issues that were overlaid by several inches of HMA in order to gain more service life from the pavement before it would need reconstruction. Converting a concrete pavement to a composite pavement is typically used as a "holding pattern" treatment to maintain the road in usable condition until reconstruction funds become available.

- **Sealcoat pavement:** Sealcoat pavement is a gravel road that have been sealed with a thin asphalt binder coating that has stone chips spread on top (not to be confused with a chip seal treatment over HMA pavement). This type of a pavement relies on the gravel layer to provide structure to support traffic, and the asphalt binder coating and stone chips shed water and eliminate the need for maintenance grading. Nonetheless, sealcoat pavement does require additional maintenance steps that asphalt and gravel do not require and does not last as long as HMA pavement, but it provides a low-cost alternative for lightly-trafficked areas and competes with asphalt for ride quality when properly constructed and maintained. Sealcoat pavement can provide service for ten or more years before the surface layer deteriorates and needs to be replaced.

Unpaved Surfacing

Typical benefits and tradeoffs for non-hard surfacing include:

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

Pavement Condition

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

HCRC 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. HCRC 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 HCRC is consistent with data collected statewide. PASER data is collected using trained inspectors in a slow-moving vehicle using GPS-enabled data collection software provided to road-owning agencies at no cost to them. The method does not require extensive training or specialized equipment, and data can be collected rapidly, which minimizes the expense for collecting and maintaining this data.

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

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

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

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

Figure 1: *Top image, right*– PASER 8 road that is considered “good” by the TAMC exhibit only minor defects. *Second image, right*– PASER 5 road that is considered “fair” by the TAMC. Exhibiting structural soundness but could benefit from CPM. *Third image, right*– PASER 6 road that is considered “fair” by the TAMC. *Bottom image, right*– PASER 2 road that is considered “poor” by the TAMC exhibiting significant structural distress.

The TAMC’s good, fair, and poor categories are based solely on the definitions, above. Therefore, caution should be exercised when comparing other condition assessments with these categories because other condition assessments may have "good", "fair", or "poor" designations similar to the TAMC condition categories but may not share the same definition. Often, other condition assessment systems define the "good", "fair", and "poor" categories differently, thus rendering the data of little use for cross-system comparison. The TAMC's definitions provide a statewide standard for all of Michigan's road-owning agencies to use for comparison purposes.

PASER data is collected 100 percent every two 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, HCRC collects 100 percent of its paved non-federal-aid-eligible network using its own staff and resources.

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 HCRC 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 2: *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 adequacy, and good structural adequacy.

Figure 2 illustrates the range over which features may be assessed. The top example in Figure 2 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 2 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 2 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, for example, 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 are 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 HCRC—counters at least one of these pavement-damaging forces.

Reconstruction

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

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

$250,000 per lane mile. The following descriptions outline the main reconstruction treatments used by HCRC.

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 3). 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 twelve 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 four 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 either rehabilitated with a structural treatment. Examples of structural improvement treatments include HMA overlay with or without milling, and crush and shape (Figure 4). The following descriptions outline the main structural improvement treatments used by HCRC.

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

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

An HMA overlay is a layer of new asphalt (liquid asphalt and stones) placed on an existing pavement (Figure 4). Depending on the overlay thickness, this treatment can add significant structural strength. This treatment also creates a new wearing surface for traffic and seals the pavement from water, debris, and sunlight damage. An HMA overlay lasts approximately five to ten years and costs $50,000 to $100,000 per lane 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 $10,000 per lane 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 4). An additional layer of gravel is often added along with a new wearing surface such as an HMA overlay or chip seal. Additional gravel and an HMA overlay give an increase in the pavements structural capacity. This treatment is usually done on rural roads with severe structural distress; Adding gravel and a wearing surface makes it more prohibitive for urban roads if the curb and gutter is not raised up. Crush and shape treatments last approximately 14 years and cost $150,000 per lane 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 5). The purpose of the following CPM treatments is to protect the pavement structure, slow the rate of deterioration, and/or correct pavement surface deficiencies. The following descriptions outline the main CPM treatments used by HCRC.

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

Crack Seal

Water that infiltrates the pavement surface softens the pavement structure and allows traffic loads to cause more damage to the pavement than in normal dry conditions. Crack sealing helps prevent water infiltration by sealing cracks in the pavement with asphalt sealant (Figure 5). HCRC seals pavement cracks early in the life of the pavement to keep it functioning as strong as it can and for as long as it can.

Crack sealing lasts approximately two years and costs $4,000 per lane 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 HCRC looks at what crack filling costs per year of the treatment's life.

Fog Seal

Fog sealing sprays a liquid asphalt coating onto the entire pavement surface to fill hairline cracks and prevent damage from sunlight (Figure 5). Fog seals are best for good to very good pavements and last approximately two years at a cost of $1,000 per lane mile.

Chip Seal

A chip seal, also known as a sealcoat, is a two-part treatment that starts with liquid asphalt sprayed onto the old pavement surface followed by a single layer of small stone chips spread onto the wet liquid asphalt layer (Figure 5). The liquid asphalt seals the pavement from water and debris and holds the stone chips in place, providing a new wearing surface for traffic that can correct friction problems and helping to prevent further surface deterioration. Chip seals are best applied to pavements that are not exhibiting problems with strength, and their purpose is to help preserve that strength. These treatments last approximately five years and cost $12,000 per lane mile.

Slurry Seal/Microsurface

A slurry seal or microsurface's purpose is to protect existing pavement from being damaged by water and sunlight. The primary ingredients are liquid asphalt (slurry seal) or modified liquid asphalt (microsurface), small stones, water and portland cement applied in a very thin (less than a half an inch) layer (Figure 5). The main difference between a slurry seal and a microsurface is the modified liquid asphalt used in microsurfacing provides different curing and durability properties, which allows microsurfacing to be used for filling pavement ruts. Since the application is very thin, these treatments do not add any strength to the pavement and only serves to protect the pavement's existing strength by sealing the pavement from sunlight and water damage. These treatments work best when applied before cracks are too wide and too numerous. A slurry seal treatment lasts approximately four years and costs $20,000 per lane mile, while a microsurface treatment tends to last for seven years and costs $25,000 per lane mile.

Partial-Depth Concrete Repair

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

Maintenance Grading (for Unpaved Roads)

Maintenance grading involves regrading an unpaved road to remove isolated potholes, washboarding, and ruts then restoring the compacted crust layer (Figure 6). Crust on an unpaved road is a very tightly compacted surface that sheds water with ease but takes time to be created, so destroying a crusted surface with maintenance grading requires a plan to restore the crust. Maintenance grading often needs to be performed three to five times per year and each grading costs $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 6). This is a relatively short-term fix that helps create a crusted surface. Chlorides work by attracting moisture from the air and existing gravel. This fix is not effective if the surface is too dry or heavy rain is imminent, so timing is very important. Dust control is done two to four times per year and each application costs $700 per mile.

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

Innovative Treatments

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

HMA Polymer Fibers

Micro-fibers were introduced to one mile of county primary roadway in 2019 (Port Hope Road from Rapson Road to Minnick Road). This one-mile test section was utilized to compare performance to a conventional HMA overlay of the next four miles to the north. The polymers serve to provide tensile strength and bridge cracks, preventing reflective cracking typical with one-course HMA overlays. This innovative treatment costs approximately $5,000 per lane mile more when compared to a conventional overlay, but could save money if it significantly delays cracking and overall pavement deterioration.

Mastic Crack Treatment

Wider transverse cracks impact ride quality negatively. Some roads exhibit wider transverse cracks but little else in terms of deficiency. Helena Road from Parisville Road to Ruth Road was one such road that crews performed a mastic crack treatment on, specifically to bridge wider transverse cracks. Helena Road will be overlaid in 2024 and the mastic treatment is expected to delay reflective cracking and provide long-term improvement in ride quality.

Maintenance

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

1. PAVEMENT ASSETS

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

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

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

The HCRC is responsible for a total of 1633.02 centerline of public roads, as shown in Figure 7.

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

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 HCRC as either county primary or county local roads. State statute prioritizes expenditures on the county primary road network.

Of the 1633.02 centerline of public roads owned and/or managed by HCRC, approximately 82% of all County Primary roads are classified as federal aid eligible, which allows them to receive federal funding for their maintenance and construction. Only 1% of County Local roads are considered federal aid eligible, which means state and local funds must be used to manage these roads.

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

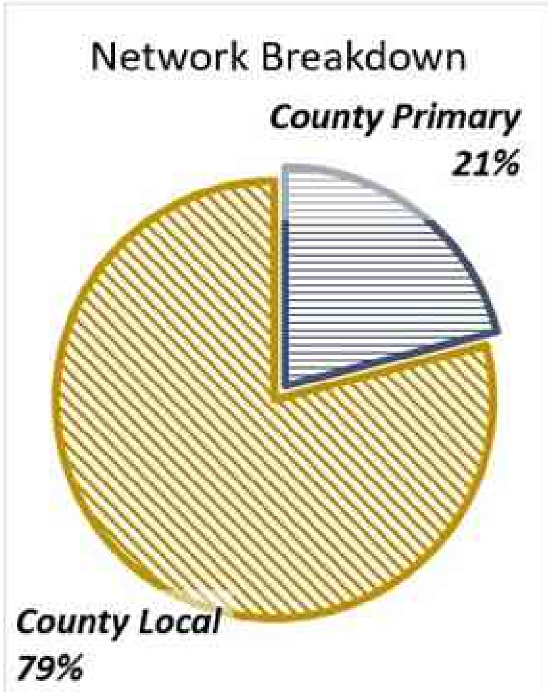
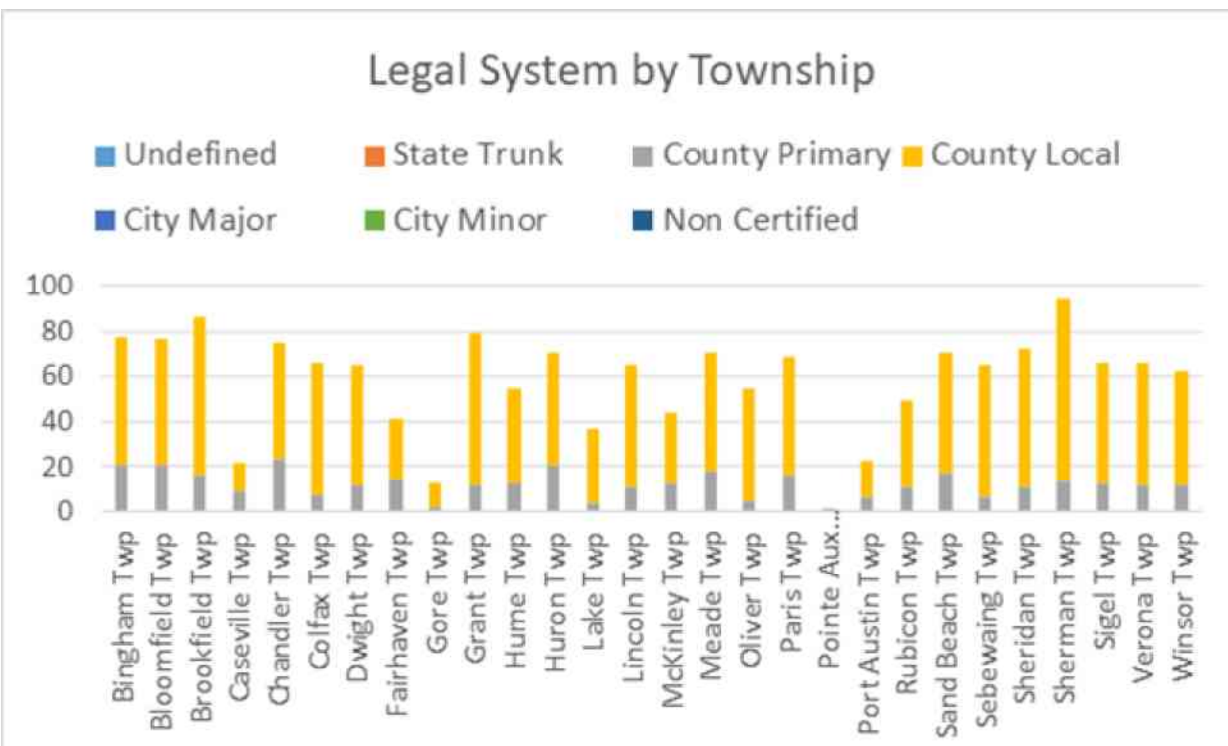


Figure 8: Percentage of county primary and county local roads for HCRC.



..Figure 9: county primary and county local roads by township for HCRC's jurisdiction.

HCRC manages 0 miles of roads that are part of the National Highway System (NHS)—in other words, those roads that are critical to the nation's economy, defense, and mobility—and monitors and maintains their condition. The NHS is subject to special rules and regulations and has its own performance metrics dictated by the FHWA. While most NHS roads in Michigan are managed by MDOT, HCRC manages a percentage of those roads located in its jurisdiction, as shown in Figure 10.

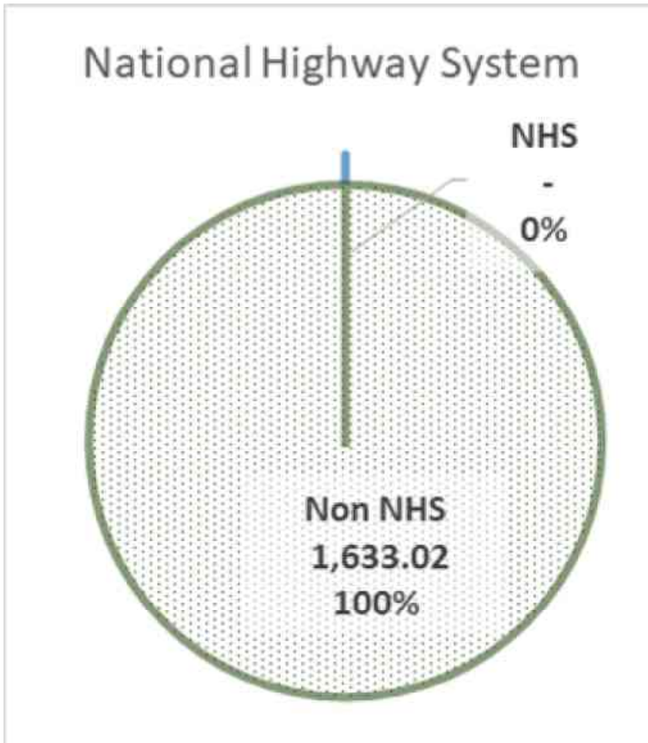


Figure 10: Miles of roads managed by HCRC that are part of the National Highway System and condition.

HCRC also owns and manages 932.733 miles of unpaved roads.

Types

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

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

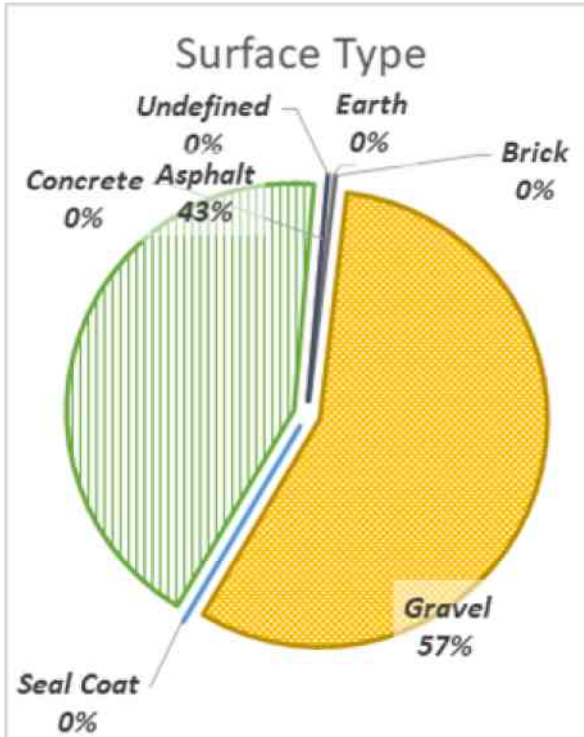


Figure 11: Pavement type by percentage maintained by HCRC Undefined pavements have not been inventoried in HCRC's asset management system to date, but will be included as data becomes available.

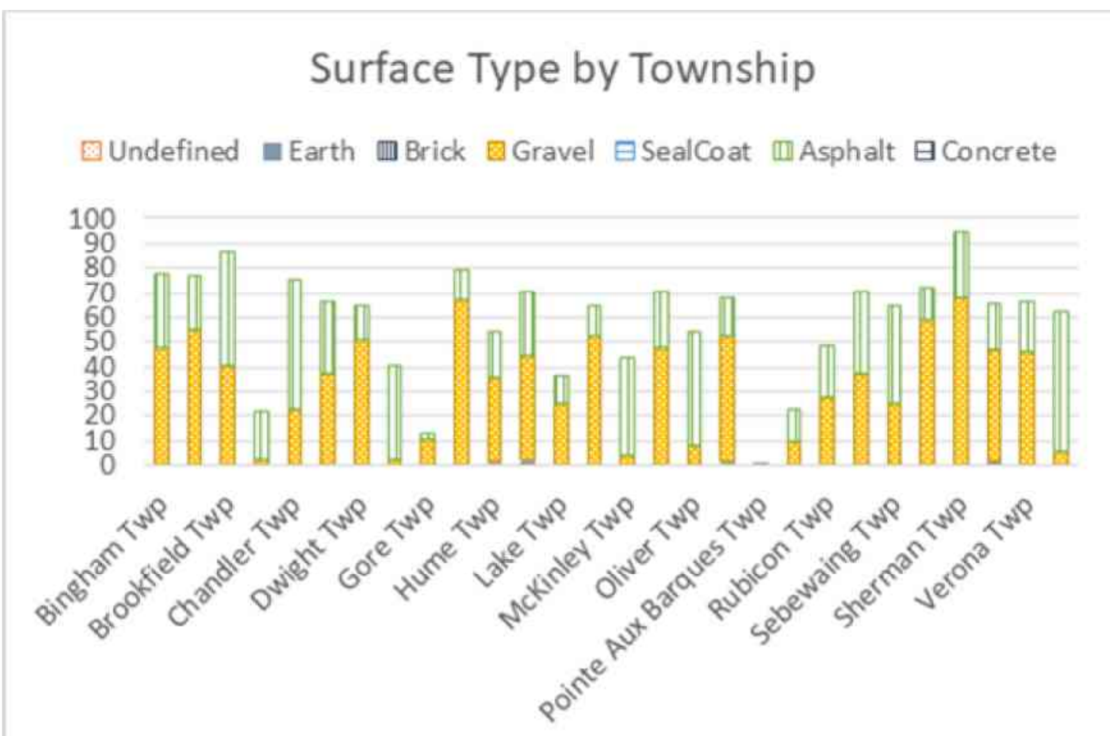


Figure 12: Pavement type by township within HCRC's jurisdiction. Undefined pavements have not been inventoried in HCRC's asset management system to date, but will be included as data becomes available.

Locations

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

Condition

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

Paved Roads

HCRC 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. HCRC 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.

HCRC collects 100 percent of its PASER data every two years on all federal-aid-eligible roads in Michigan. In addition, HCRC collects 100 percent of its paved non-federal-aid-eligible network using its own staff and resources.

HCRC's 2023 paved county primary road network has 25 percent of roads in the TAMC good condition category, 49 percent in fair, and 26 percent in poor (Figure 13A). The paved county local road network has 41 percent in good, 35 percent in fair, and 24 percent in poor (Figure 13B).

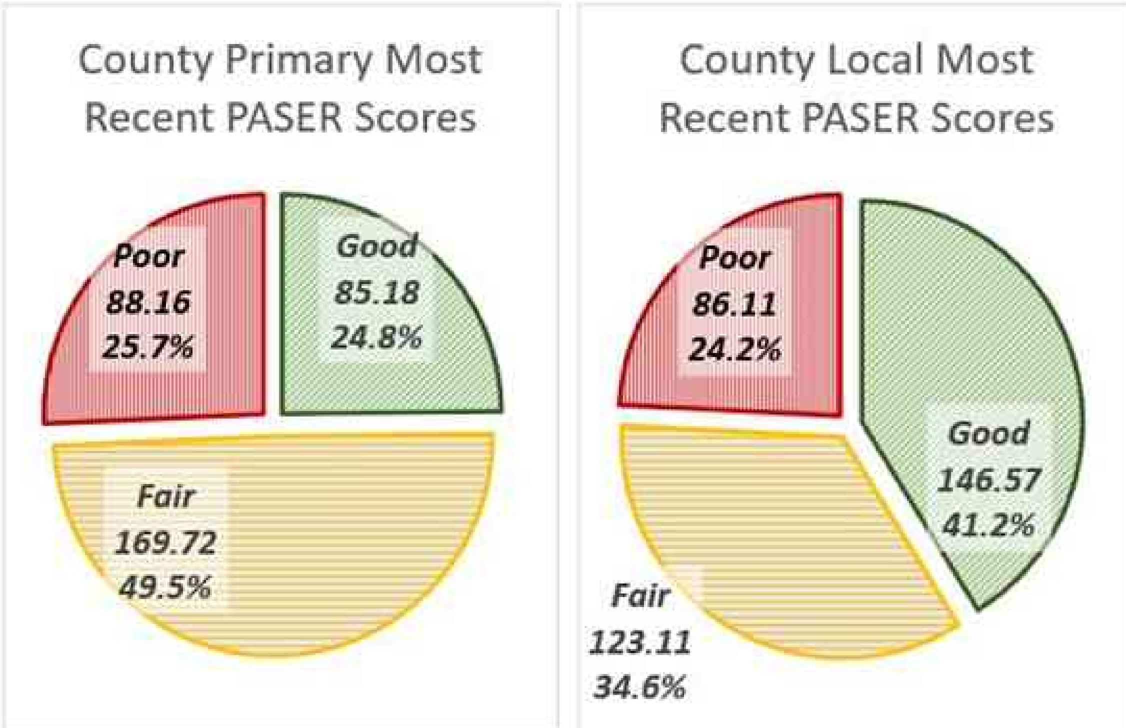


Figure 13: (A) Left: HCRC paved county primary road network conditions by percentage of good, fair, or poor, and (B) Right: paved county local road network conditions by percentage of good, fair, or poor

In comparison, the statewide paved county primary road network has 30 percent of roads in the TAMC good condition category, 50 percent in fair, and 20 percent in poor (Figure 14A). The statewide paved county local road network has 40 percent in good, 35 percent in fair, and 25 percent in poor (Figure 14B). Comparing Figure 13A and Figure 14A shows that HCRC's paved county primary road network is better than similarly-classified roads in the rest of the state, while Figure 13B and Figure 14B show that HCRC's paved county local road network is better than similarly-classified roads in the rest of the state. Other road condition graphs can be viewed on the TAMC pavement condition dashboard at: http://www.mcgi.state.mi.us/mitrp/Data/PaserDashboard.aspx.

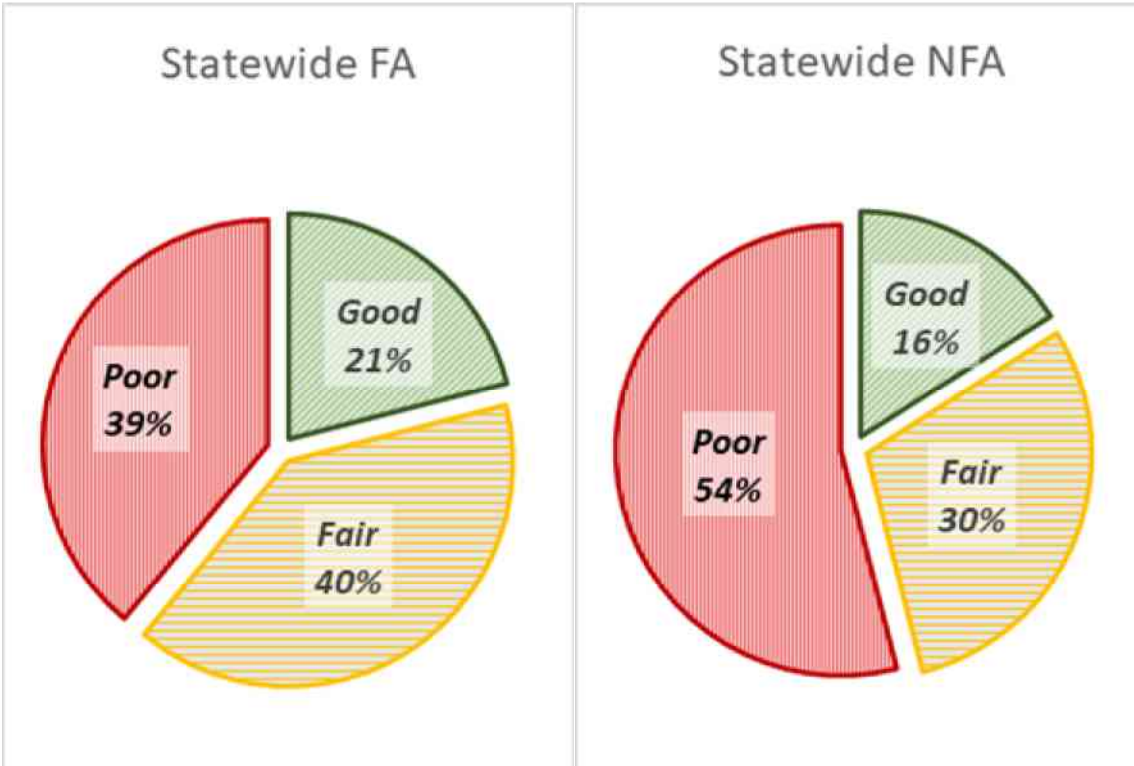


Figure 14: (A) Left: Statewide paved county primary road network conditions by percentage of good, fair, or poor, and (B) Right: paved county local road network conditions by percentage of good, fair, or poor

Local and county millages have contributed to the condition of Huron County's road network, both paved and unpaved. Without these revenue sources, conditions would be worse. The willingness of taxpayers and those in the agricultural and manufacturing fields to contribute to this revenue has improved the condition of the roads.

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

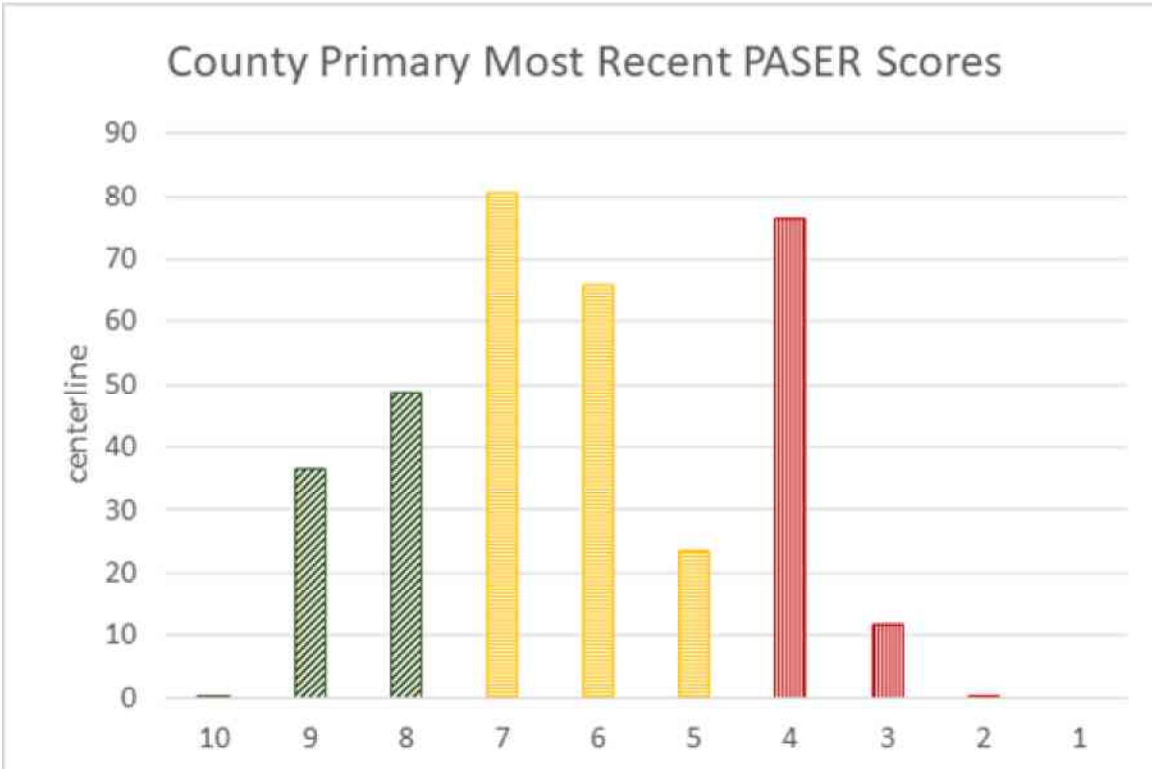


Figure 15: HCRC paved county primary road network conditions. Bar graph colors correspond to good/fair/poor TAMC designations.

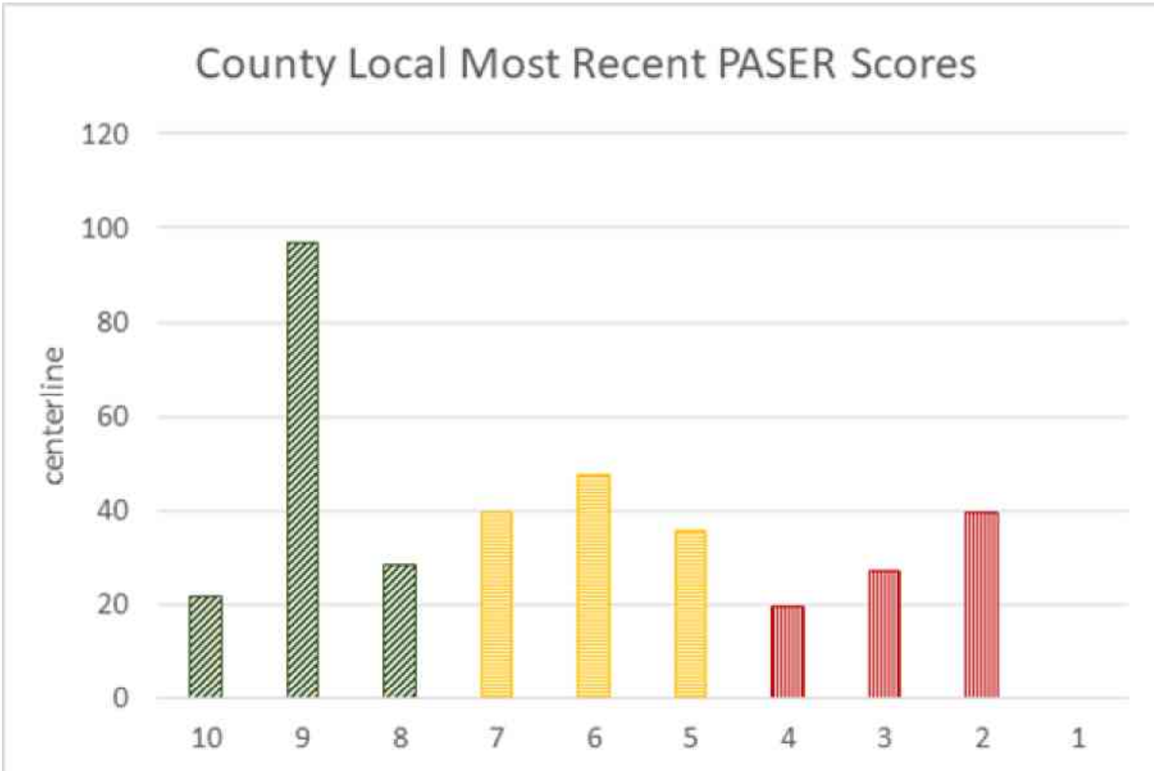


Figure 16: HCRC paved county local network condition by PASER rating. Bar graph colors correspond to good/fair/poor TAMC designations.

Figure 17 illustrates HCRC's entire paved road network divided by township into the TAMC good/fair/poor designations.

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

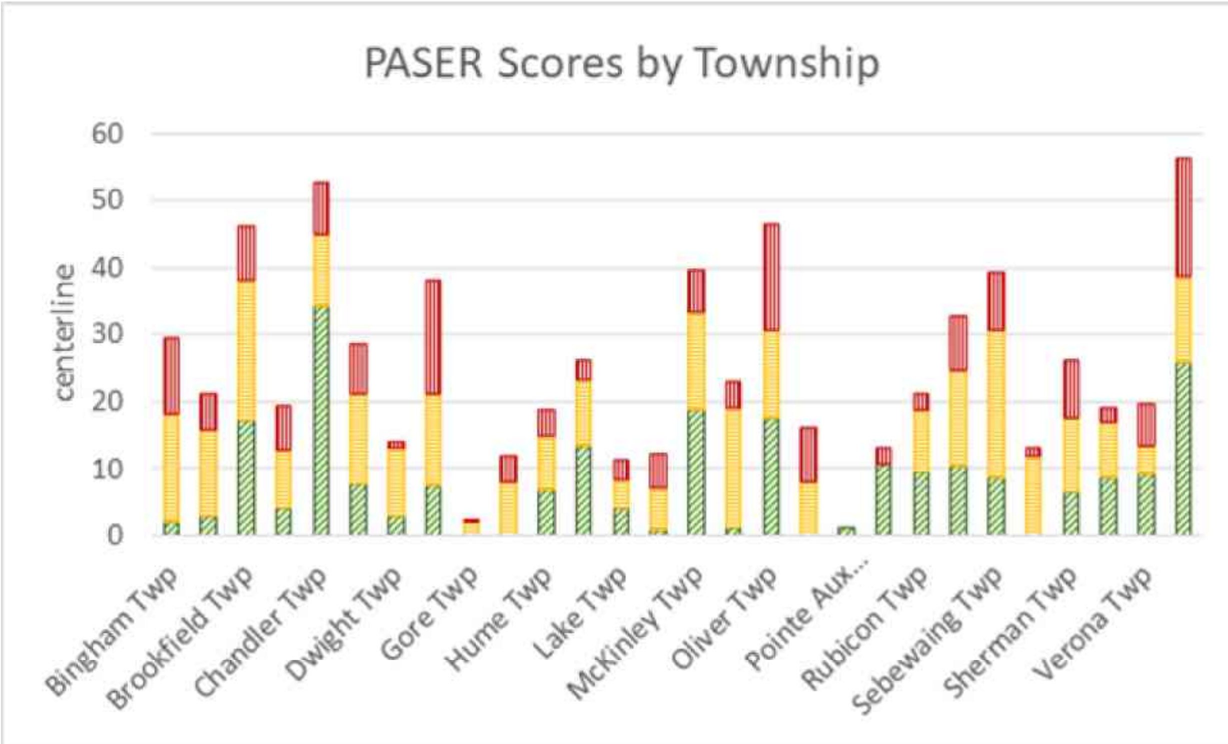


Figure 17: Number of miles of paved road in each township divided in categories of good (PASER 10, 9, 8), fair (PASER 7, 6, 5), and poor (PASER 4, 3, 2, 1).

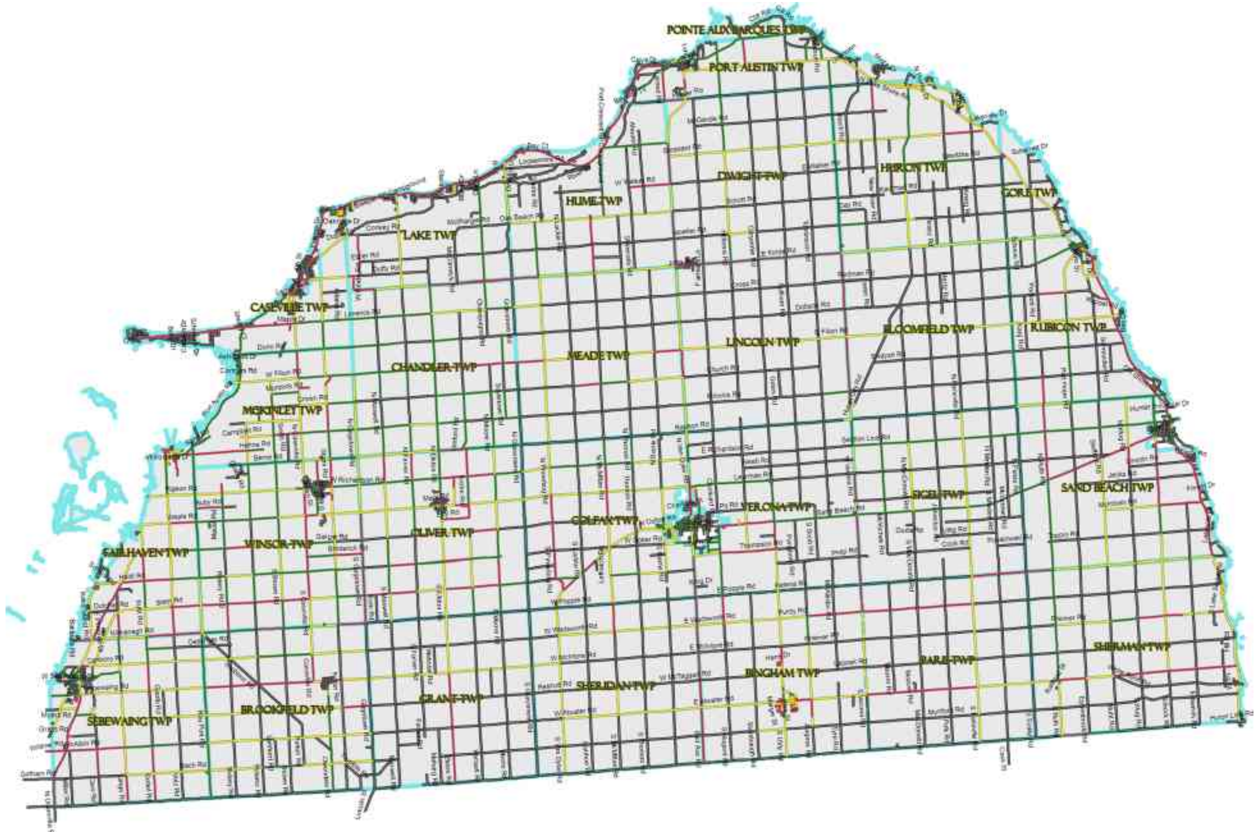


Figure 18: Map of the current paved road condition in good (PASER 10, 9, 8) shown in green, fair (PASER 7, 6, 5) shown in yellow, and poor (PASER 4, 3, 2, 1) shown in red. Unpaved roads are grey.

In general, the PASER scale shows that there is a significant amount of poor and fair roads in the county. As previously discussed, however, many of the "poor" roads have not reached a PASER rating of 3. So, even though the network is showing as having a majority of poor and fair roads, the goals of the agency and the users are being met through the management of the road program within the county. This is also a testament to the investment put forth by the taxpayers of Huron County, as the revenue generated through county millage is main reason the road conditions have remained acceptable. Providing a mixture of fixes and performing timely maintenance have proven to be critical in maintaining this condition. The risk of not meeting the goals and needs is predicated on the amount of county, state, and federal revenue.

Historically, the overall quality of HCRC's paved county primary roads have increasing, as can be observed in Figure 19. The amount of roads in good and fair condition have seen modest gains and the amount of roads in poor condition has decreased.

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

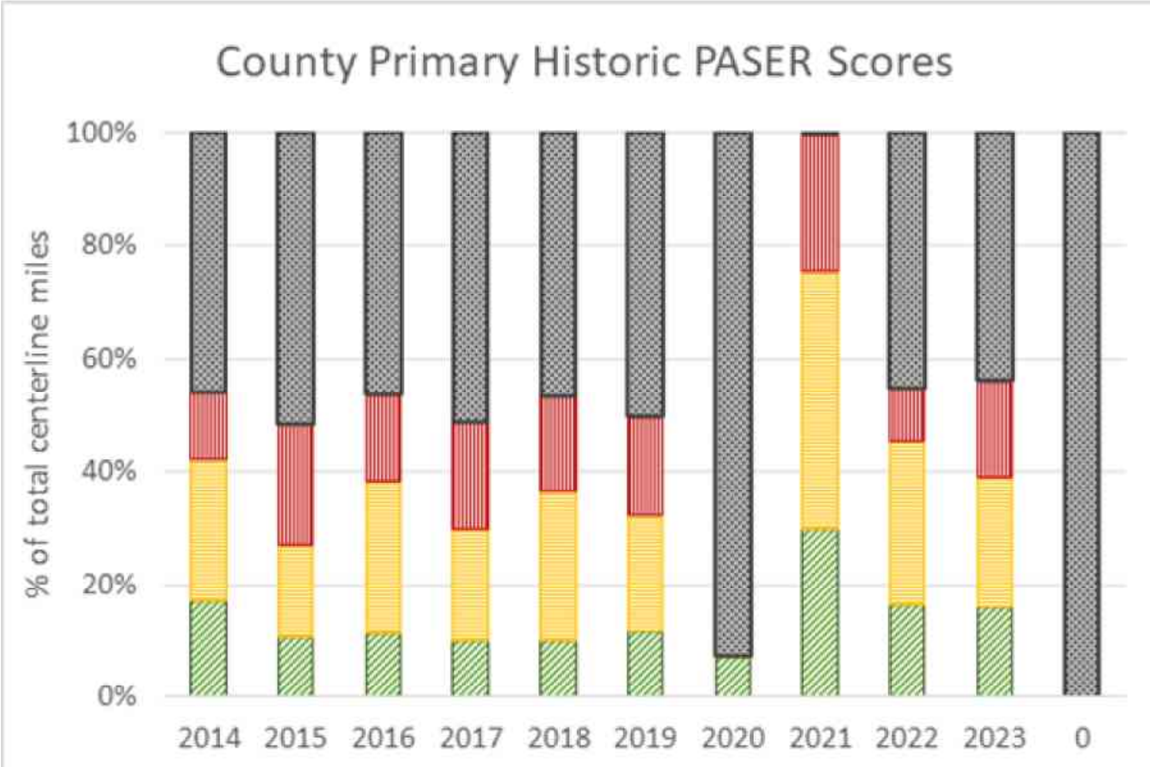


Figure 19: Historical HCRC paved county primary road network condition trend

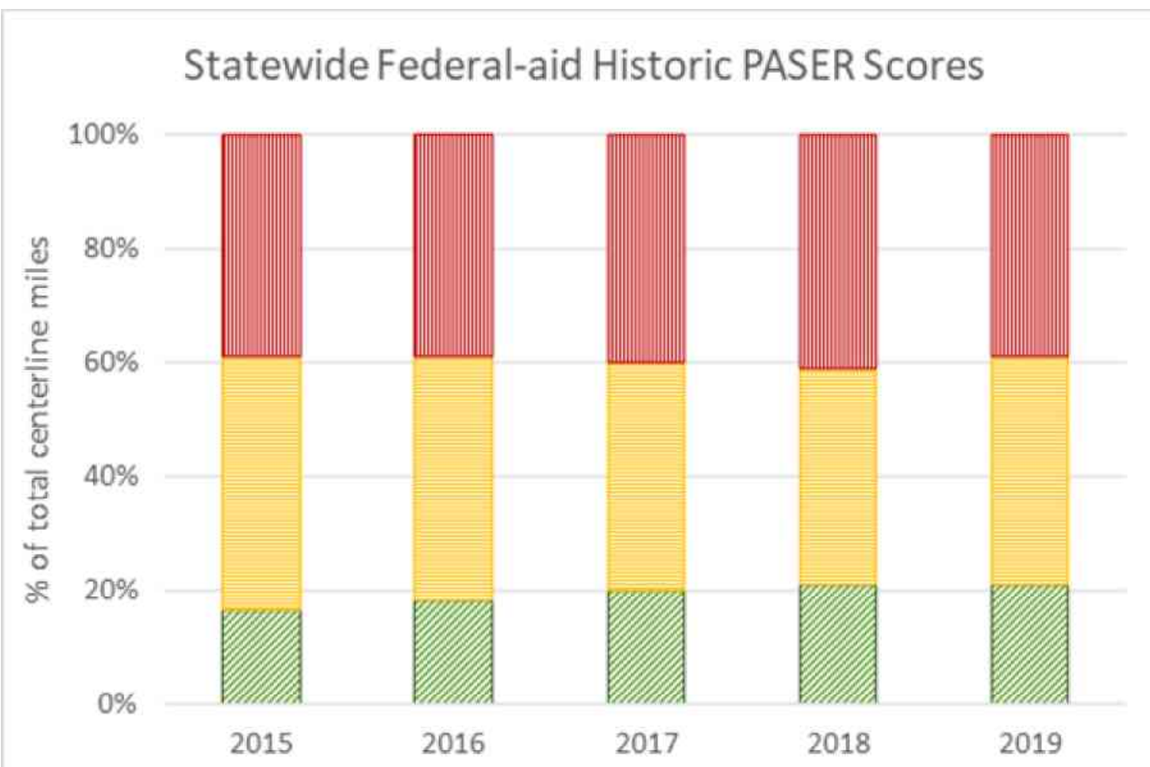


Figure 20: Historical statewide county primary road network condition trend

Historically, the overall quality of HCRC's paved county local roads has been staying relatively the same as the paved county primary road network. However, they lack a source of state and federal funding and therefore must be supported locally. Figure 21 illustrates the condition of the paved county local road network in HCRC while Figure 22 illustrates these conditions statewide.

Comparing HCRC's paved county local road condition trends illustrated in Figure 21 with overall statewide condition trends for all paved county local roads illustrated in Figure 22 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 is not collected each year.

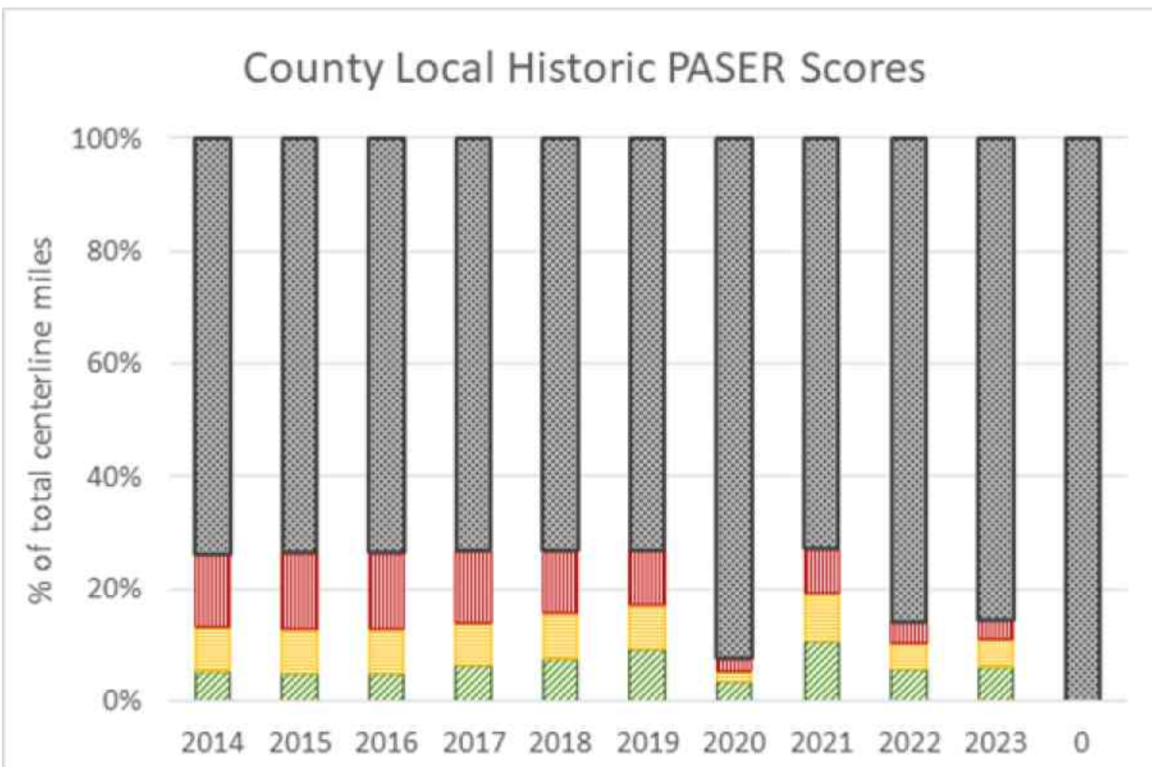


Figure 21: Historical HCRC paved county local road network condition trend

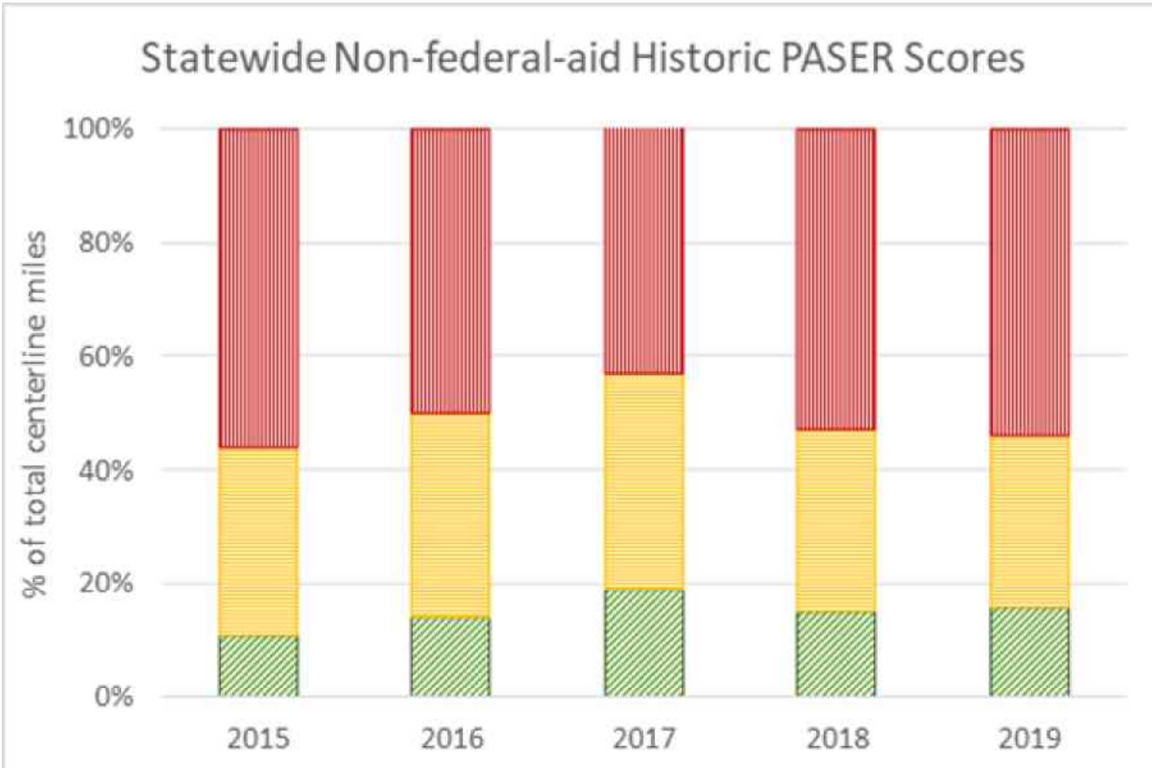


Figure 22: Historical statewide paved county local road network condition trend

Unpaved Roads

The condition of unpaved roads can be rapidly changing, which makes it difficult to obtain a consistent surface condition rating over the course of weeks or even days. The TAMC adopted the Inventory Based Rating (IBR) System™ for rating unpaved roads, and HCRC uses the IBR System™ for rating its unpaved roads. More information regarding the IBR System™ can be found in Introduction's Pavement Primer.

Figure 23 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 24 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.

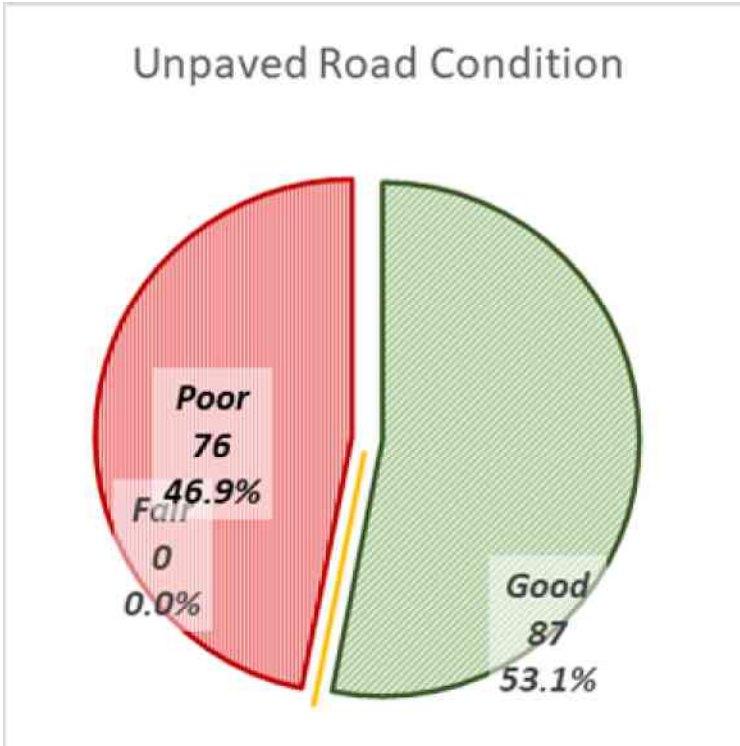


Figure 23: HCRC's unpaved road network condition by percentage of roads with IBR numbers of 10, 9, and 8; roads with IBR numbers of 7, 6, and 5; and IBR numbers of 4, 3, 2, and 1.

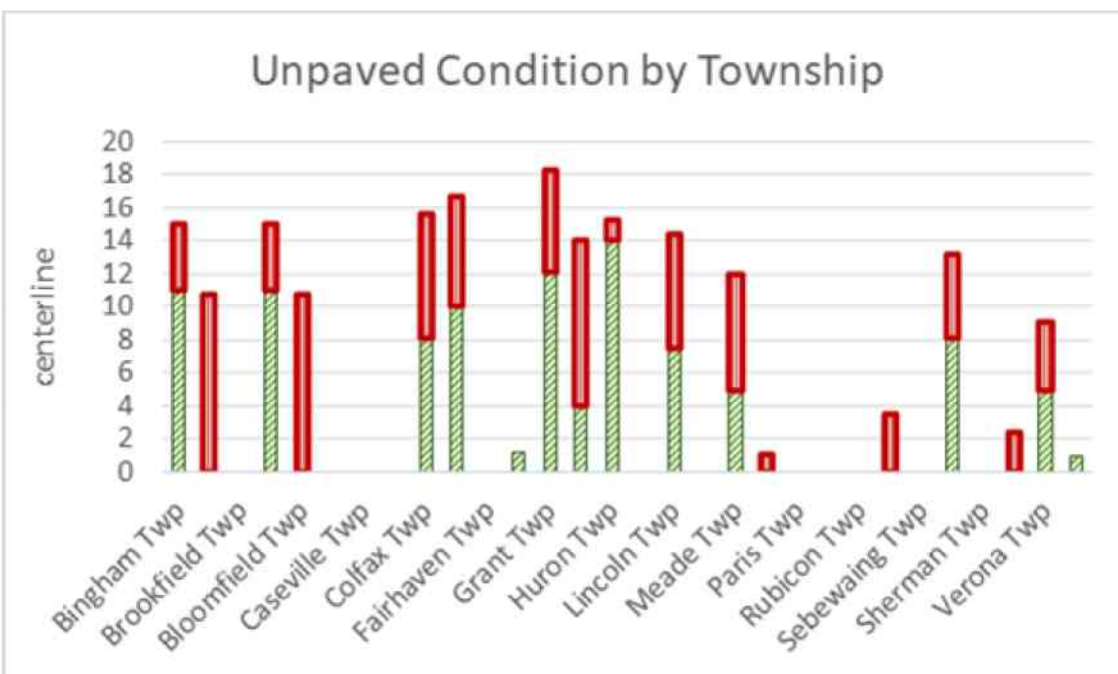


Figure 24: Number of miles of unpaved road in each township divided in categories of roads with IBR numbers of 10, 9, and 8; IBR numbers of 7, 6, and 5; and IBR numbers of 4, 3, 2, and 1.

Figure 25, Figure 26, and Figure 27 are maps illustrating the geographic location of unpaved roads and the assessment of the IBR elements, respectively: surface width, drainage adequecy, and structural adequecy.

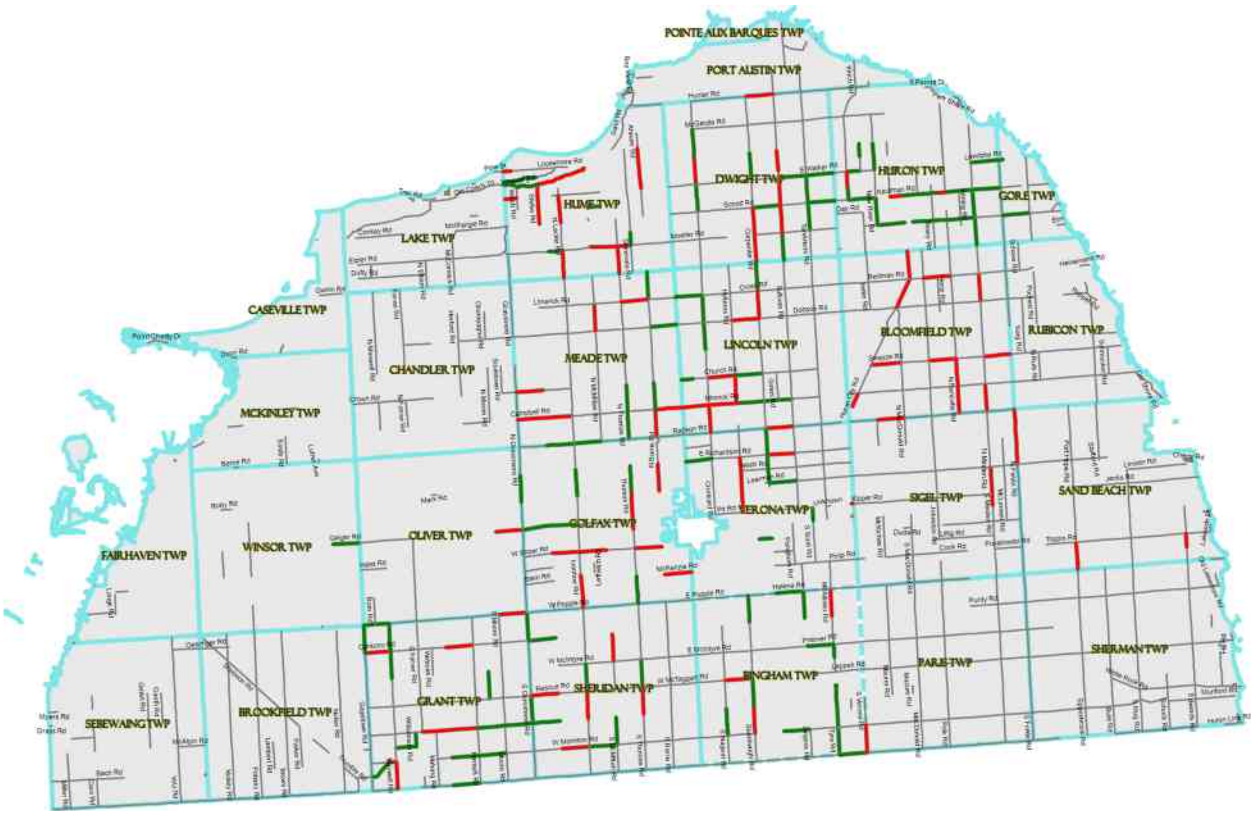


Figure 25: Map of the current IBR for surface width with good (22' and greater) shown in green, fair (16' to 21') shown in orange, and poor (15' or less) shown in red. Only unpaved roads owned by HCRC are shown.

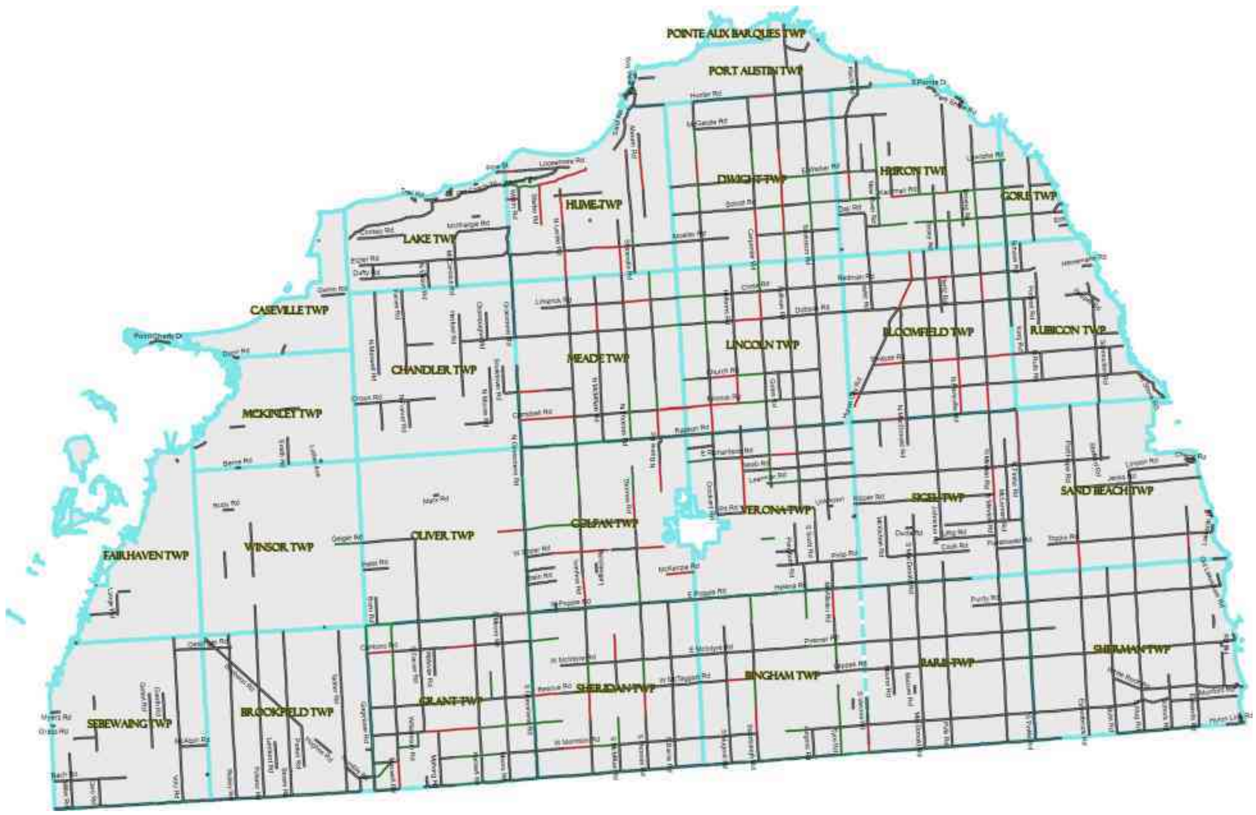


Figure 26: Map of the current IBR for drainage adequacy with good (2’ or more) shown in green, fair (0.5’ to less than 2’) shown in orange, and poor (less than 0.5’) shown in red. Only unpaved roads owned by HCRC are shown.

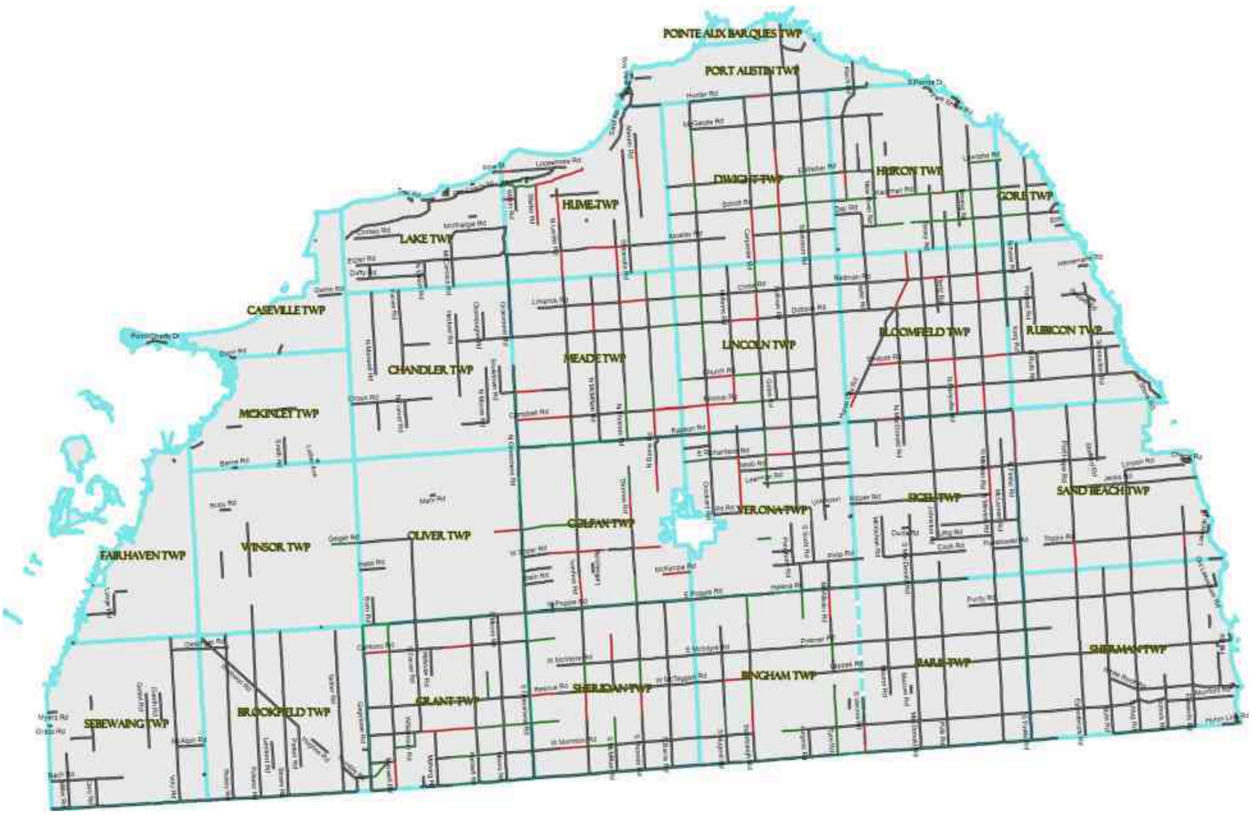


Figure 27: Map of the current IBR structural adequacy good (greater than 7”) shown in green, fair (4” to 7”) shown in orange, and poor (less than 4”) shown in red. Only unpaved roads owned by HCRC are shown.

Huron County Road commission works with townships to place gravel to consistently improve structure, drainage, and quality of the unpaved network. Significant investment has taken place over the years to get our network into the condition it is currently in.

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. HCRC is not able to control any of these factors fully 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. Pavement Assets*: *Gap Analysis* section of this plan.

Goals for Paved County Primary Roads

The overall goal for HCRC's paved county primary road network is to maintain or improve road conditions network-wide at 2023 levels. The baseline condition for this goal is illustrated in Figure 28.

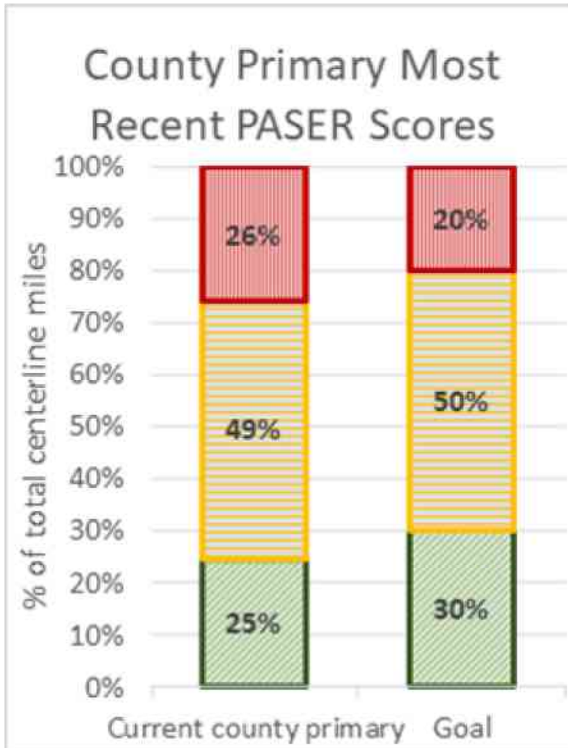


Figure 28: HCRC's 2023 county primary road network condition by percentage of good/fair/poor

HCRC'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 4 percent of paved county primary roads out of the poor category.

Goals for Paved County Local Roads

The overall goal for HCRC's paved county local road network is to maintain or improve road conditions network-wide at 2023 levels. The baseline condition for this goal is illustrated in Figure 29.

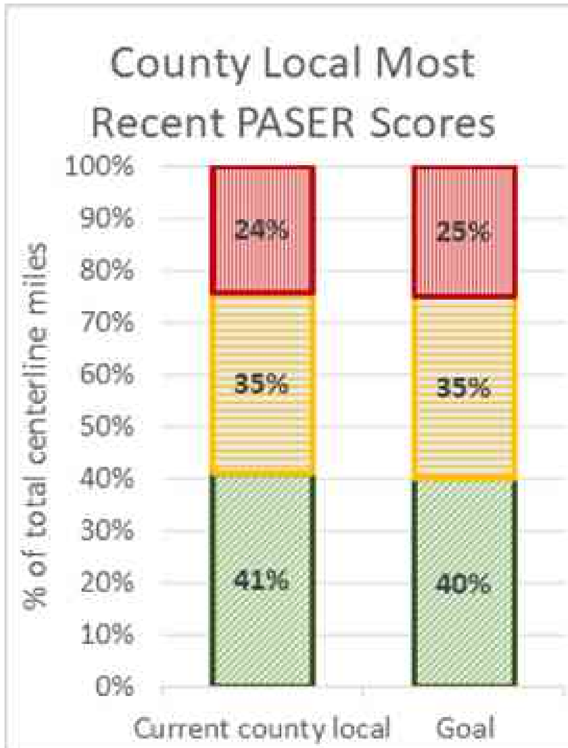


Figure 29: HCRC 2023 paved county local road network condition by percentage of good/fair/poor

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

1. Prevent its good and fair (PASER 10 - 5) paved county local roads from becoming poor (PASER 4 - 1).
2. Retain or lessen the amount of roads in the poor category.

Goals for Unpaved Roads

The overall goal for HCRC's unpaved road network is to maintain or improve road conditions network-wide at 2023 levels. The baseline condition for this goal is illustrated in Figure 30.

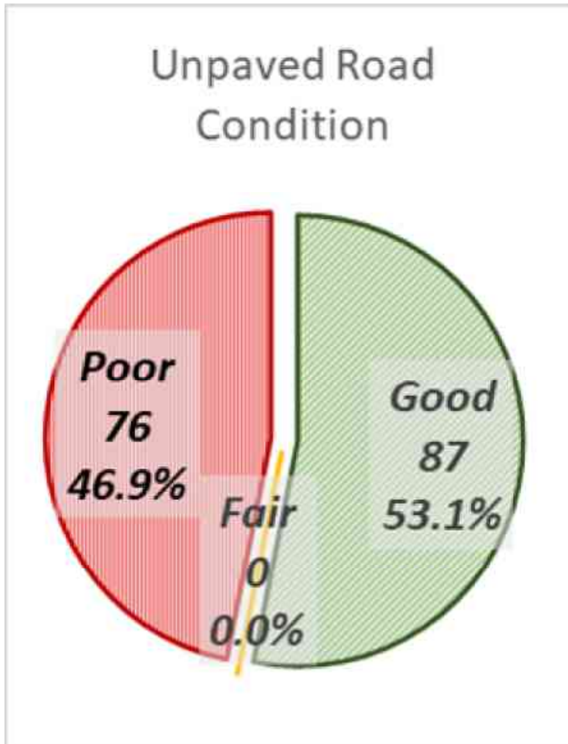


Figure 30: HCRC's 2023 unpaved road network condition by percentage of good/fair/poor

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, 53 percent of HCRC's year-round unpaved roads have good or fair structural adequacy and 53 percent have good or fair drainage adequacy. Year-round unpaved roads that have either or both of these two categories assessed as poor will be strategically upgraded as funding is available to address, first, drainage issues and, then, structural issues. Surface widths will be addressed on an as-needed basis to provide service or to address safety issues. Seasonal roads will be addressed to provide pass-ability and safety but do not have a goal associated with them.

Modelled Trends

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

HCRC 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 HCRC's financial resources can be found in the *5. Financial Resources* section.

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

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

Table 1: Service Life Extension (in Years) for Pavement Types Gained by Fix Type[1]				
	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 for example, wedging, bar seals, spot double chip seals, injection spray patching or other pre-treatments.				
[1] Part of Appendix D-1 from *MDOT Local Agency Programs Guidelines for Geometrics on Local Agency Projects* 2017 Edition Approved Preventive Maintenance Treatments				

Roadsoft Pavement Condition Forecast to Forecast Future Trends

HCRC uses Roadsoft, an asset management software suite, to manage road- and bridge-related infrastructure. Roadsoft is developed by Michigan Technological University and is available for Michigan local agencies at no cost to them. Roadsoft uses pavement condition data to drive network-level deterioration models that forecast future road conditions based on planned construction and maintenance work. A screenshot of Roadsoft's pavement condition model and the associated output is shown in Figure 31.

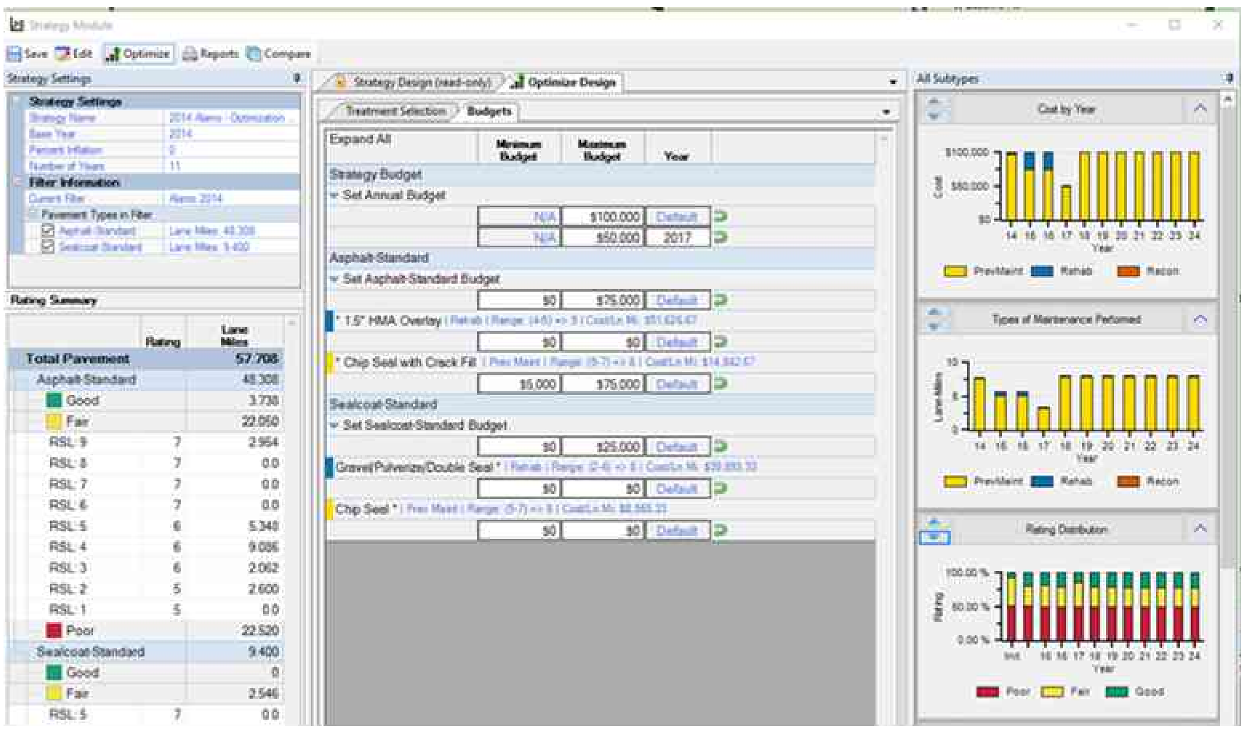


Figure 31: Pavement condition forecast model in the software program Roadsoft.

Paved County Primary Roads

Table 4 illustrates the network-level model inputs for Roadsoft on the paved county primary road network. Other pavement types in this network were neglected due to their small numbers relative to HMA pavements. The treatments outlined in Table 4 are the average treatment volume of planned projects scheduled to be completed in 2024-2026. See Appendix A of this plan for details on planned projects. Full model inputs and outputs are included in Appendix D.

Table 2: Roadsoft Modelled Trends, Planned Projects, and Gap Analysis for 's Road Assets—Modelled Trends: Roadsoft Annual Work Program for the Paved County Primary Road Network Forecast			
Treatment Name	**Annual Miles of Treatment**	**Years of Life**	**Trigger-Reset**
Crack Treatment	20	1	7–7
Chip Seal	7	5	5, 6-8
HMA Overlay	15	10	3, 4-9
Crush and Shape	3	18	1, 2, 3-10

Results from the Roadsoft network condition model for the county primary roads are shown in Figure 32. The Roadsoft network analysis of HCRC's planned projects from its currently-available budget does allow HCRC to reach its pavement condition goals given the projects planned for the next three years.

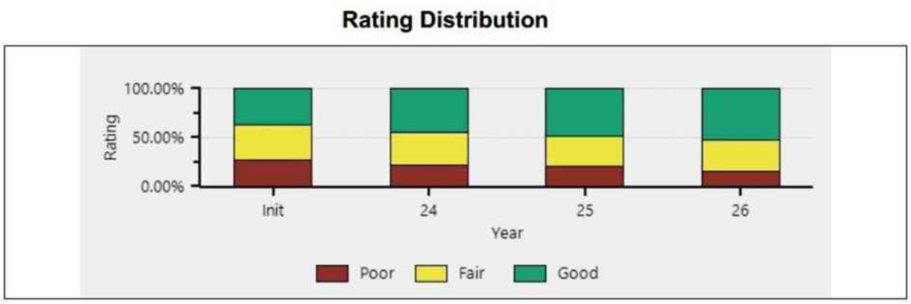


Figure 32: Forecast good/fair/poor changes to HCRC network condition from planned projects on the county primary road network.

Network condition is improving, with a projected improvement in Good condition roads up to 52.0 percent by 2026 with the amount of poor roads falling to 15.5 percent. These trends are predicated on anticipated budget and construction costs.

Paved County Local Road

A screenshot of Roadsoft's pavement condition model and the associated output is shown in Figure 33.

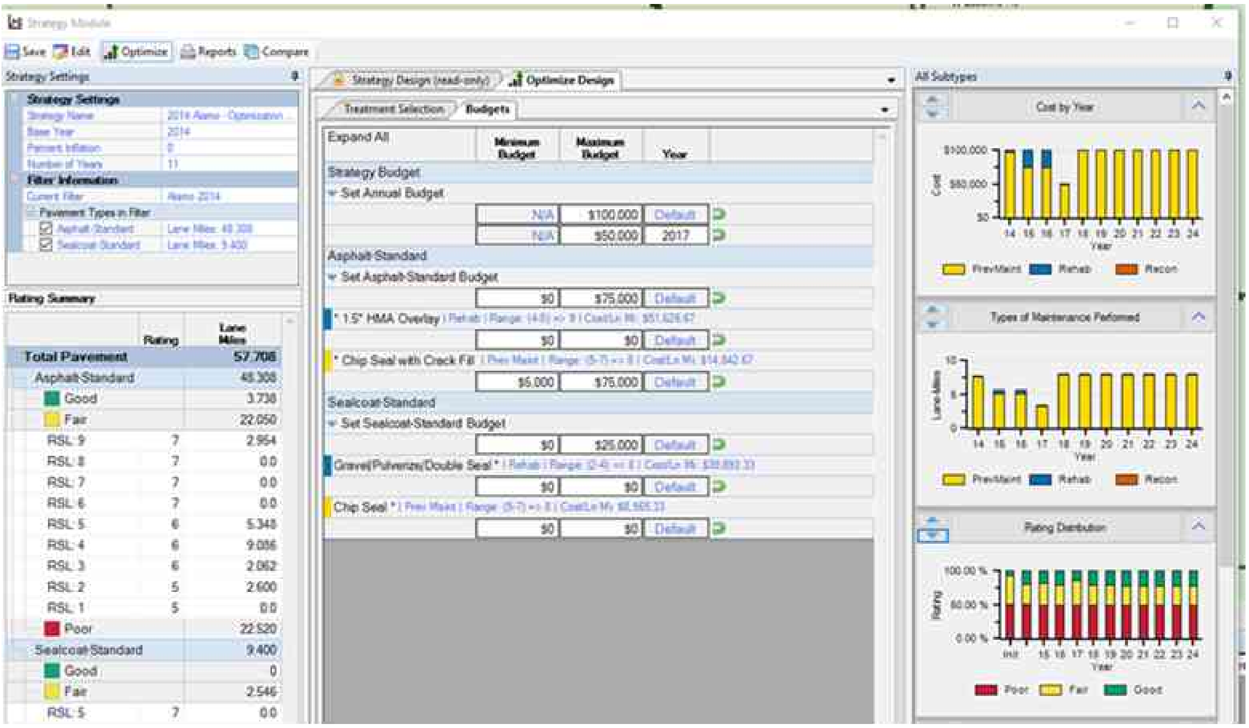


Figure 33: Pavement condition forecast model in the software program Roadsoft.

Table 5 illustrates the network-level model inputs for Roadsoft on the paved county local road network. Other pavement types in this network were neglected due to their small numbers relative to HMA pavements. The treatments outlined in Table 5 are the average treatment volume of planned projects scheduled to be completed in 2024-2026. Details on planned projects are included in Appendix A, and full model inputs and outputs are included in Appendix D.

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

Treatment Name	Annual Miles of Treatment	Years of Life	Trigger-Reset
Crack Treatment	20	1	7–7
Chip Seal	5	5	5, 6-8
HMA Overlay	15	10	3, 4-9
Crush and Shape	7	18	1, 2, 3-10

Results from the Roadsoft network condition model for the paved county local roads are shown in Figure 34. The Roadsoft network analysis of HCRC's planned projects from its currently available budget does allow HCRC to reach its pavement condition goal given the projects planned for the next three years.

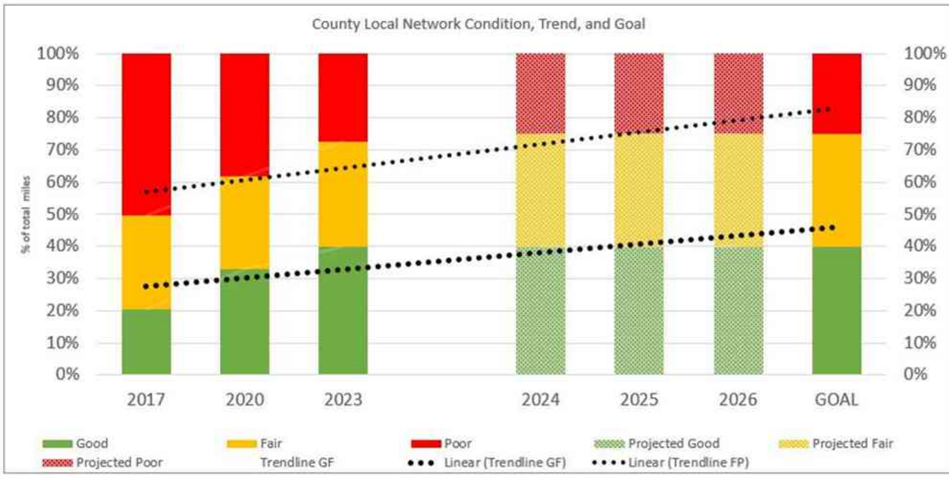


Figure 34: Forecast good/fair/poor changes to HCRC network condition from planned projects on the paved county local road network.

Condition trends continue to improve pending funding from our township partners and dependent on construction cost increases.

Planned Projects

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

Per PA 499 of 2002 (later amended by PA 199 of 2007), road projects for the upcoming three years are required to be reported annually to the TAMC. Planned projects represent the best estimate of future activity; however, changes in design, funding, and permitting may require HCRC to alter initial plans. Project planning information is used to predict the future condition of the road networks that HCRC maintains. The *1. Pavement Assets*: *Modelled Trends* section of this plan provides a detailed analysis of the impact of the proposed projects on their respective road networks.

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

Paved County Primary Projects
HCRC is currently planning the construction and maintenance projects listed in Appendix A for the paved county primary road network. The locations of these projects are shown in Figure 35. The total cost of these projects is approximately $9,040,000.00.

Figure 35: Map showing paved county primary road projects planned for 2024-2026. Projects in 2024 are red, 2025 in yellow, and 2026 in green.

Paved County Local Projects

HCRC is currently working with township officials to review proposed improvements to the county local network. These projects are yet to be determined.

Gap Analysis

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

2. FINANCIAL RESOURCES

Public entities must balance the quality and extent of services they can provide with the tax resources provided by citizens and businesses, all while maximizing how efficiently funds are used. HCRC 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 hcroads.com.

HCRC has a total budget for pavement asset management of $3,000,000.

County Primary Network

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

County Local Network

HCRC has historically spent $4,000,000 annually on pavement-related projects. Over the next three years, HCRC plans to spend $4,000,000 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 township contributions Many local agencies in Michigan use local tax millages to supplement their road-funding budget. These taxes can provide for additional construction and maintenance for new or existing roads that are also funded using MTF or MDOT funds. HCRC has local tax millages in its road-funding budget.A county road millage is levied for the improvement of the primary road network and many townships have road improvement millages for the local road network..

3. RISK OF FAILURE ANALYSIS

Transportation infrastructure is designed to be resilient. The system of interconnecting roads and bridges maintained by HCRC provides road users with multiple alternate options in the event of an unplanned disruption of one part of the system. There are, however, key links in the transportation system that may cause significant inconvenience to users if they are unexpectedly closed to traffic. Figure 43 illustrates the key transportation links in HCRC'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: all-season road network (see Figure 43).

Figure 43: Key transportation links in HCRC's road network (Primary Network in yellow).

4. COORDINATION WITH OTHER ENTITIES

An asset management plan 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. HCRC communicates with both public and private infrastructure owners to coordinate work in the following ways:

- Township Meetings
- Road and Drain Commission Board Meetings
- Press Releases
- Direct Correspondence

HCRC coordinates planned work ahead of time with our government partners to leverage similar work types and save taxpayer dollars.

APPENDIX A: 2024-2026> PAVED COUNTY PRIMARY ROAD PLANNED PROJECTS

2024		
Road	Limits	Proposed Treatment
Verona	Rapson Rd to Kinde Rd	Cold Mill & 180 # HMA Overlay
Pinnebog	M-53 to M-142 (Truck Route)	180 # HMA Overlay
Stoddard	Verona Rd to M-25	2-Course HMA Overlay
Helena Rd	Parisville Rd to Ruth Rd	180 # HMA Overlay
Oak Beach	M-25 to M-53	Chip Seal with Fog Seal

2025		
Road	Limits	Proposed Treatment
Elkton	Co. Line to Sebewaing Rd	Crush and Shape
Crescent Beach	West Limits to M-25	Cold Mill & 220 # HMA Overlay
Crescent Beach	M-25 to Caseville Rd	180 # HMA Overlay
Stein	M-25 to Bay Port Rd	180 # HMA Overlay
Stein	Bay Port Rd to Caseville Rd	Chip Seal with Fog Seal
Gagetown	Berne Rd to Filion Rd	Joint Repairs, Chip Seal w/ Fog

2026		
Road	Limits	Proposed Treatment
Filion	Pinnebog Rd to M-53	180 # HMA Overlay
Atwater	Verona Rd to Parisville Rd	180 # HMA Overlay
Atwater	Ubly EVL to Verona Rd	180 # HMA Overlay
Atwater	Parisville Rd to Ruth Rd	Cold Mill & 180 # HMA Overlay
Sturm	Richardson Rd to Berne Rd	180 # HMA Overlay
Henne	M-25 to Pobanz Rd	180 # HMA Overlay
Ruth	M-142 to Rapson Rd	180 # HMA Overlay
Helena	Ruth Rd to M-25	Chip Seal with Fog Seal

APPENDIX E: ROADSOFT NETWORK-LEVEL MODEL INPUTS AND OUTPUTS

APPENDIX F: MEETING MINUTES VERIFYING PLAN ACCEPTANCE BY GOVERNING BODY