

Lapeer County Road Commission 2022 Pavement Asset Management Plan



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

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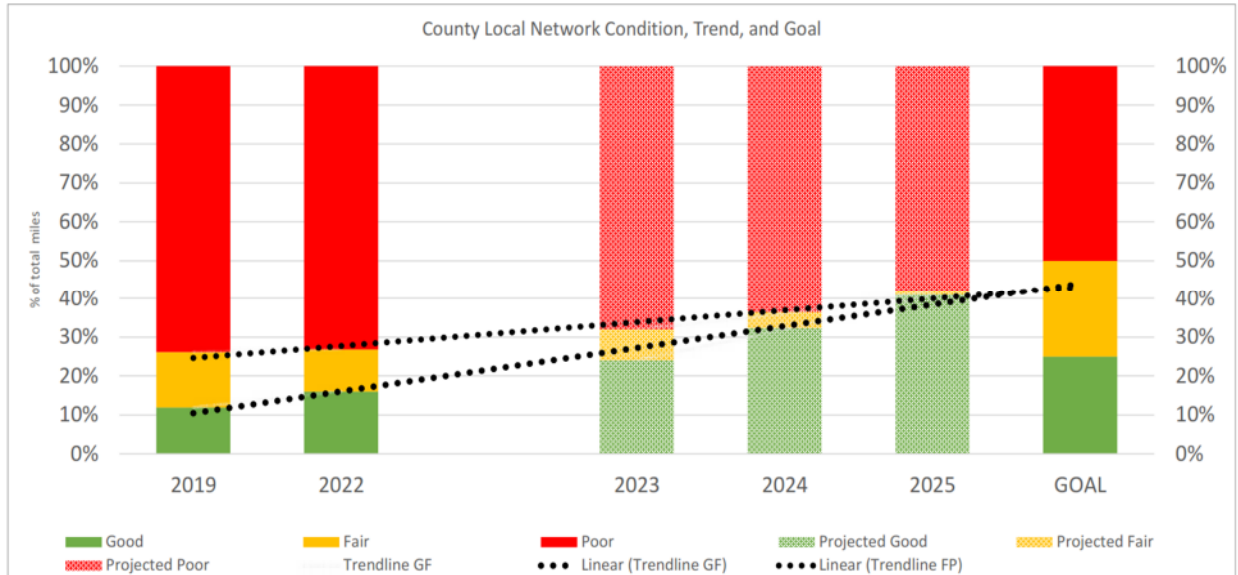
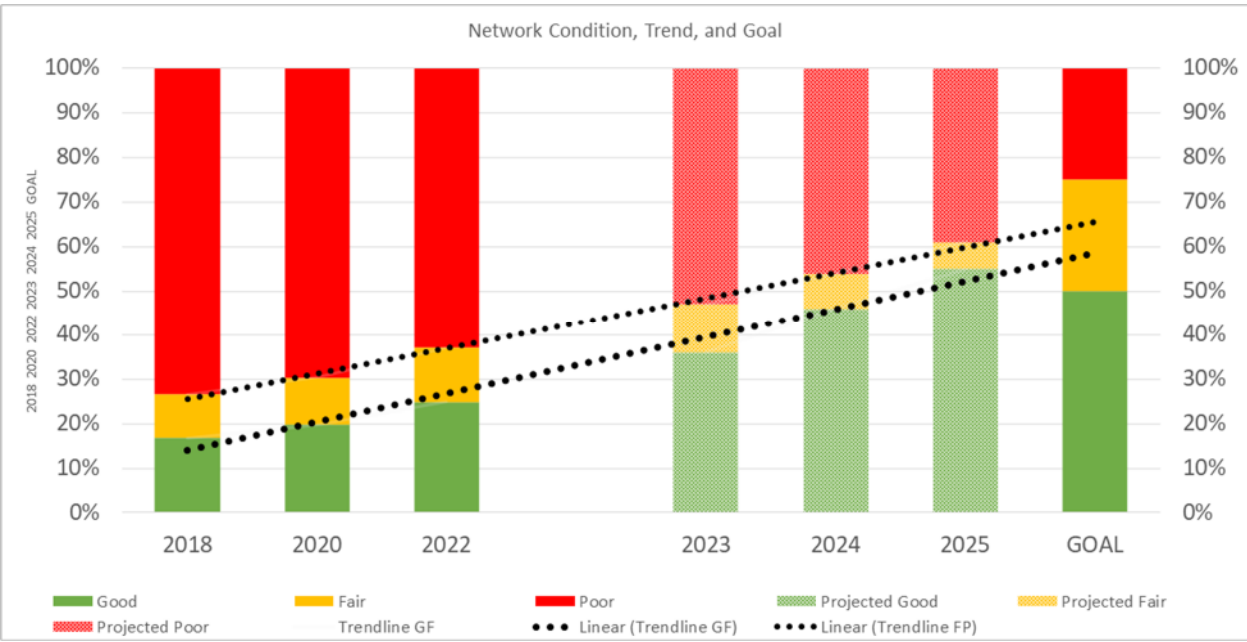
EXECUTIVE SUMMARY

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 Lapeer County Road Commission's (Lapeer CRC) 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 Lapeer CRC is meeting its obligations to maintain the public assets for which it is responsible.

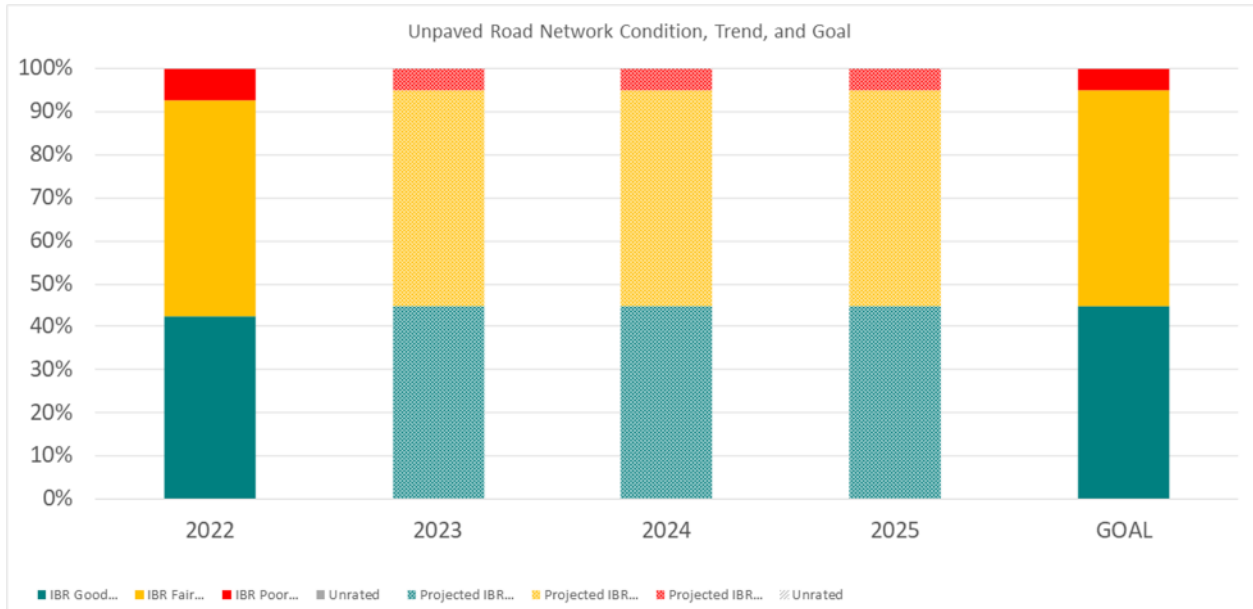
This plan overviews Lapeer CRC's Road assets and condition, and explains how Lapeer CRC works to maintain and improve the overall condition of those assets. These explanations can help answer the following questions:

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

Lapeer CRC owns and/or manages 1300.779 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 Lapeer CRC 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:



A summary of Lapeer CRC 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 Lapeer CRC’s obligations towards meeting these requirements. This asset management plan also helps demonstrate Lapeer CRC’s responsible use of public funds by providing elected and appointed officials as well as the general public with inventory and condition information of Lapeer CRC’s 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). Lapeer CRC 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 Lapeer County Road Commission (Lapeer CRC) has adopted an “asset management” business process to overcome the challenges presented by having limited financial, staffing, and other resources while needing to meet road users’ expectations. Lapeer CRC is responsible for maintaining and operating over 1300.779 centerline of roads.

This plan outlines how Lapeer CRC 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 (3) years to reflect changes in road conditions, finances, and priorities.

Questions regarding the use or content of this plan should be directed to Destain Gingell, PE at 820 Davis Lake Road, Lapeer, Michigan 48446 or at (810) 664-6272 and / or dgingell@lcrconline.com. Copies of the plan are found on the Lapeer CRC website at the following address:

<https://www.lcrconline.com/resources/>

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

Knowing the basic features of 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. Lapeer CRC 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

Lapeer CRC 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. Lapeer CRC 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 Lapeer CRC 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 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, Lapeer CRC collects 100 percent of its paved non-federal-aid-eligible network using its own staff and resources every two years, during odd years.

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 Lapeer CRC 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 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



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.

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 Lapeer CRC—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 20 years and costs



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

\$425,000 per lane mile. The following descriptions outline the main reconstruction treatments used by Lapeer CRC.

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 \$150,000 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 \$50,000 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 two (2") inches of new gravel every 8 years at a cost of \$15,000 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 Lapeer CRC.

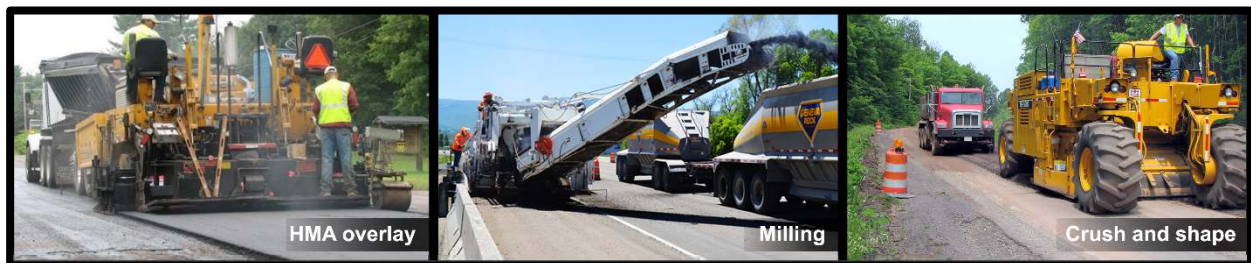


Figure 4: Examples of structural improvement treatments—(from left) HMA overlay on an unmilled pavement, milling asphalt pavement, and pulverization of a road during a crush-and-shape project.

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 twelve years and costs \$125,000 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 \$20,000 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 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 18 years and cost \$275,000 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 Lapeer CRC.



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). Lapeer CRC 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 Lapeer CRC 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 \$12,000 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 eight years and cost \$15,000 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 \$35,000 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 \$500 per mile.

Dust Control (for Unpaved Roads)

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



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

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 Lapeer CRC is responsible for a total of 1300.779 centerline of public roads, as shown in Figure 7.

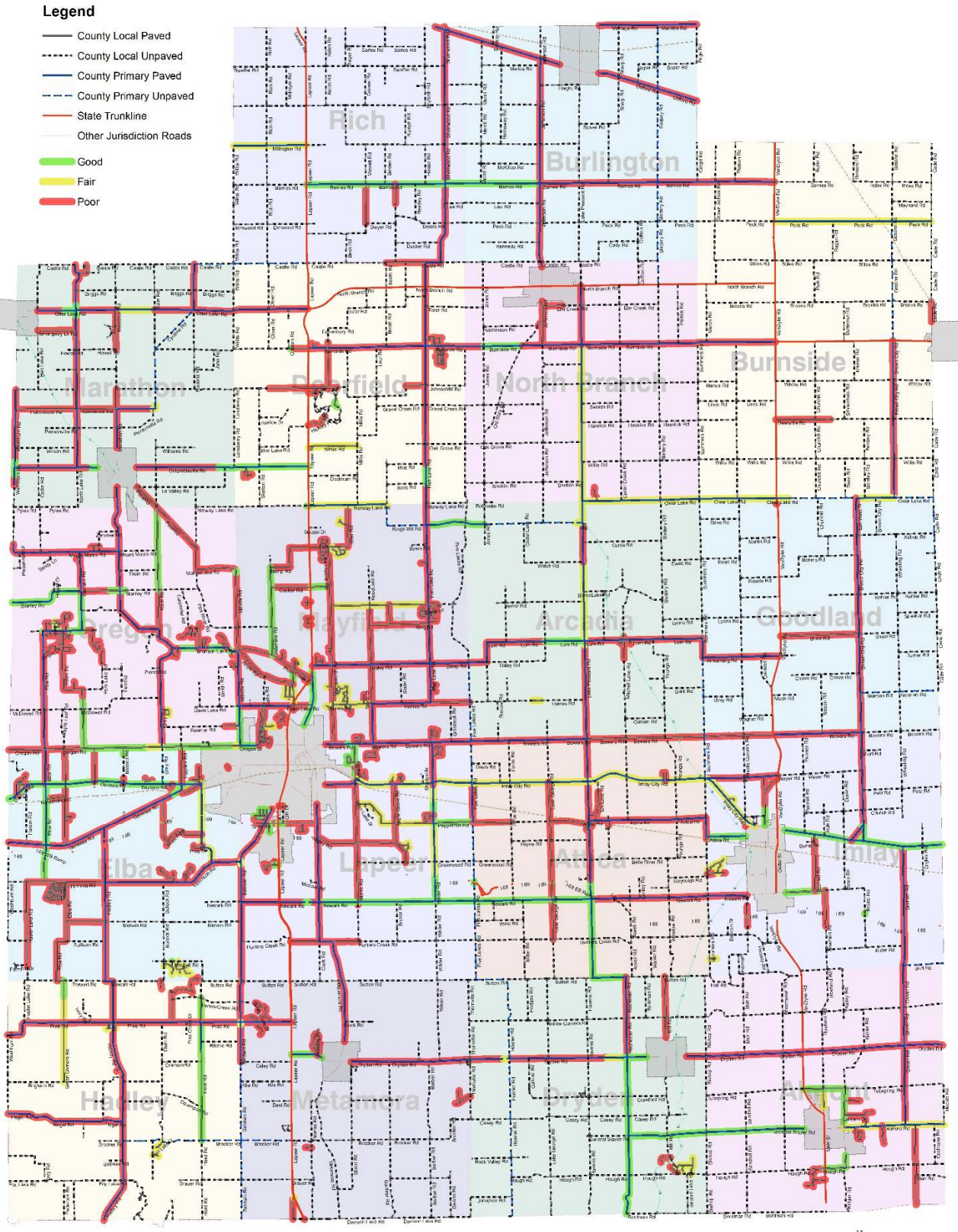


Figure 7: Map showing location of Lapeer CRC's paved roads (i.e., those managed by Lapeer CRC) and their current condition for paved roads with green for good (i.e., PASER 10, 9, 8), yellow for fair (i.e., PASER 7, 6, 5), and red for poor (i.e., PASER 4, 3, 2, 1), as well as the location of Lapeer CRC's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

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

Of the 1300.779 centerline of public roads owned and/or managed by Lapeer CRC, 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 Lapeer CRC that are classified as county primary and county local roads. Figure 9 illustrates this breakdown of these road networks by township boundary within Lapeer CRC's jurisdiction.

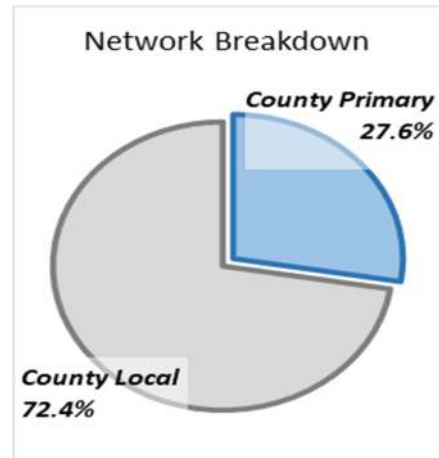


Figure 8: Percentage of county primary and county local roads for Lapeer CRC.

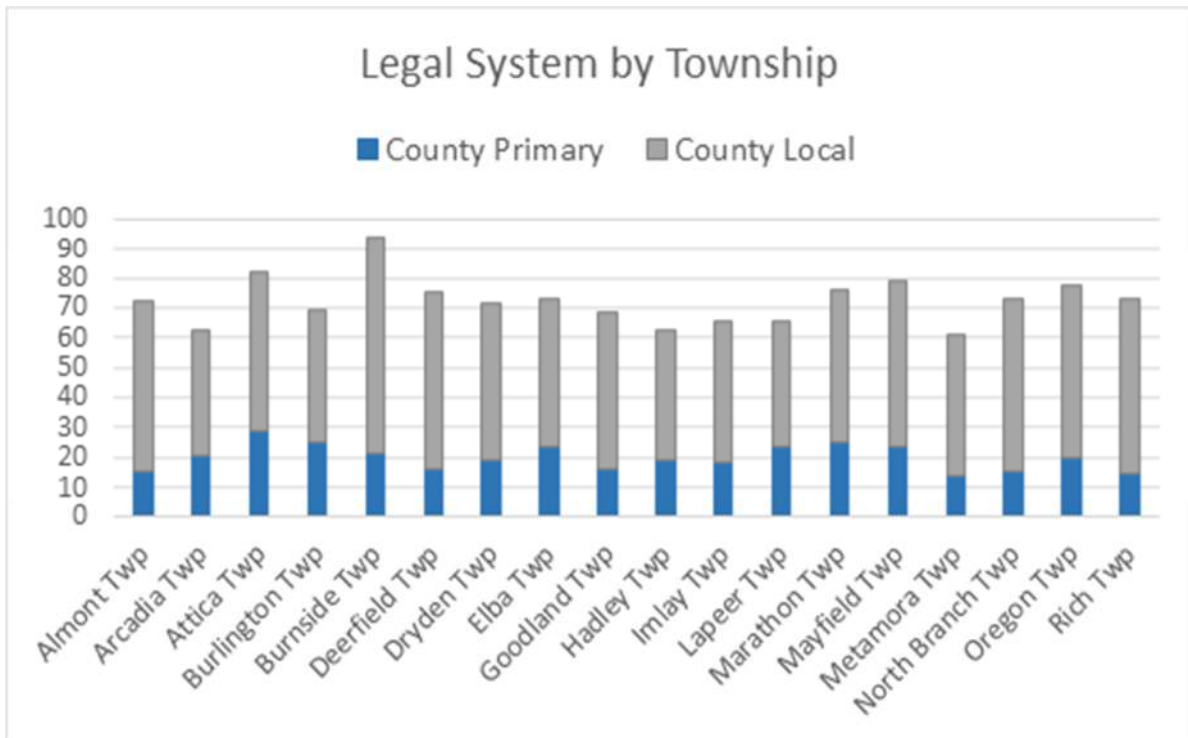


Figure 9: county primary and county local roads by township for Lapeer CRC's jurisdiction.

Lapeer CRC 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, Lapeer CRC manages a percentage of those roads located in its jurisdiction, as shown in Figure 10.

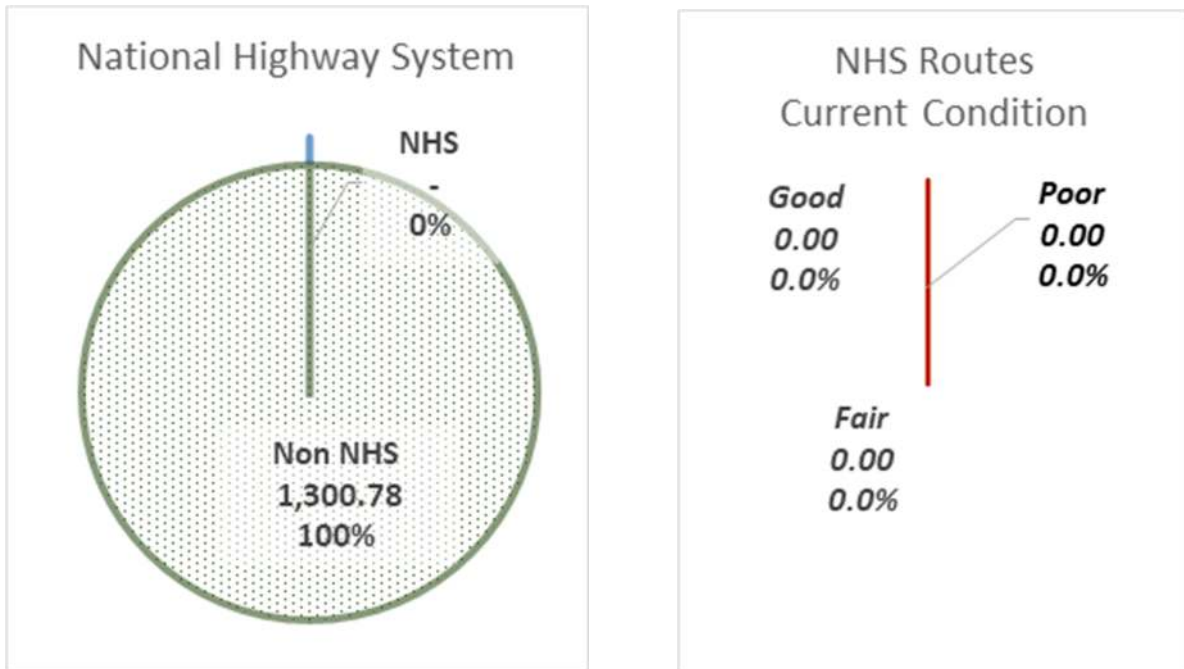


Figure 10: Miles of roads managed by Lapeer CRC that are part of the National Highway System and condition.

Lapeer CRC also owns and manages 799.863 miles of unpaved roads.

Types

Lapeer CRC has multiple types of pavements in its jurisdiction, including: asphalt, concrete; 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 Lapeer CRC has in its network. Figure 12 shows the pavement type by Township boundary for Lapeer CRC’s jurisdiction.

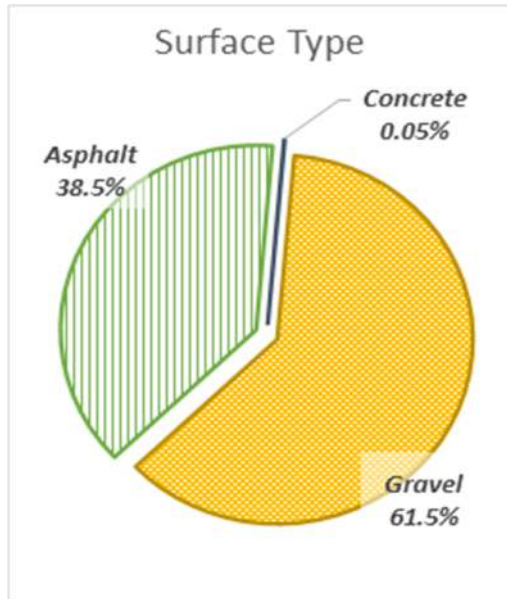


Figure 11: Pavement type by percentage maintained by Lapeer CRC. Undefined pavements have not been inventoried in Lapeer CRC's asset management system to date, but will be included as data becomes available.

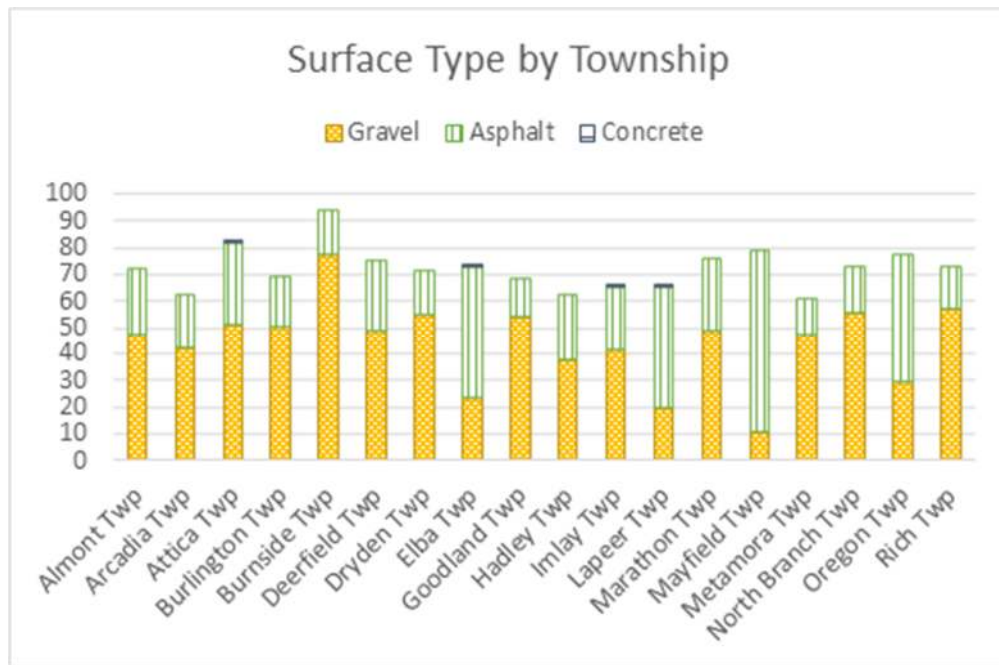


Figure 12: Pavement type by township within Lapeer CRC's jurisdiction. Undefined pavements have not been inventoried in Lapeer CRC's asset management system to date, but will be included as data becomes available.

Locations

Locations and sizes of each asset can be found in Lapeer CRC's Roadsoft database or on the Lapeer CRC's Paser Rating Dashboard at <https://www.lcrconline.com/resources/paser-maps/>. 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. Lapeer CRC 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 Lapeer CRC 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

Lapeer CRC 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. Lapeer CRC 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*.

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

Lapeer CRC’s 2022 paved county primary road network has 26.5 percent of roads in the TAMC good condition category, 13.0 percent in fair, and 60.5 percent in poor (Figure 13A). The paved county local road network has 15.3 percent in good, 11.2 percent in fair, and 73.5 percent in poor (Figure 13B).

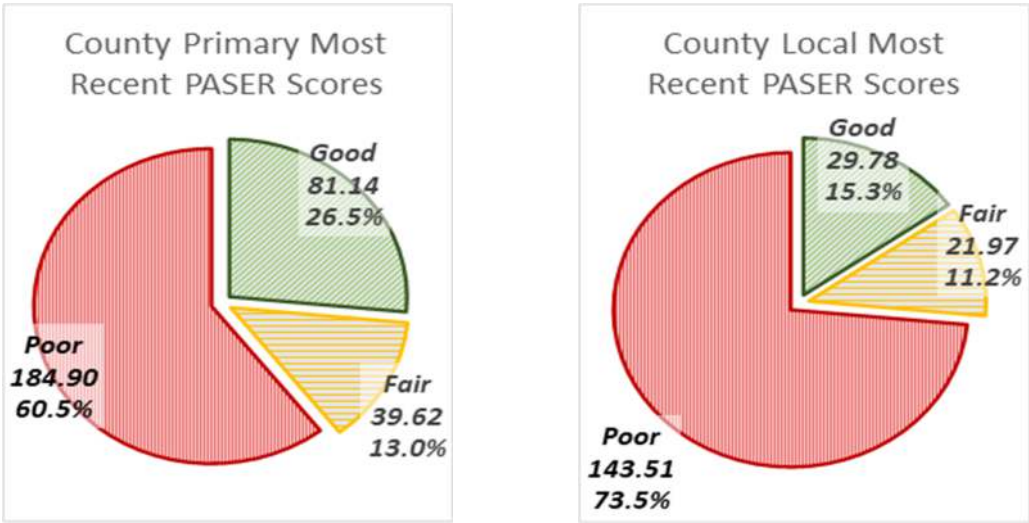


Figure 13: (A) Left: Lapeer CRC paved county primary road network conditions by percentage of good, fair, or poor, and (B) Right: paved county local road network conditions by percentage of good, fair, or poor

In comparison, the statewide paved county primary road network has 26 percent of roads in the TAMC good condition category, 42 percent in fair, and 32 percent in poor (Figure 14A). The statewide paved county local road network has 20 percent in good, 35 percent in fair, and 45 percent in poor (Figure 14B). Comparing Figure 13A and Figure 14A shows that Lapeer CRC’s paved county primary road network has similar amounts in the “Good” category for more roads within the “Poor” category than similarly-classified roads in the rest of the state. While Figure 13B and Figure 14B show that Lapeer CRC’s paved county local road network is similar in the “Good” category and has more “Poor” roads 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>.

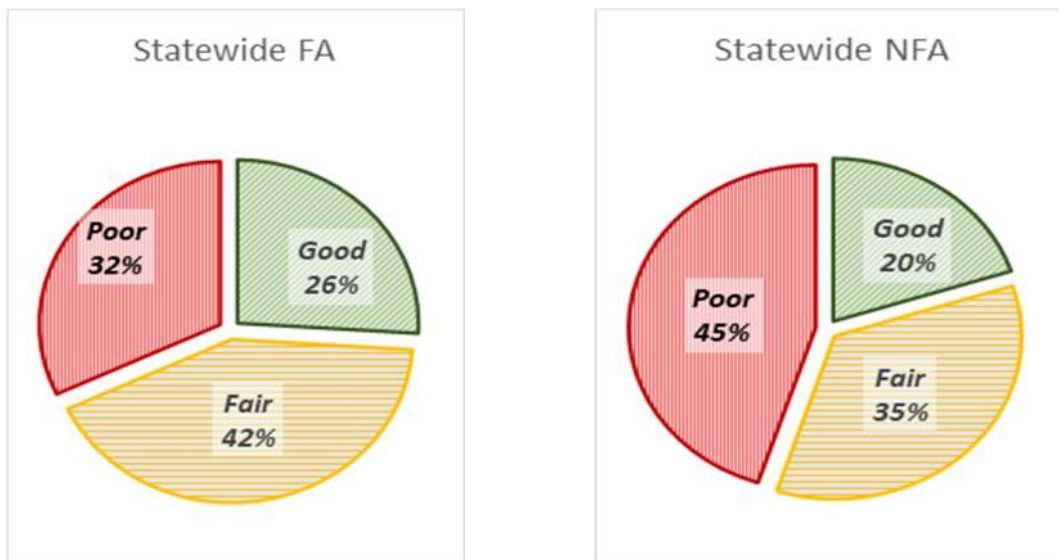


Figure 14: (A) Left: Statewide paved county primary road network conditions by percentage of good, fair, or poor, and (B) Right: paved county local road network conditions by percentage of good, fair, or poor

The increase in the number of roadways within the Poor category, compared to state-wide results, could be partially contributed to the past focus on reconstruction of roadways instead of preventative maintenance. The number of reconstructed roads were not keeping up with the deterioration of the Fair Roadways. As the cost of constructed increased due to inflation, the funding levels stayed relatively constant, thus causing a gap in the length of roadways being completed. Finally, Lapeer County has seen a large increase in traffic volumes over the past 10 years. Urban development coming north from the Greater Detroit area has contributed to heavier commercial traffic, thus causing faster deterioration of the road rating curves.

Figure 15 and Figure 16 show the number of miles for Lapeer CRC’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). Lapeer CRC 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.

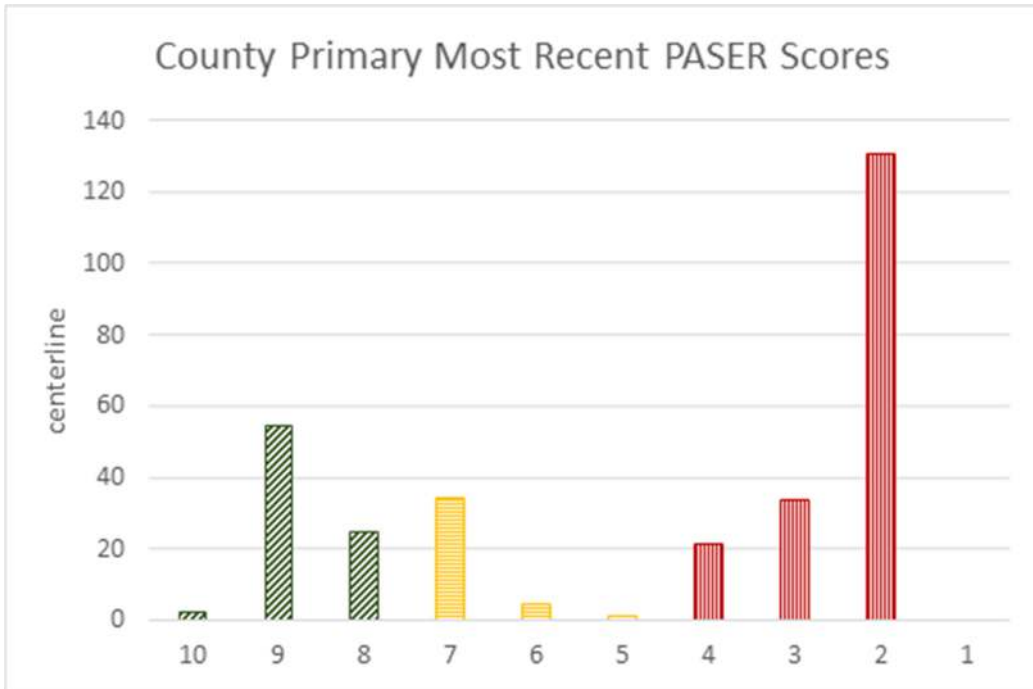


Figure 15: Lapeer CRC paved county primary road network conditions. Bar graph colors correspond to good/fair/poor TAMC designations.

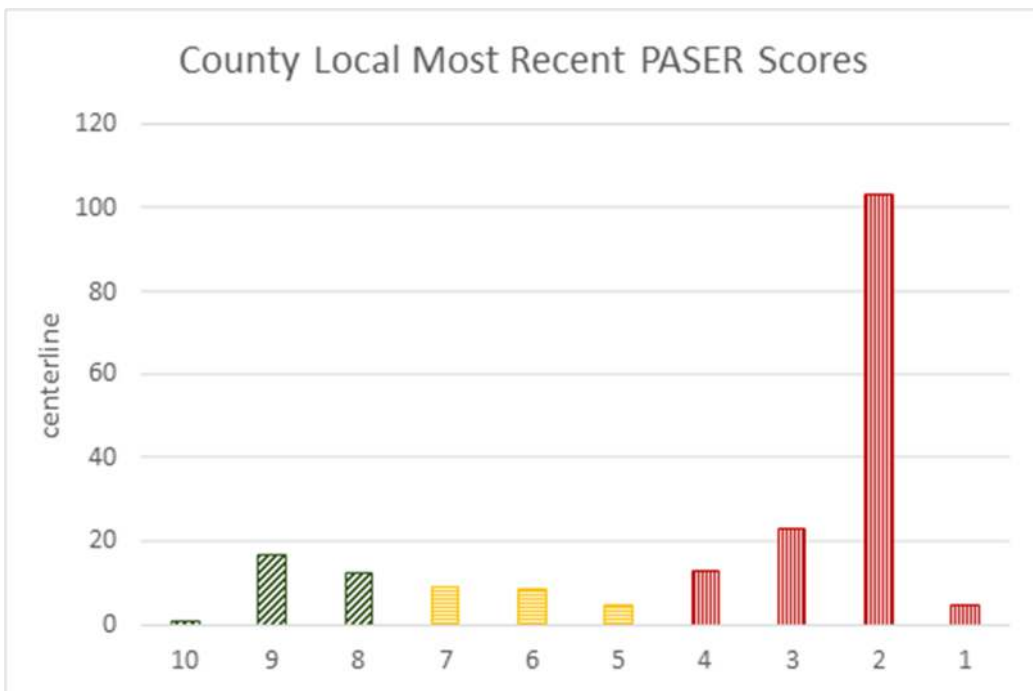


Figure 16: Lapeer CRC paved county local network condition by PASER rating. Bar graph colors correspond to good/fair/poor TAMC designations.

Figure 17 illustrates Lapeer CRC’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/>.

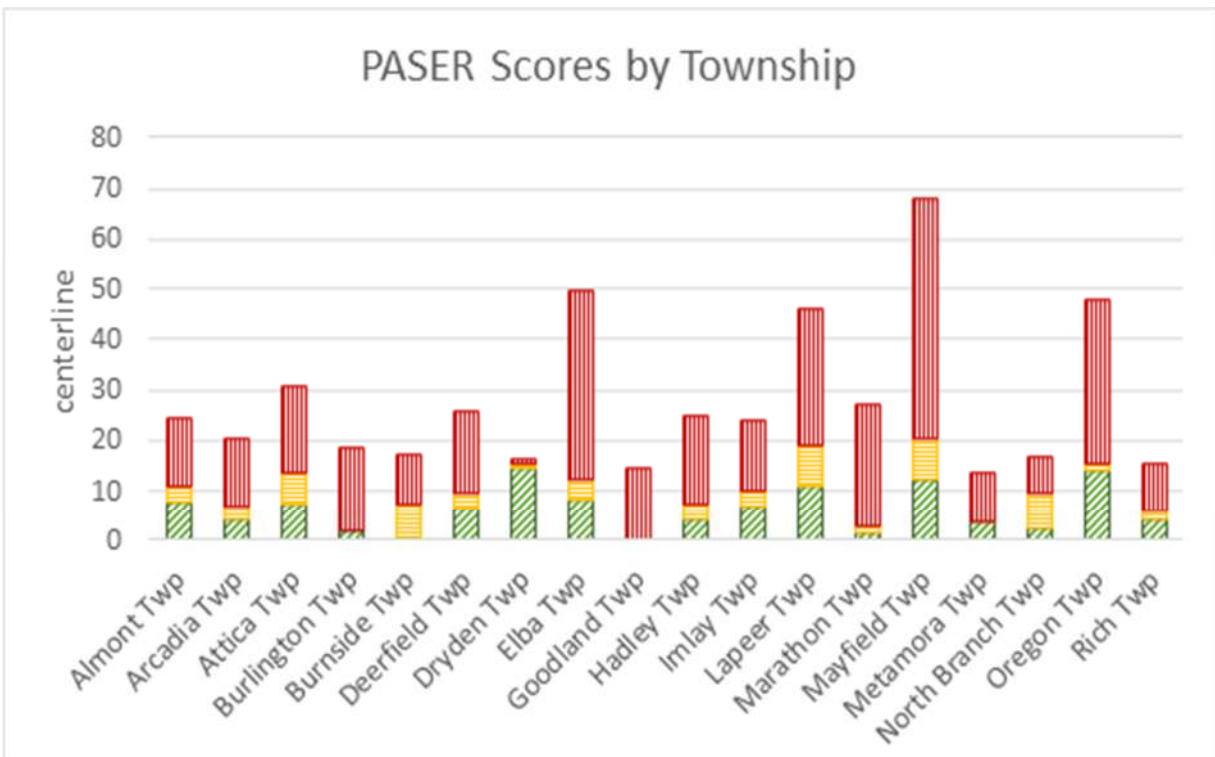


Figure 17: Number of miles of paved road in each township divided in categories of good (PASER 10, 9, 8), fair (PASER 7, 6, 5), and poor (PASER 4, 3, 2, 1).

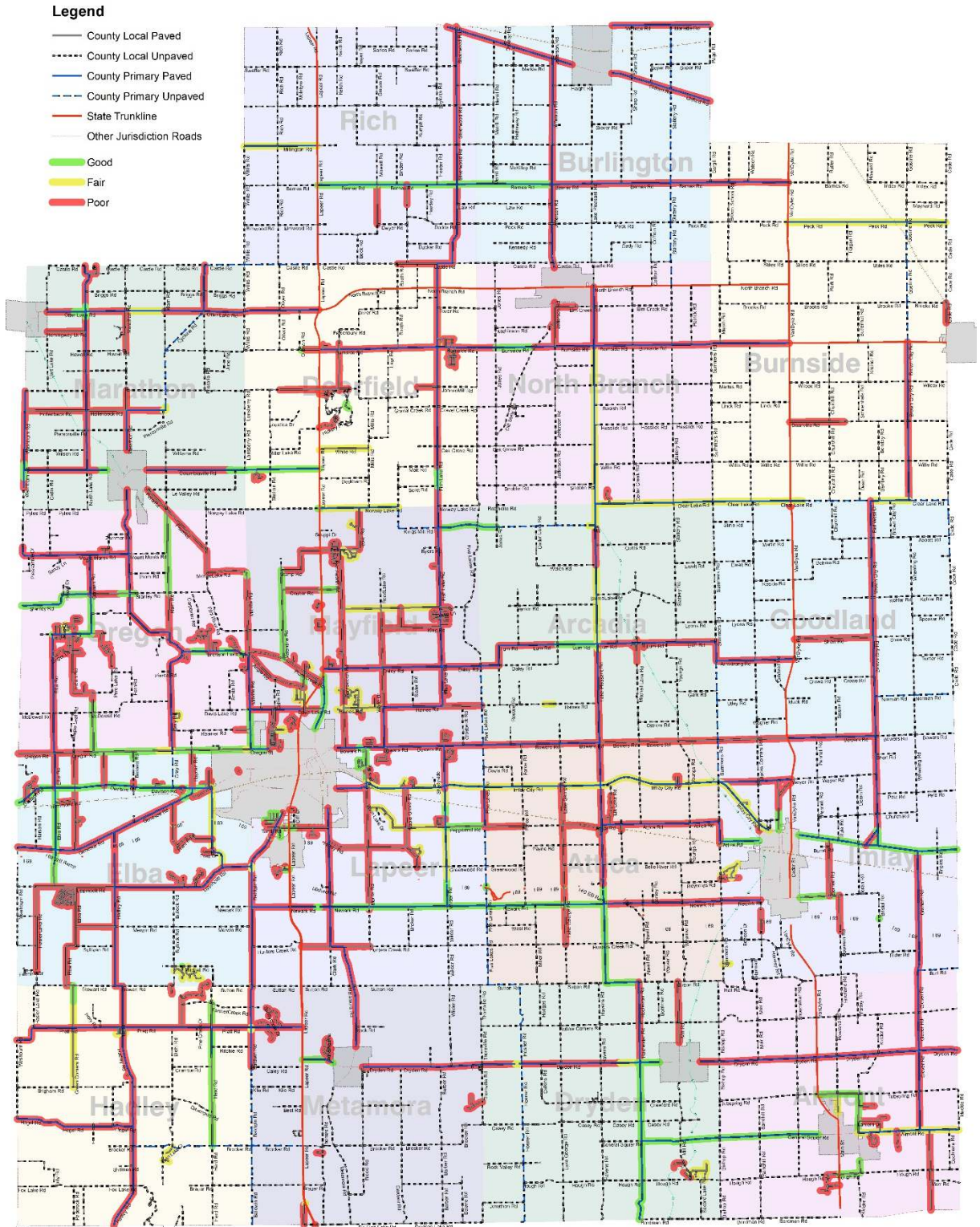


Figure 18: Map of the current paved road condition in good (PASER 10, 9, 8) shown in green, fair (PASER 7, 6, 5) shown in yellow, and poor (PASER 4, 3, 2, 1) shown in red.

Lapeer CRC has identified the trend prior to 2016, while focusing on the lowest PASER Rating roads (level 2), the Good and Fair roads are continuing to deteriorate. Recently the Lapeer CRC has switched priorities for future project over the next three (3) year program to focus on Preventative Maintenance projects. This will “save” the PASER level 3 and 4 roads before they fail beyond the ability to use a more cost-effective solution, or to use the “biggest bang for the buck”. Over the next three (3) years we should see an increase in Good road category and a decrease in the Poor category. At the end of the three (3) years we can re-evaluate the status of the system. However, it is projected that the distribution of the road ratings will be more in line with the road condition goals.

Historically, the overall quality of Lapeer CRC’s paved county primary roads has been decreasing until 2016, when the focus shifted to more Preventative Maintenance projects. This change in goals should assist in increasing the status of the road condition as can be observed in Figure 19.

Comparing Lapeer CRC’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.

The decrease in overall conditions of the Lapeer CRC paved Primary Road system can be observed in Figure 19 by noting the increase in roads in poor condition. Between 2013 and 2016 the percentage of roads in poor condition increased from 60% to 80%. However, starting in 2017, the focus of the Lapeer CRC shifted to more Preventative Maintenance projects such as HMA overlays. This helped the system to start an upward trend in more recent years. The percentage of fair roads remained fairly consistent over the years indicating that the crack seal projects were completed in a timely manner. Based on current projections for the upcoming three (3) year program, the network should see a decrease in poor roads, matching the trend as seen from 2017 forward.

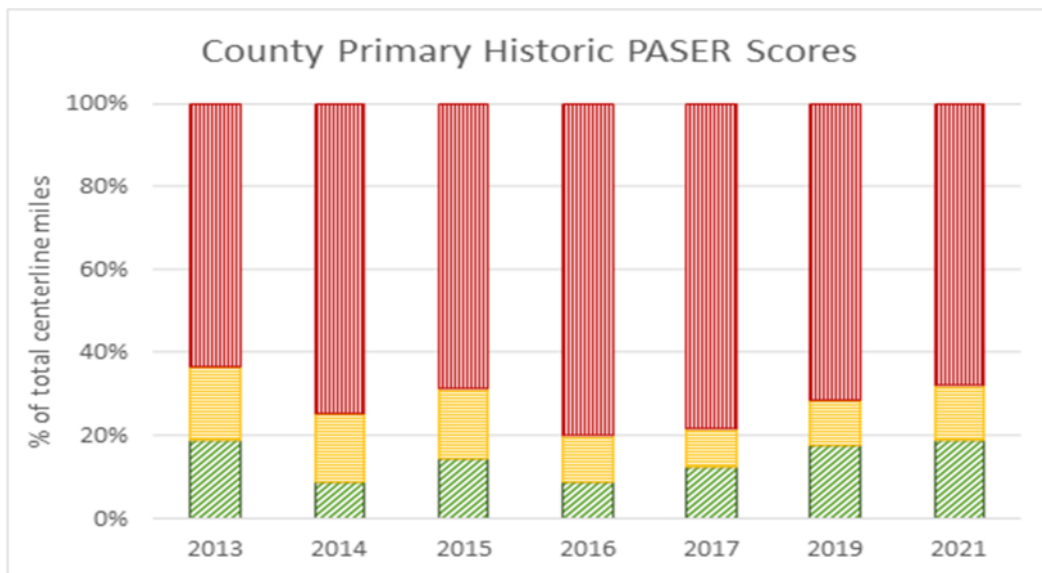


Figure 19: Historical Lapeer CRC paved county primary road network condition trend

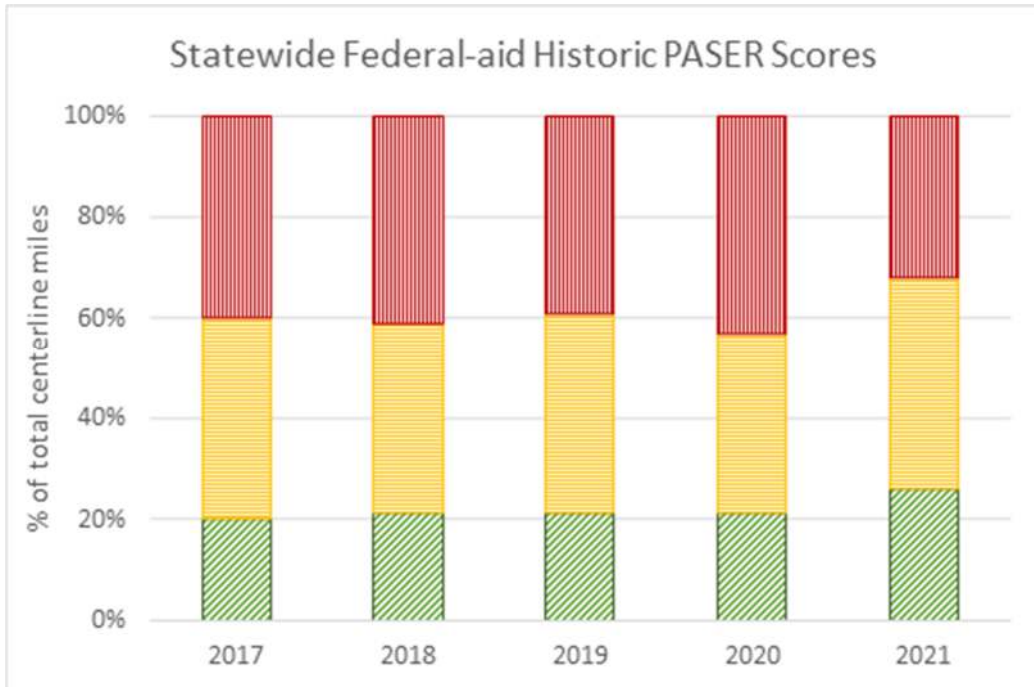


Figure 20: Historical statewide county primary road network condition trend

Historically, the overall quality of Lapeer CRC’s paved county local roads is more deteriorated, in general, than the paved county primary road network because 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 Lapeer CRC while Figure 22 illustrates these conditions statewide.

Comparing Lapeer CRC’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 condition of the Local Roads appears to stay consistent throughout the review years. This is partially contributed to the lower available funding at the Township level. Townships must wait so long between projects, due to funding constraints, that the overall system is continuing to degrade. Thereby, not allowing for conditions to improvement timely.

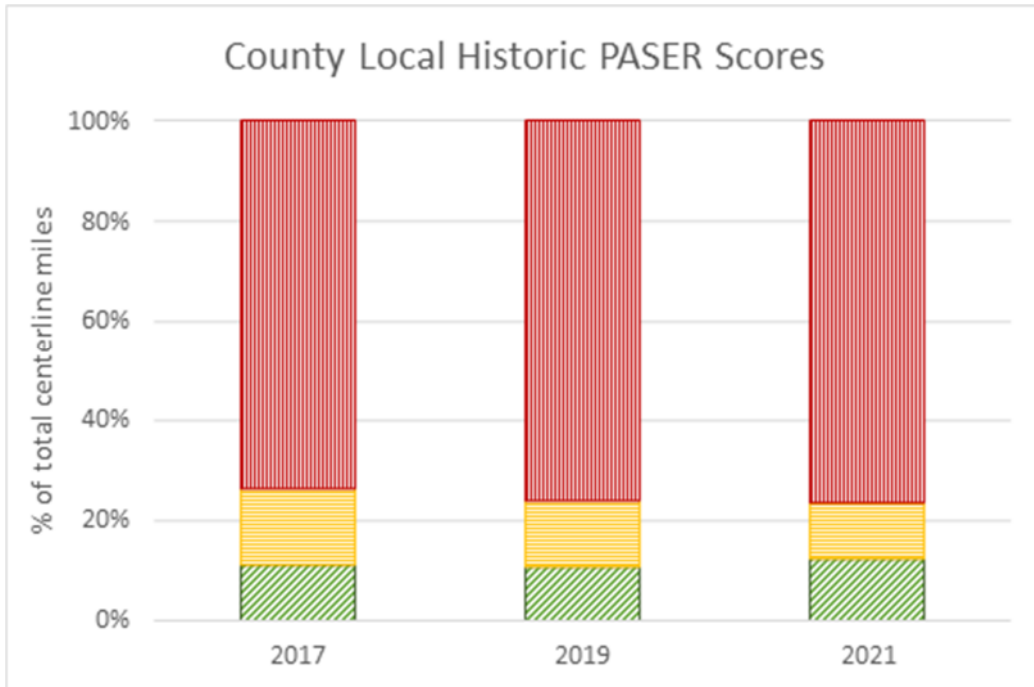


Figure 21: Historical Lapeer CRC paved county local road network condition trend

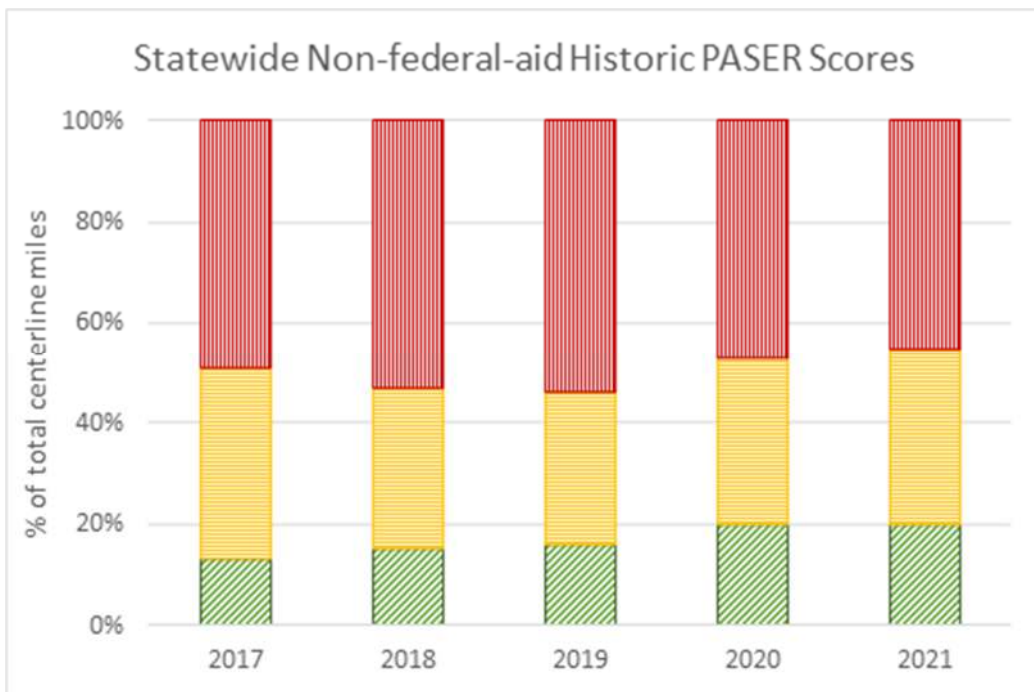


Figure 22: Historical statewide paved county local road network condition trend

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 Lapeer CRC uses the IBR System™ for rating its unpaved roads. More information regarding the IBR System™ can be found in Introduction’s Pavement Primer.

The majority of roads within the Lapeer CRC network are unpaved roadways. As shown in Figure 11, 61.5% of the network are unpaved. They form the local grid network that serves as access to residential and agricultural industries throughout the county. The maintenance focus on these roads includes 3 – 4 gradings per year, plus dust control. Due to the overall shortage of available funding assistance from the State and Federal level, at local levels, these roads will most likely continue to be unpaved. There are no plans in the near future to add hard surface roads within the Lapeer CRC network.

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.

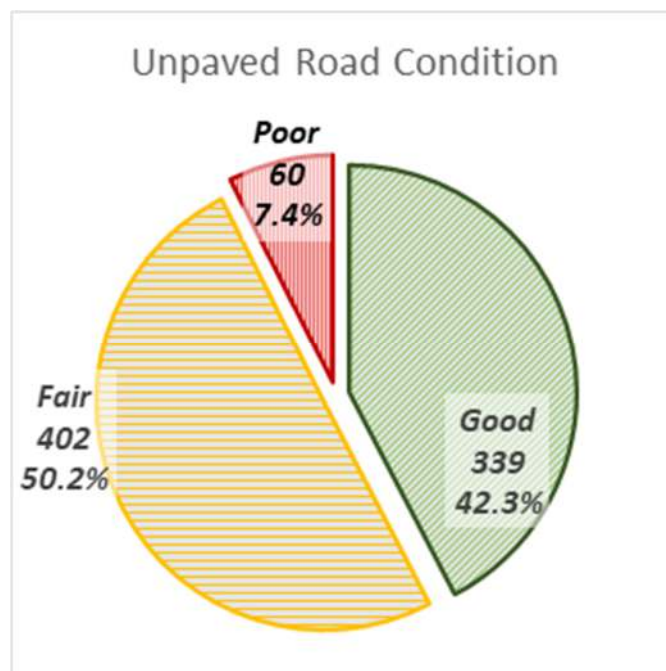


Figure 23: Lapeer CRC’s unpaved road network condition by percentage of roads with IBR numbers of 10, 9, and 8; roads with IBR numbers of 7, 6, and 5; and IBR numbers of 4, 3, 2, and 1.

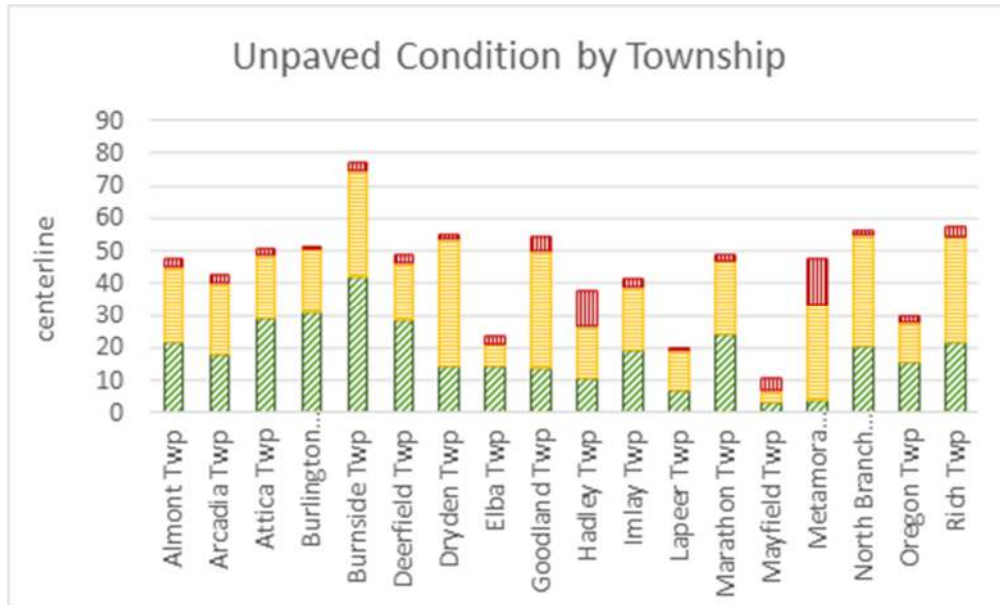


Figure 24: Number of miles of unpaved road in each township divided in categories of roads with IBR numbers of 10, 9, and 8; IBR numbers of 7, 6, and 5; and IBR numbers of 4, 3, 2, and 1.

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 adequacy, and structural adequacy.

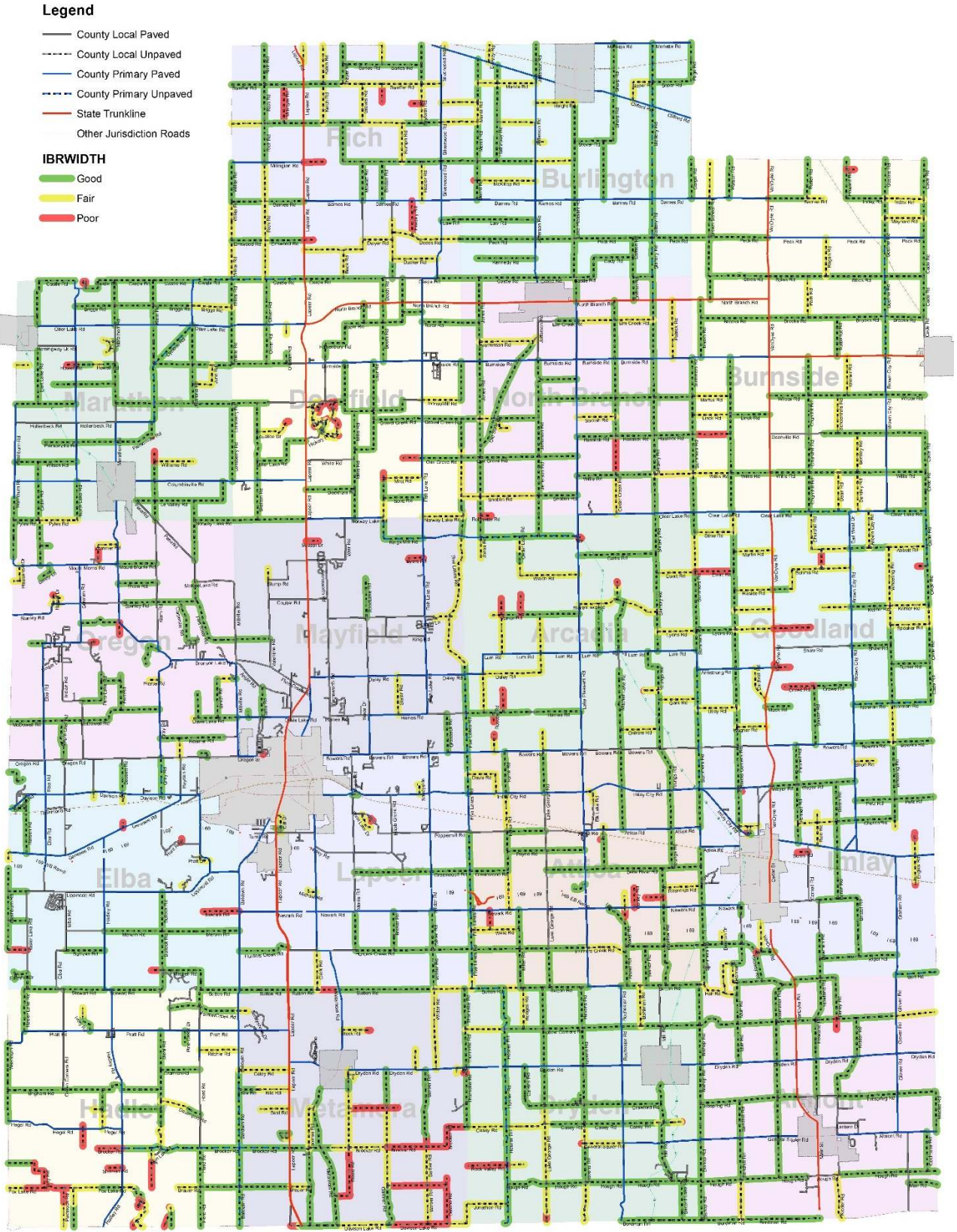


Figure 25: Map of the current IBR for surface width with good (22' and greater) shown in green, fair (16' to 21') shown in orange, and poor (15' or less) shown in red. Only unpaved roads owned by Lapeer CRC are shown.

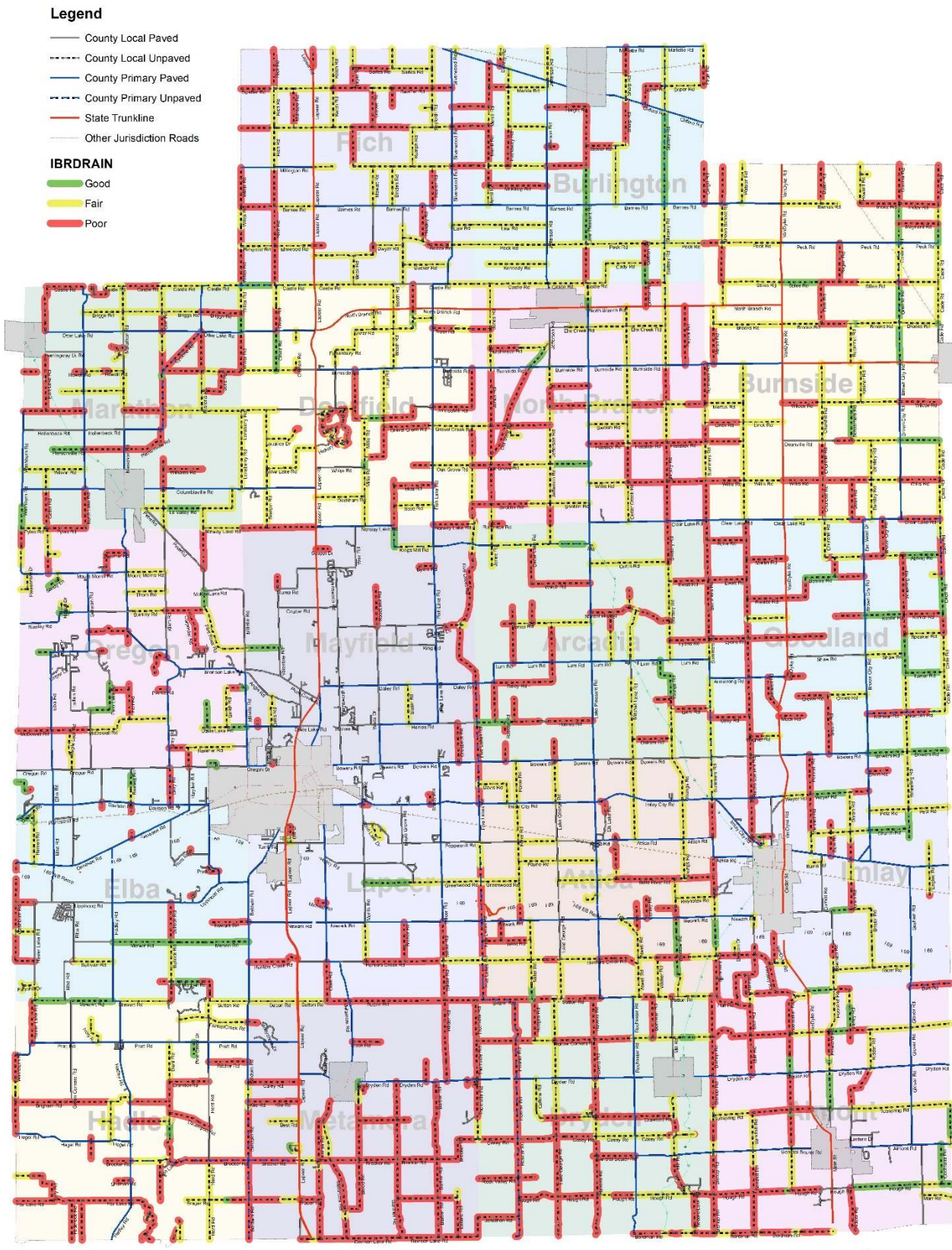


Figure 26: Map of the current IBR for drainage adequacy with good (2' or more) shown in green, fair (0.5' to less than 2') shown in orange, and poor (less than 0.5') shown in red. Only unpaved roads owned by Lapeer CRC are shown.

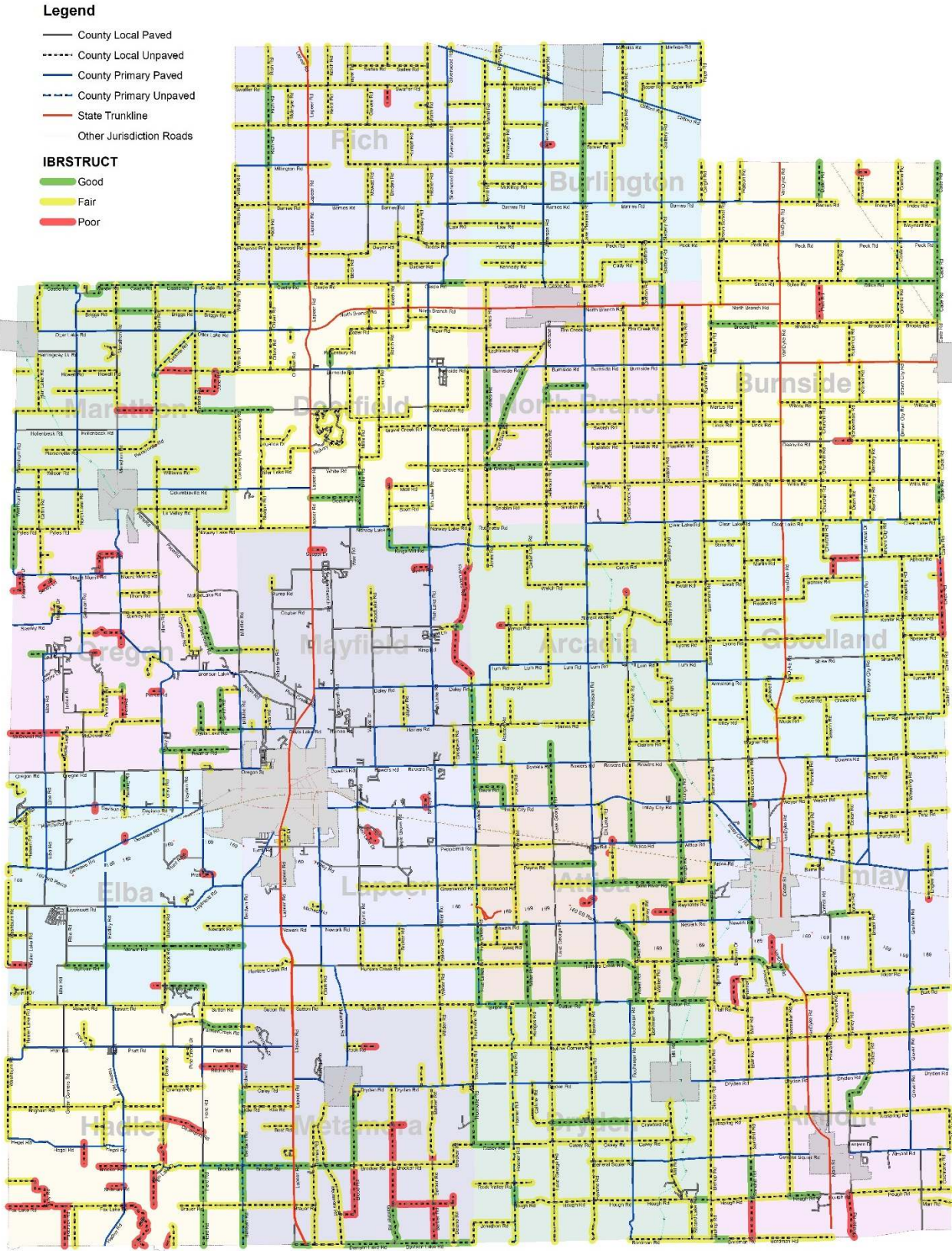


Figure 27: Map of the current IBR structural adequacy good (greater than 7") shown in green, fair (4" to 7") shown in orange, and poor (less than 4") shown in red. Only unpaved roads owned by Lapeer CRC are shown.

The current condition of the unpaved road network in regards to Width is overall good. The roads were widened in the early days of the Lapeer CRC during the 1930s – 1940s. Performing maintenance on the roads with select tree removals and brush axing programs, these widths continue to stay in relatively good condition for the amount of traffic. In regards to Structure, the Lapeer CRC Maintenance Department works closely with the Township on the Local Roads to maintain a gravel program that rotates throughout all roads on an 8 – 10-year program. The metric that needs the most attention in the future continues to be the Drainage aspect of the road condition. The overall drainage condition of the road network is poor. This is mostly due to limited funding, but also due to the higher priority of maintaining the traveled portion of the roadway. By placing the majority of the funding into the structure of the roadway, this reduces the complaints from the traveling public.

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. Lapeer CRC 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 Lapeer CRC’s paved county primary road network is to maintain and improve road conditions network-wide at 2022 levels. The baseline condition for this goal is illustrated in Figure 28.

Lapeer CRC’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 thirty-five (35%) percent of paved county primary roads out of the poor category. This goal will be accomplished by focusing on Preventative Maintenance projects over the next three (3) years to get the biggest impact with the available funding.

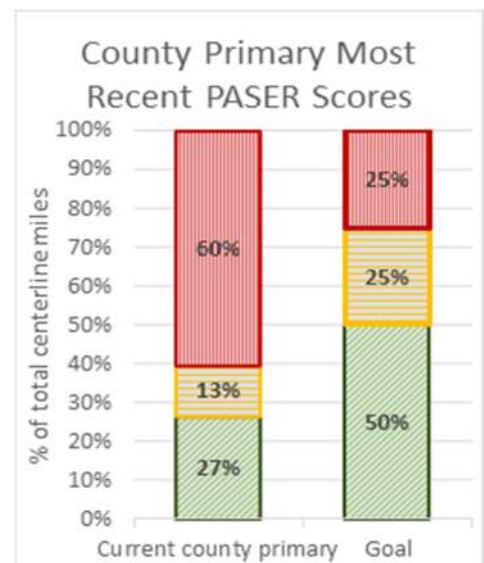


Figure 28: Lapeer CRC's 2022 county primary road network condition by percentage of good/fair/poor

Goals for Paved County Local Roads

The overall goal for Lapeer CRC’s paved county local road network is to maintain and improve road conditions network-wide at 2022 levels. The baseline condition for this goal is illustrated in Figure 29.

Lapeer CRC’s network-level pavement condition strategy for paved county local roads is:

1. Prevent its good and fair (PASER 10 - 5) paved county local roads from becoming poor (PASER 4 - 1).
2. Move twenty-three (23%) percent of paved county local roads out of the poor category. This goal will be accomplished by focusing on Preventative Maintenance projects over the next three (3) years to get the biggest impact with the available funding.

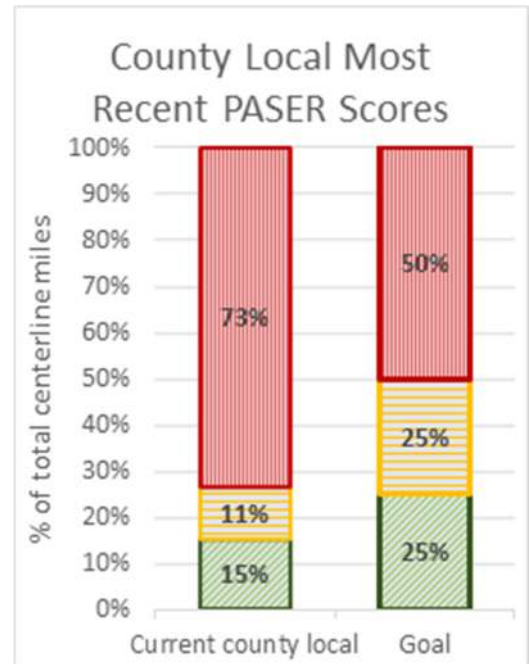


Figure 29: Lapeer CRC 2022 paved county local road network condition by percentage of good/fair/poor

Goals for Unpaved Roads

The overall goal for Lapeer CRC’s unpaved road network is to maintain and improve road conditions network-wide at 2022 levels. The baseline condition for this goal is illustrated in Figure 30.

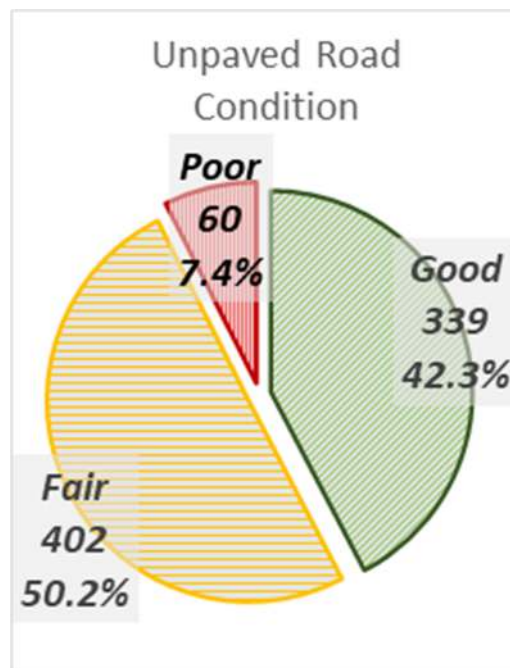


Figure 30: Lapeer CRC’s 2022 unpaved road network condition by percentage of good/fair/poor

Our year-round unpaved roads will be maintained at their current Width, Structural Adequacy and Drainage assessments for roads where these IBR elements are assessed as Good or Fair.

Currently, approximately ninety-five (95%) percent of Lapeer CRC's year-round unpaved roads have good or fair structural and width adequacy. However, only approximately fifty (50%) percent have good or fair drainage adequacy.

Year-round unpaved roads that have categories assessed as poor will be strategically upgraded as funding is available to address, first, drainage issues and, then, structural issues. Surface widths will be addressed on an as-needed basis to provide service or to address safety issues.

Seasonal roads will be addressed to provide passability and safety but do not have a goal associated with them.

Modelled Trends

Roads age and deteriorate just like any other asset. All pavements are damaged by water, traffic weight, freeze/thaw cycles, sunlight, and traffic weight. To offset natural deterioration and normal wear-and-tear on the road, Lapeer CRC 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.

Lapeer CRC 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 Lapeer CRC'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 Type¹

Fix Type	Life Extension (in years)*			
	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.

Roadsoft Pavement Condition Forecast to Forecast Future Trends

Lapeer CRC 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. An example screenshot of Roadsoft’s pavement condition model and the associated output is shown in Figure 31.

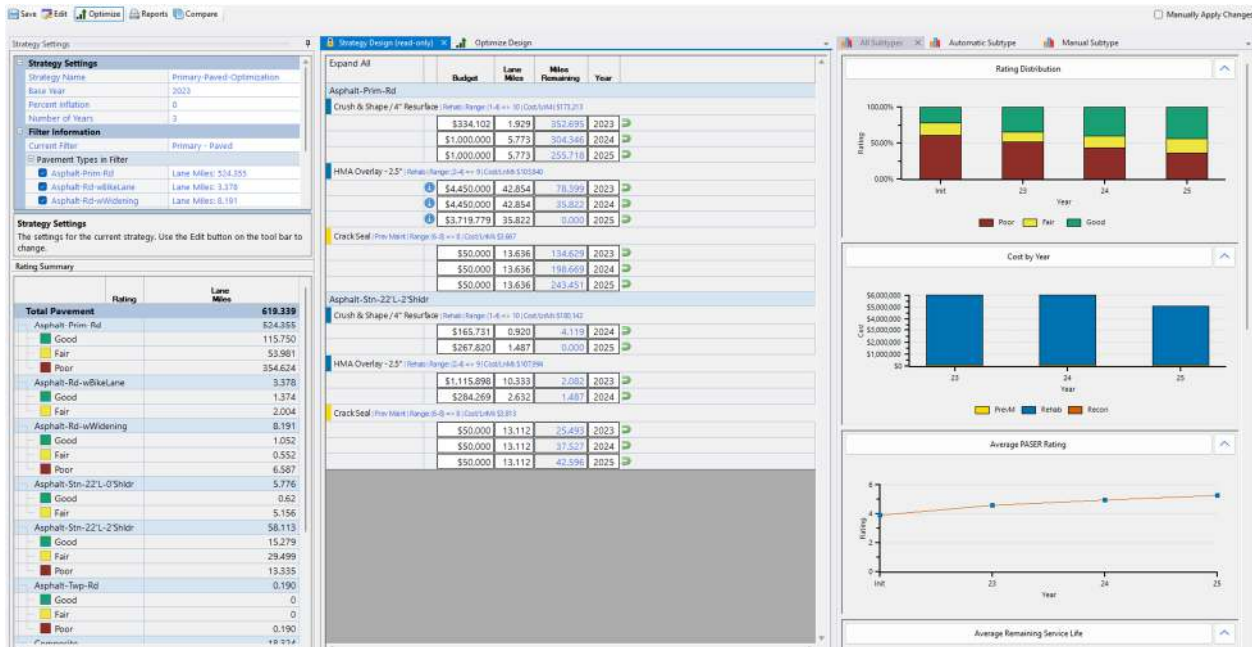


Figure 31: Pavement condition forecast model in the software program Roadsoft.

Paved County Primary Roads

Table 2 illustrates the network-level model inputs for Roadsoft on the paved county primary road network. Other pavement types in this network were neglected due to their small numbers relative to HMA pavements. The treatments outlined in Table 2 are the average treatment volume of planned projects scheduled to be completed in 2023 - 2025. See Appendix A of this plan for details on planned projects. Full model inputs and outputs are included in Appendix B.

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

Treatment Name	Annual Miles of Treatment	Years of Life	Trigger-Reset
Crack Seal	59	3	7 : 8
Seal Coat	5	5	5 : 8
HMA Overlay	55	12	3 : 9
Crush, Shape and Resurface	131	18	1,2 : 9

Results from the Roadsoft network condition model for the county primary roads are shown in Figure 32. The Roadsoft network analysis of Lapeer CRC’s planned projects from its currently-available budget does allow Lapeer CRC to reach its pavement condition goals given the projects planned for the next three (3) years.

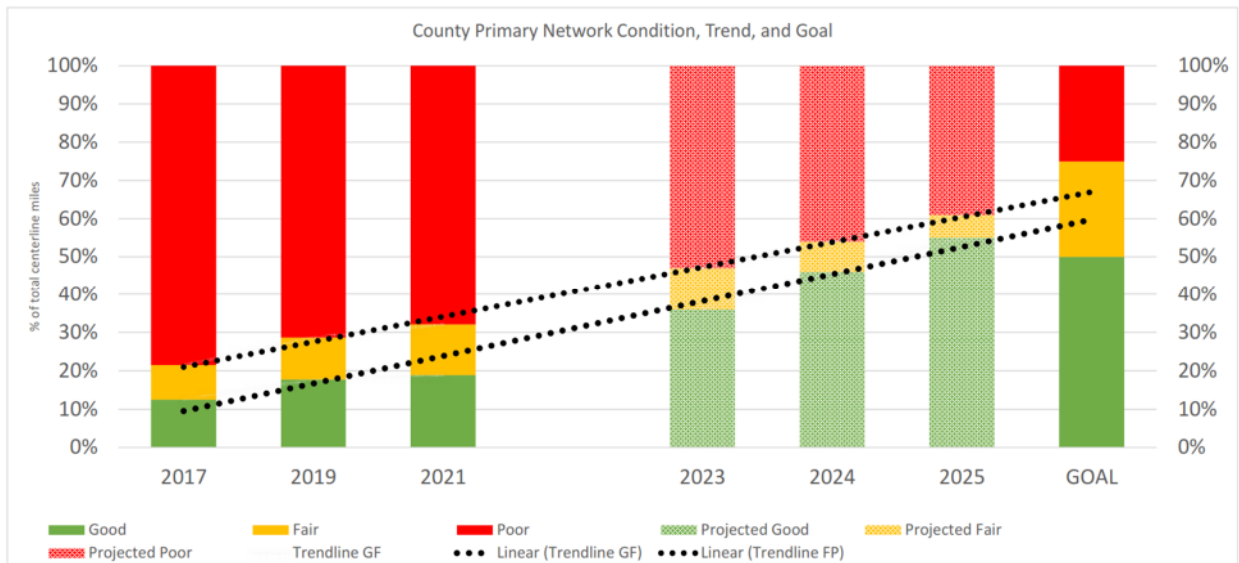


Figure 32: Forecast good/fair/poor changes to Lapeer CRC network condition from planned projects on the county primary road network.

Over the next three (3) years, Lapeer CRC is committed to focus on rehabilitation projects to stretch the available funding as much as possible. This means that roads that are already deteriorated beyond the level of performing an overlay or other preventative maintenance method, will be placed on hold until other roads that can be improved at a lower cost are completed.

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 3 illustrates the network-level model inputs for Roadsoft on the paved county local road network. Other pavement types in this network were neglected due to their small numbers relative to HMA pavements. The treatments outlined in Table 3 are the average treatment volume of planned projects scheduled to be completed in 2023 - 2025.

Treatment Name	Annual Miles of Treatment	Years of Life	Trigger-Reset
Crack Seal	21	3	7 : 8
Seal Coat	13	5	5 : 8
HMA Overlay	36	12	3 : 9
Crush, Shape and Resurface	108	18	1,2 : 9

Anticipated results from the Roadsoft network condition model for the paved county local roads are shown in Figure 34. The Roadsoft network analysis of Lapeer CRC's planned projects from its currently available budget does allow Lapeer CRC to reach its pavement condition goal given the projects planned for the next three (3) years, contingent upon participation in funding from the local Townships.

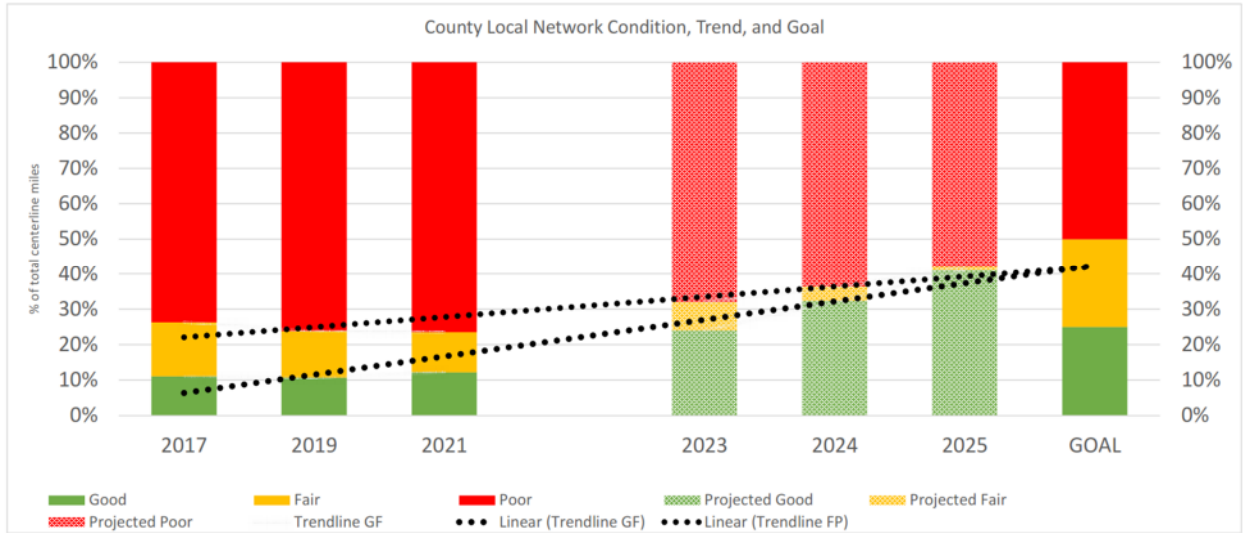


Figure 34: Forecast good/fair/poor changes to Lapeer CRC network condition from planned projects on the paved county local road network.

Townships within Lapeer County participate in funding road projects each year. Typically, approximately 5 - 7 miles of Local roads are paved each year. However, the majority of the allocated funds and supplemental funds from the Township are utilized on the unpaved road network, which accounts for 61.5% of the road network. If Local communities keep with the anticipated amount resurfacing mileage over the next few years, roads with fair conditions will be addressed, however, there will still be a need for additional funding assistance to address the overall deterioration of the road network in the poor category.

Planned Projects

Lapeer CRC 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 (3) 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 Lapeer CRC to alter initial plans. Project planning information is used to predict the future condition of the road networks that Lapeer CRC 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 2023 – 2025 Lapeer CRC plans to do the following projects:

Paved County Primary Projects

Lapeer CRC 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, Figure 36, and Figure 37. The total cost of these projects is approximately \$6,000,000 each year.

Paved County Local Projects

Lapeer CRC is currently planning the construction and maintenance projects as coordinated with the Townships for the paved county local road network. The locations of these projects will be selected with the Townships during planning meetings over the next three years. The total cost of these projects is approximately \$2,250,000 each year, total with paved and unpaved projects.

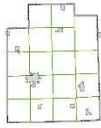
Unpaved Road Projects

Lapeer CRC is currently planning the construction and maintenance projects as coordinated with the Townships for the unpaved road network. The location of these projects will be selected with the Township during the planning meetings over the next three years. The total cost of these projects is approximately \$2,250,000 each year, total with paved and unpaved road projects.

Lapeer CRC is working with the eighteen (18) local Townships in regards to their projects over the next three (3) years. In meetings and discussions over the past year, we have received assurances from the Townships that they are committing funds for road maintenance and improvements. The chart below depicts the estimated funding from each Township, subject to change.

Township	Estimated Road Funding per Year
Almont Twp	\$175,000
Arcadia Twp	\$70,000
Attica Twp	\$175,000
Burlington Twp	\$100,000
Burnside Twp	\$100,000
Deerfield Twp	\$100,000
Dryden Twp	\$150,000
Elba Twp	\$150,000
Goodland Twp	\$100,000
Hadley Twp	\$200,000
Imlay Twp	\$125,000
Lapeer Twp	\$100,000
Marathon Twp	\$100,000
Mayfield Twp	\$125,000
Metamora Twp	\$125,000
North Branch Twp	\$100,000
Oregon Twp	\$175,000
Rich Twp	\$80,000
	\$2,250,000

More detailed information on these projects can be found in Appendix A-B.



2023 Primary Road Overlay

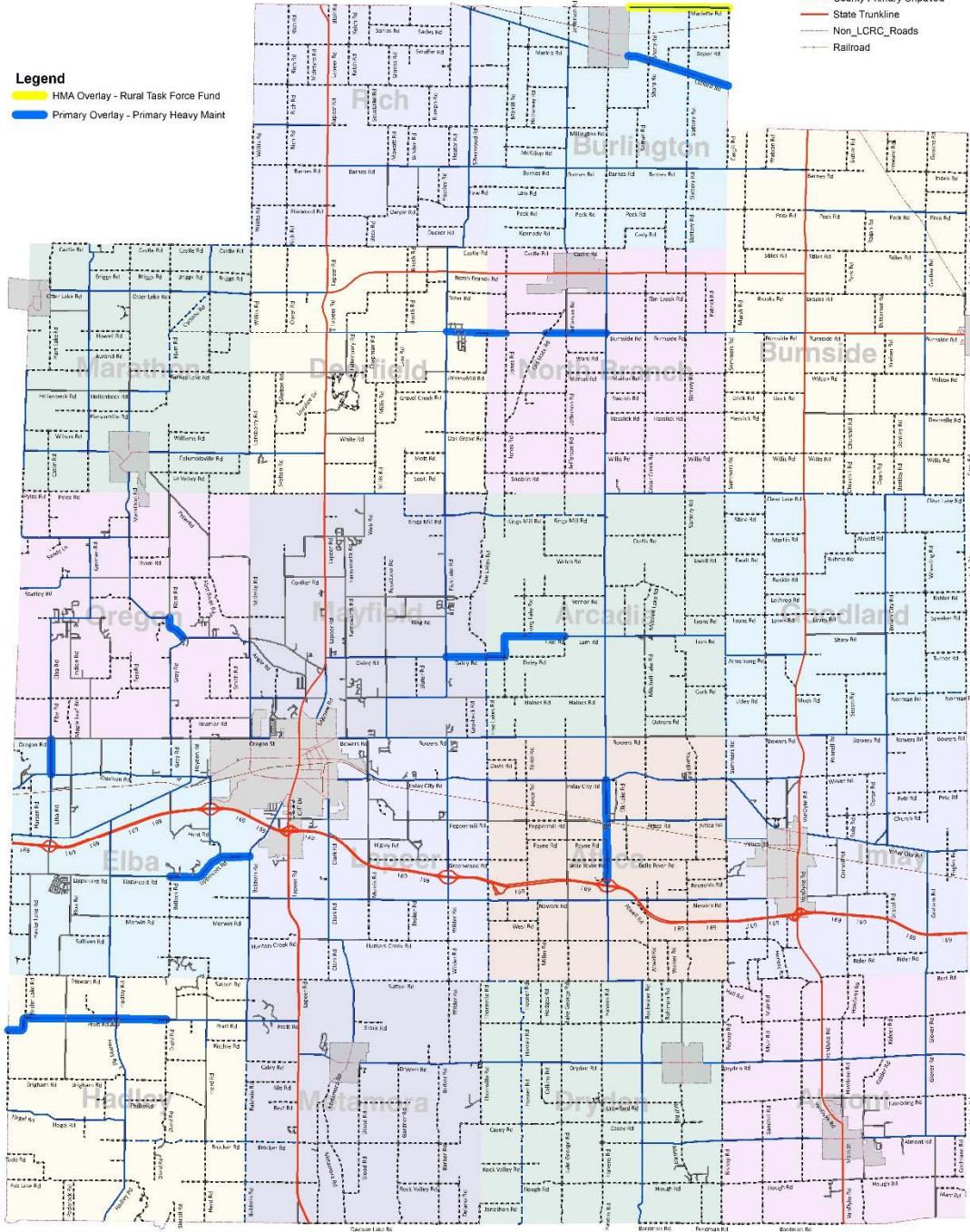
Selected Roads for HMA Overlay Program in 2023 are subject to available funds. This scope of work may vary depending on project cost projections.

Legend - Roads

- County Local Paved
- - - County Local Unpaved
- County Primary Paved
- - - County Primary Unpaved
- State Trunkline
- Non_LCRC_Roads
- Railroad

Legend

- HMA Overlay - Rural Task Force Fund
- Primary Overlay - Primary Heavy Maint



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 Web: www.lcraonline.com

Primary Paved: 308.04 miles
 Primary Unpaved: 52.52 miles
 Total Primary: 360.56 miles



Figure 35: Map showing paved county primary road projects planned for 2023.

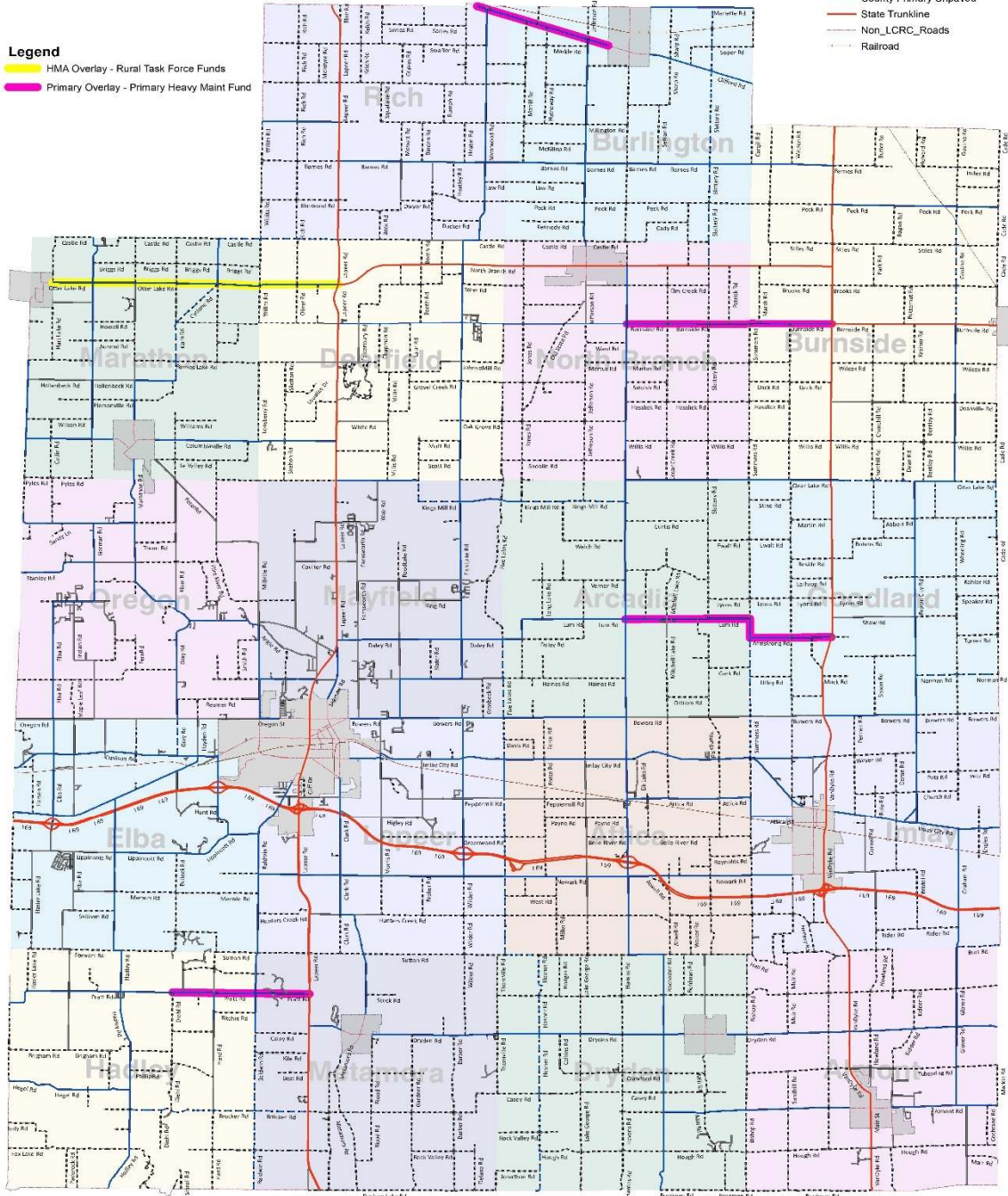


2024 Primary Road Overlay

Selected Roads for HMA Overlay Program in 2024 are subject to available funds. This scope of work may vary depending on project cost projections.

- Legend**
- HMA Overlay - Rural Task Force Funds
 - Primary Overlay - Primary Heavy Maint Fund

- Legend - Roads**
- County Local Paved
 - County Local Unpaved
 - County Primary Unpaved
 - County Primary Paved
 - State Trunkline
 - Non_LCRC_Roads
 - Railroad



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Figure 36: Map showing paved county primary road projects planned for 2024.



2025 Primary Road Overlay

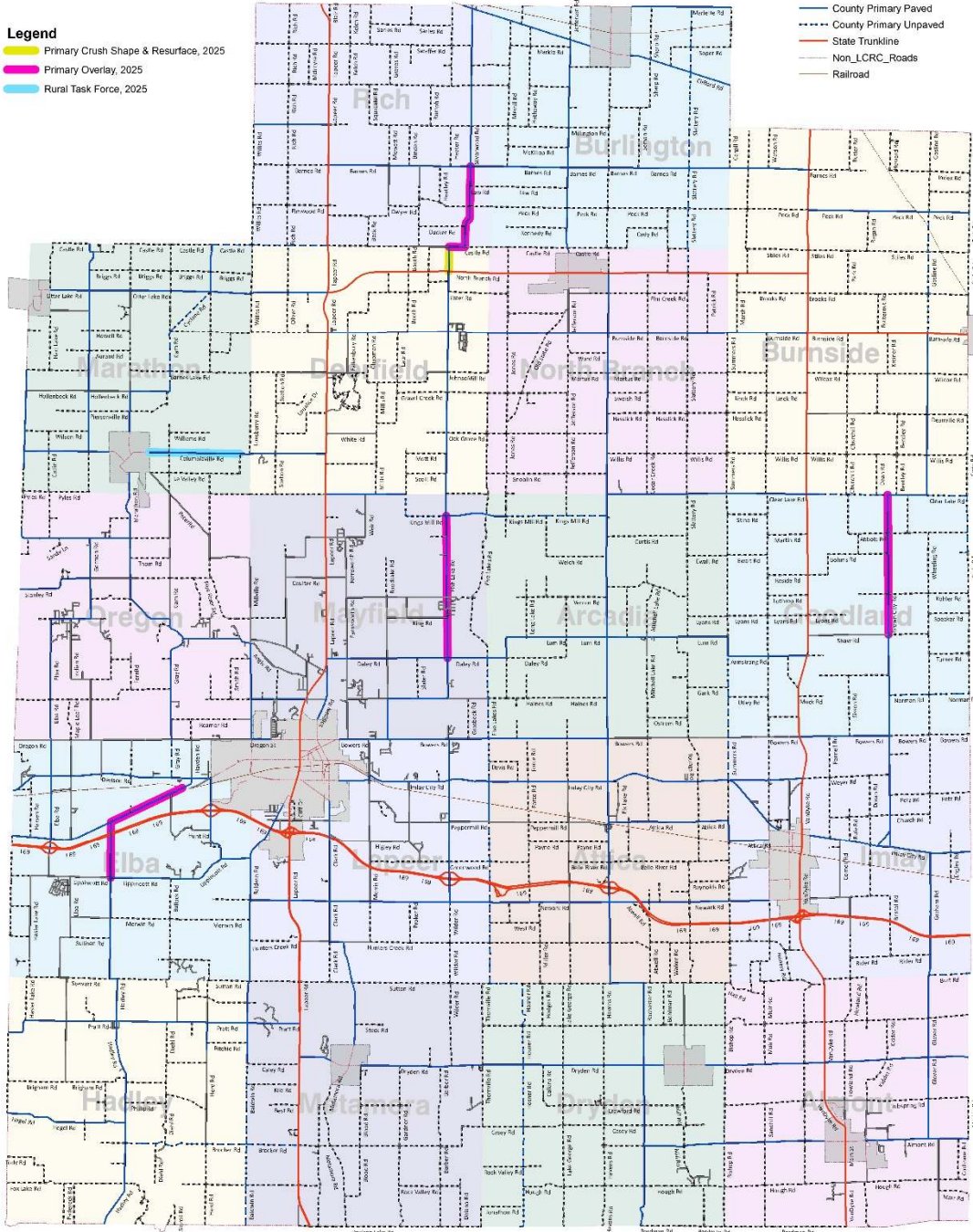
Selected Roads for HMA Overlay Program in 2025 are subject to available funds. This scope of work may vary depending on project cost projections.

Legend

- Primary Crush Shape & Resurface, 2025
- Primary Overlay, 2025
- Rural Task Force, 2025

Legend - Roads

- County Local Paved
- - - County Local Unpaved
- County Primary Paved
- - - County Primary Unpaved
- State Trunkline
- Non_LCRC_Roads
- Railroad



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Figure 37: Map showing paved county primary road projects planned for 2025.

Gap Analysis

The current funding levels that Lapeer CRC 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, Lapeer CRC believes that the overall condition of this network can be maintained or improved with additional funding for construction and maintenance. An alternate strategy may be used to overcome the current shortfall and meet the goals on the paved county primary road network, the paved county local road network, and the unpaved road network:

Roadsoft Pavement Condition Forecast for the Paved County Primary and County Local Network

Lapeer CRC used Roadsoft to forecast the necessary additional construction and maintenance work for meeting agency goals on the paved county primary and county local road networks. Table 4 and Table 5 illustrate the network-level model inputs used for this simulation. Full model inputs and outputs are included in Appendix B.

Table 4: Roadsoft Modelled Trends, Planned Projects, and Gap Analysis for 's Road Assets—Pavement Condition Forecast and Gap Analysis: Roadsoft Annual Work Program for Paved County Primary Road Network Forecast			
Pavement Condition Forecast			
Treatment Name	Annual Miles of Treatment	Years of Life	Trigger-Reset
Crack Seal	10	3	7 : 8
Seal Coat	3	5	5 : 8
HMA Overlay	20	12	3 : 9
Crush, Shape and Resurface	2	18	1,2 : 9
Additional Work Necessary to Overcome Deficit			
Treatment	Annual Miles of Treatment	Years of Life	Trigger-Reset
Crack Seal	49	3	7 : 8
Seal Coat	2	5	5 : 8
HMA Overlay	35	12	3 : 9
Crush, Shape and Resurface	129	18	1,2 : 9

Table 5: Roadsoft Modelled Trends, Planned Projects, and Gap Analysis for 's Road Assets—Pavement Condition Forecast and Gap Analysis: Roadsoft Annual Work Program for Paved County Local Road Network Forecast			
Pavement Condition Forecast			
Treatment Name	Annual Miles of Treatment	Years of Life	Trigger-Reset
Crack Seal	7	3	7 : 8
Seal Coat		5	5 : 8
HMA Overlay	6	12	3 : 9
Crush, Shape and Resurface	1	18	1,2 : 9
Additional Work Necessary to Overcome Deficit			
Treatment	Annual Miles of Treatment	Years of Life	Trigger-Reset
Crack Seal	14	3	7 : 8
Seal Coat	13	5	5 : 8
HMA Overlay	30	12	3 : 9
Crush, Shape and Resurface	107	18	1,2 : 9

If Lapeer CRC was to theoretically stop funding Primary paved road improvements, by the year 2028, approximately 67.3% of the network would be in Poor condition. Lapeer CRC is committed to creating a strategy to keep the network in the same condition of better over the next three (3) years. With approximately 129 miles of roadway being rated PASER 2, the strategy must be to address the PASER 3 and 4 category over the next three (3) years, to then create time to fix the PASER 2's at the higher cost.

Using current levels of funding at approximately \$6,000,000 per year, at the end of 2028, in theory, 22.5% of the roads will still be in poor condition.



Figure 38: Forecast good/fair/poor Changes to Lapeer CRC Network Condition from planned projects on the county primary paved road network with current funding levels

If additional funds were available for the Primary Road network, at approximately \$10,000,000 per year, at the end of 2028, in theory, all poor road conditions could be addressed.

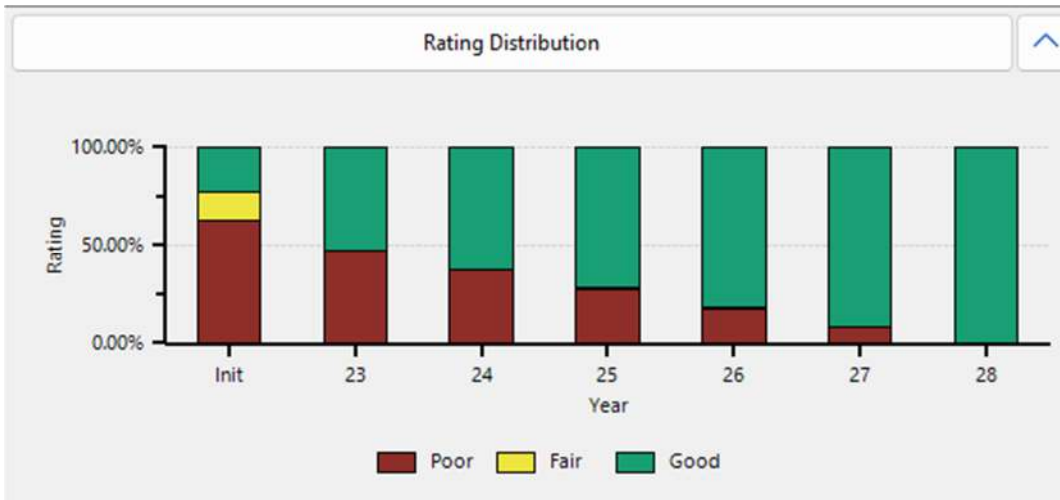


Figure 39: Forecast good/fair/poor Changes to Lapeer CRC Network Condition from planned projects on the county primary paved road network with an increase in funding levels

If Townships were to theoretically stop funding Local paved road improvements, by the year 2028 approximately 81.6% of the network would be in Poor condition. In meetings with local Township, it is our understanding that they are committed to creating a strategy to keep the network in the same condition of better over the next three (3) years. With 107 miles of local roads being rated PASER 2 it is clear that additional funding assistance is critical in maintaining the local road network.

Using current levels of funding at approximately \$1,000,000 per year, at the end of 2028, in theory, 65.6% of the roads will still be in poor condition.



Figure 40: Forecast good/fair/poor Changes to Lapeer CRC Network Condition from planned projects on the county local paved road network with current funding levels

If additional funds were available for the Local Road network, at approximately \$7,100,000 per year, at the end of 2028, in theory, all poor road conditions could be addressed.



Figure 41: Forecast good/fair/poor Changes to Lapeer CRC Network Condition from planned projects on the county local paved road network with an increase in funding levels

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. Lapeer CRC 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://www.lcrconline.com/about/dashboard/>.

Lapeer CRC has a total budget for pavement asset management of approximately \$9,000,000.

County Primary Network

Lapeer CRC has historically spent \$6,000,000 annually on pavement-related projects. Over the next three (3) years, Lapeer CRC plans to spend \$6,000,000 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), and federal/state programs.

County Local Network

Lapeer CRC has historically spent \$2,000,000 annually on pavement-related projects. Over the next three (3) years, Lapeer CRC plans to spend \$2,000,000 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 Michigan Transportation Fund (MTF), millages, township contributions, and federal/state programs.

3. RISK OF FAILURE ANALYSIS

Transportation infrastructure is designed to be resilient. The system of interconnecting roads and bridges maintained by Lapeer CRC 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 42 illustrates the key transportation links in Lapeer CRC'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.

Overall, the Lapeer CRC Road Network is set with 1-mile segments creating a grid pattern. Our road network includes the following critical assets (see Figure 42):

- Railroad crossings – The CN Railroad dissects Lapeer County through Elba, Lapeer, Attica and Imlay Townships. These twelve (12) at-grade crossings are critical in allowing traffic from the north to access the only expressway within the County - I-69
- Holloway Reservoir – This 1,975-acre reservoir was created in 1955 for the increase of demand for drinking water in the City of Flint, in Genesee County. Water was backed up with a dam for eight miles and 1,975 acres of land was flooded. In 1968, the City of Flint switched to the Detroit water system, so the Genesee County Parks department converted the area to recreation use. Currently, only two (2) Lapeer CRC bridges cross the reservoir, Stanley Road Bridge and Mt. Morris Road Bridge. If both of these bridges were closed, then a 30-mile primary road detour would be needed to maintain .

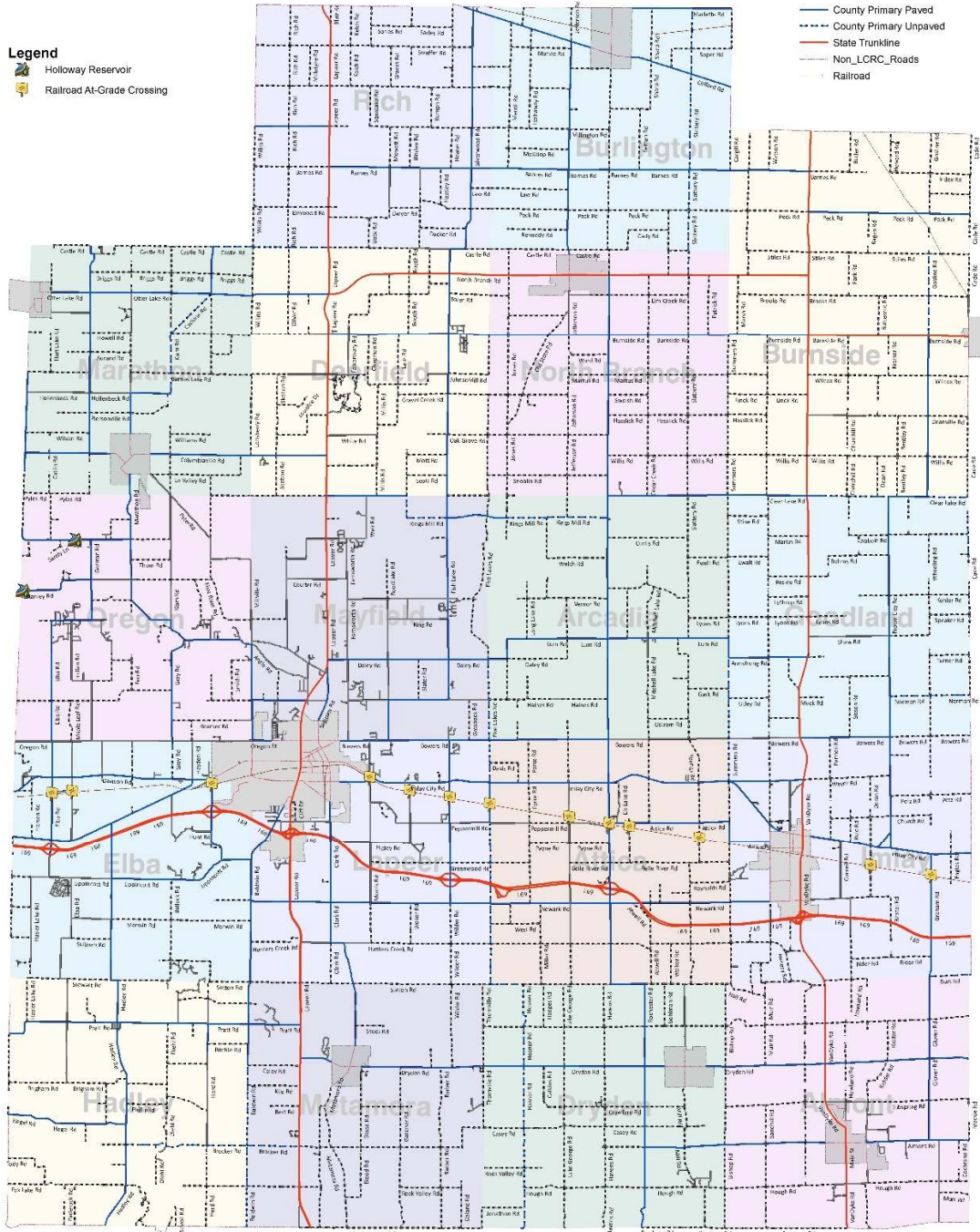


CRITICAL LINKS

This map shows critical links in the transportation system that may cause significant inconvenience to users if they are unexpectedly closed to traffic

- Legend**
- Holloway Reservoir
 - Railroad At-Grade Crossing

- Legend - Roads**
- County Local Paved
 - County Local Unpaved
 - County Primary Paved
 - County Primary Unpaved
 - State Trunkline
 - Non_LCRC_Roads
 - Railroad



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Primary Paved: 308.04 miles
 Primary Unpaved: 52.52 miles
 Total Primary: 360.56 miles



Figure 42: Key transportation links in Lapeer CRC's road network

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. Lapeer CRC communicates with both public and private infrastructure owners to coordinate work in the following ways:

- Utilities are encouraged to locate their facilities according to the Utility Policy.
 - Gas, Telephone and Fiber facilities are located 29-ft to 33-ft off road centerline.
 - Water and Sanitary Sewer are located 25-ft to 29-ft off road centerline.
 - Poles, hydrants and pedestals are located at 33-ft off road centerline.
- Projected Primary Road Improvements are provided to utilities and townships a minimum of 1-year prior to the project commencement to address underground facilities prior to surface improvements.

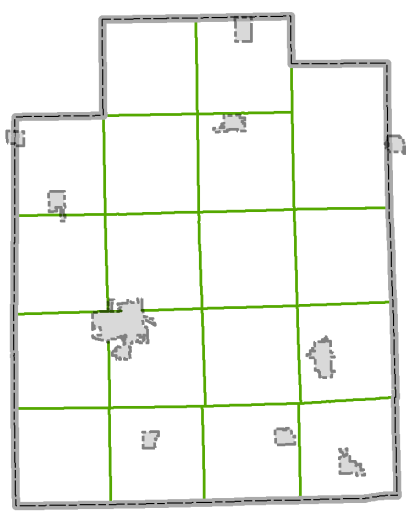
Lapeer CRC maintains storm sewer, cross-culverts, manholes, catch basins, traffic signs, traffic signs, pavement markings, and guardrail assets in addition to transportation assets. Lapeer CRC follows an asset management process for all of its assets by coordinating the upgrade, maintenance, and operation of all major assets.

Lapeer CRC 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 width 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 sub surface utilities are upgraded to have at least a 40 years of remaining service life.

APPENDIX A: 2023 – 2025 PAVED COUNTY PRIMARY ROAD PLANNED PROJECTS



2023 Primary Road Overlay

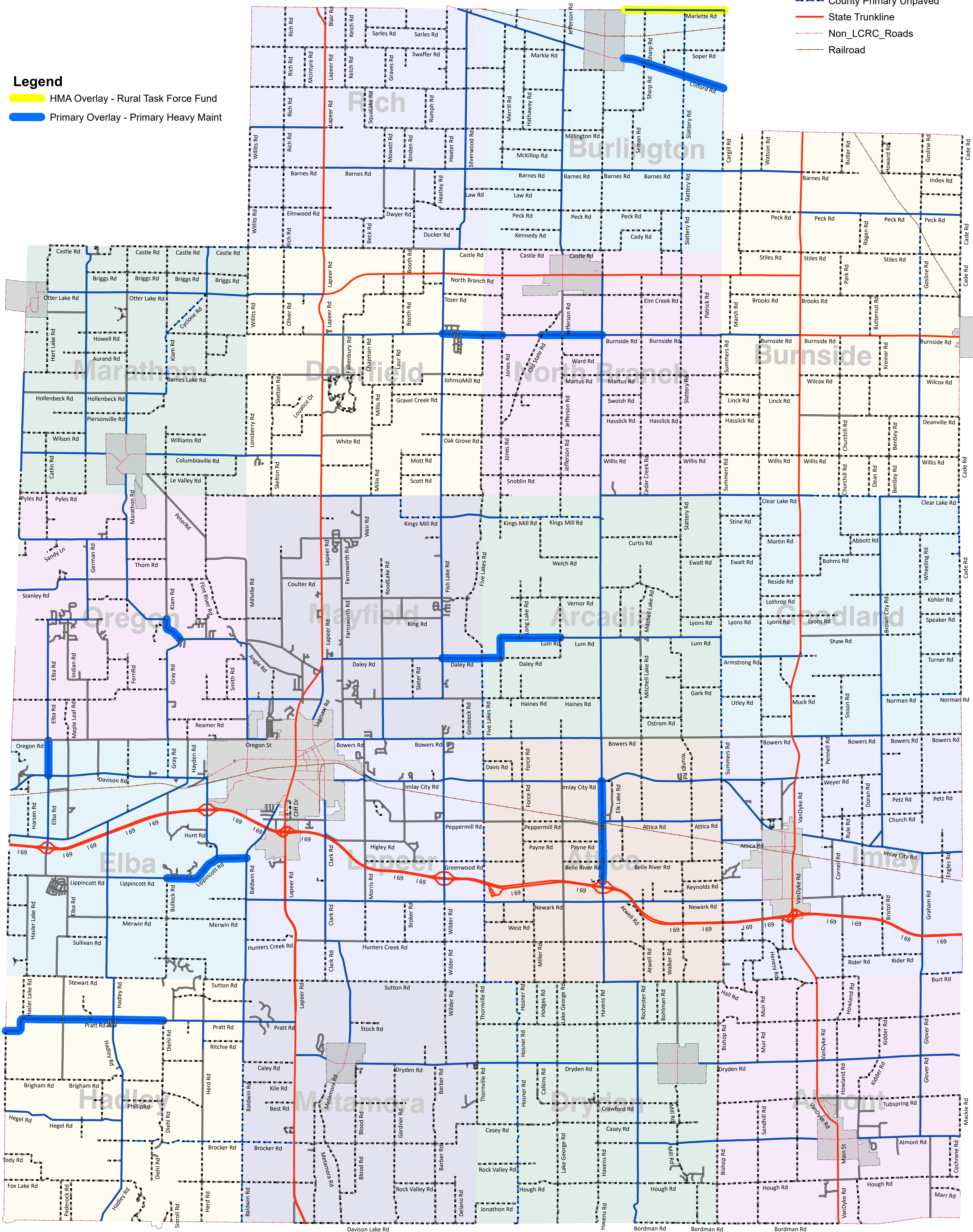
Selected Roads for HMA Overlay Program in 2023 are subject to available funds. This scope of work may vary depending on project cost projections.

Legend - Roads

- County Local Paved
- County Local Unpaved
- County Primary Paved
- County Primary Unpaved
- State Trunkline
- Non_LCRC_Roads
- Railroad

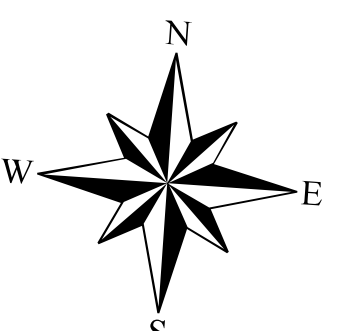
Legend

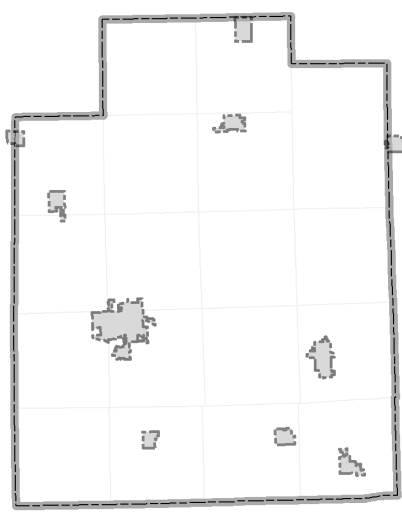
- HMA Overlay - Rural Task Force Fund
- Primary Overlay - Primary Heavy Maint



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 Total Primary: 360.56 miles





2024 Primary Road Overlay

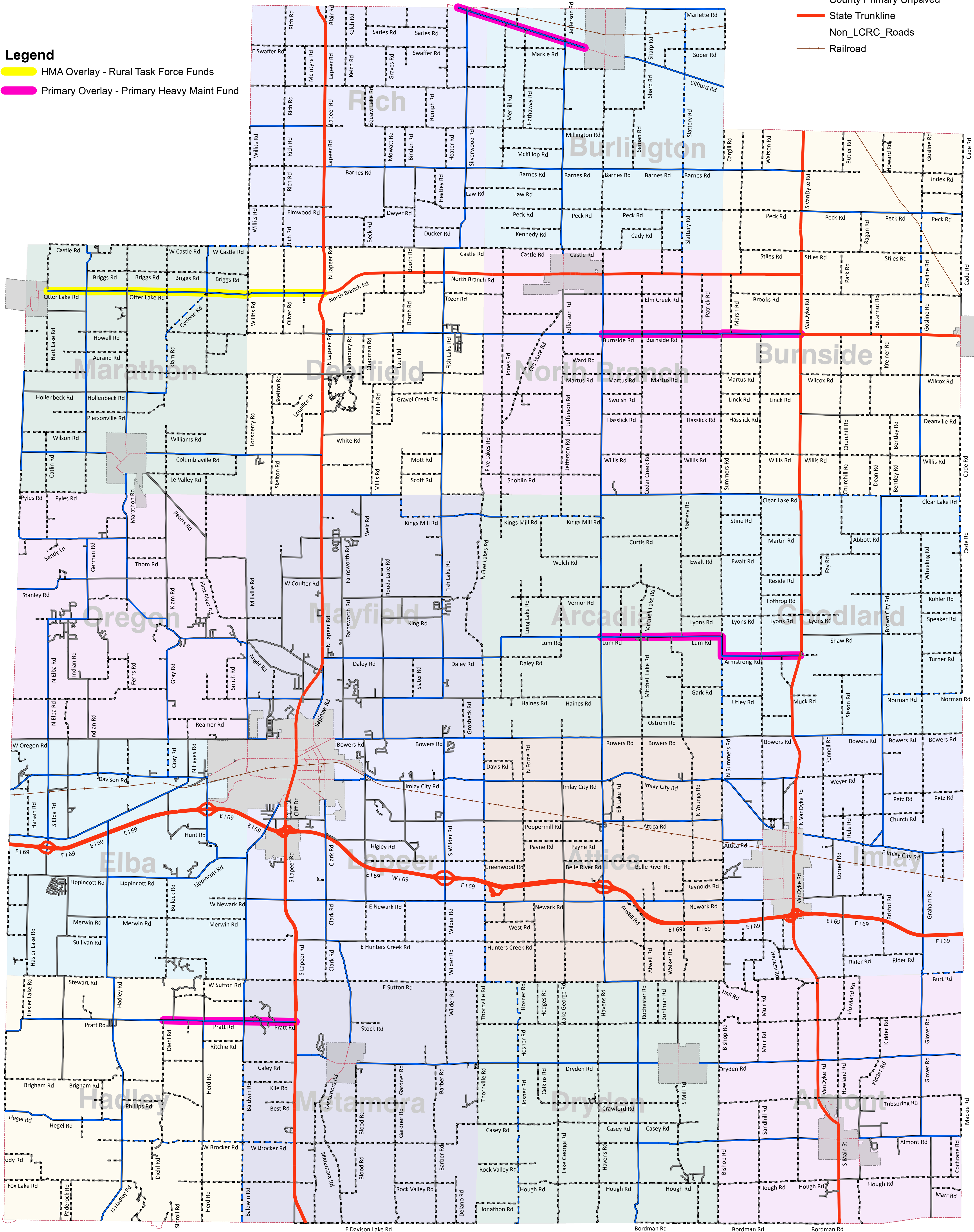
Selected Roads for HMA Overlay Program in 2024 are subject to available funds. This scope of work may vary depending on project cost projections.

Legend - Roads

- County Local Paved
- County Local Unpaved
- County Primary Paved
- County Primary Unpaved
- State Trunkline
- Non_LCRC_Roads
- Railroad

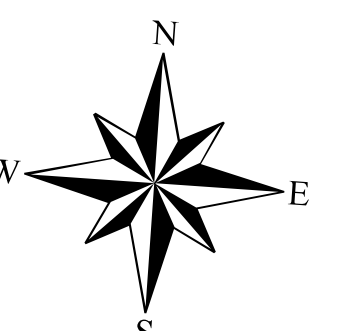
Legend

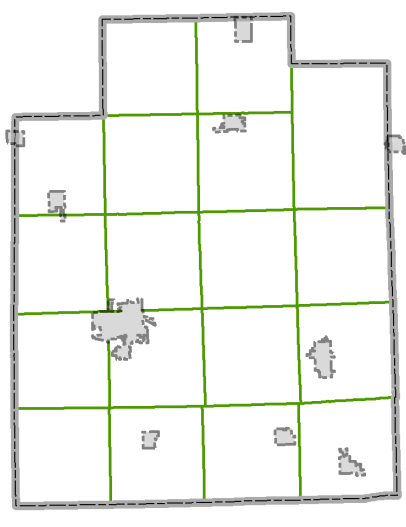
- HMA Overlay - Rural Task Force Funds
- Primary Overlay - Primary Heavy Maint Fund



LAPEER COUNTY ROAD COMMISSION
 820 DAVIS LAKE ROAD
 LAPEER, MI 48446
 Phone: 810-664-6272
 Web: www.lcrconline.com

Primary Paved: 308.04 miles
 Primary Unpaved: 52.52 miles
 Total Primary: 360.56 miles





2025 Primary Road Overlay

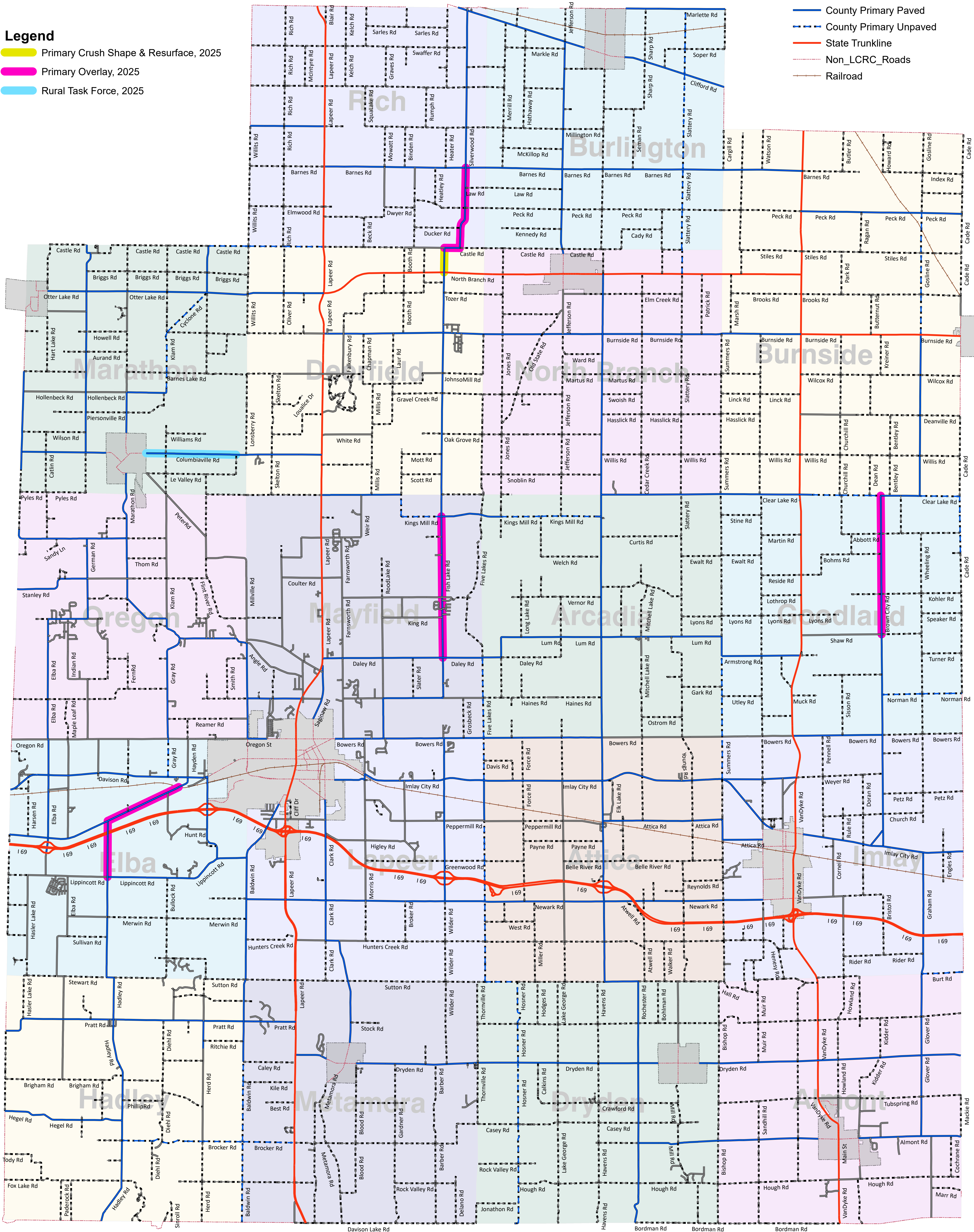
Selected Roads for HMA Overlay Program in 2025 are subject to available funds. This scope of work may vary depending on project cost projections.

Legend

- Primary Crush Shape & Resurface, 2025
- Primary Overlay, 2025
- Rural Task Force, 2025

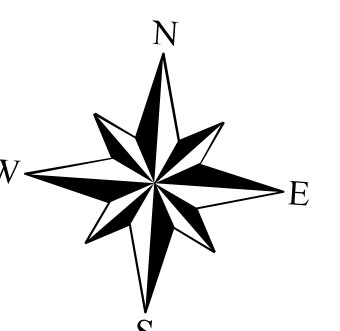
Legend - Roads

- County Local Paved
- County Local Unpaved
- County Primary Paved
- County Primary Unpaved
- State Trunkline
- Non_LCRC_Roads
- Railroad



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Primary Paved: 308.04 miles
 Primary Unpaved: 52.52 miles
 Total Primary: 360.56 miles



Project Planner Detailed Projects By Year Report

Lapeer (County)

Report Module: Planner Evaluation

Today's Date: Friday, September 16, 2022

AMP-3Yr

Last Modified: 9/16/2022

Percent Inflation: 0

Number of Years: 3

Strategy/Filter Name: Filter: Project-Scheduled

Strategy Filter: Project-Scheduled

Plan Memo:


Project Planner Detailed Projects By Year Report

Planner Name: AMP-3Yr

2023 Asphalt-Prim-Rd

Crush & Shape / 4" Resurface



Project	Key	PR Number	Road Name	From/To Desc	Bmp/Emp	Length	Lanes	Lane Length	Width	Surface Cost
Project - 1		762801	Pratt Rd	Washburn Hasler Lake	0.000 0.676	0.676	2	1.352	22.00	\$234,184
		3440055	Daley Rd	Fish Lake Rd Five Lakes	2.999 3.987	0.988	2	1.976	22.00	\$342,270

Project Planner Detailed Projects By Year Report

Planner Name: AMP-3Yr

755001	Elba Rd	Lane Widening Oregon	2.547 3.395	0.848	2	1.696	22.00	\$176,113
755306	Lake Pleasant Rd	Campbell Belle River	2.631 3.006	0.375	2	0.750	22.00	\$77,880
755306	Lake Pleasant Rd	Belle River Payne	3.006 3.507	0.501	2	1.002	22.00	\$104,048
755306	Lake Pleasant Rd	Payne Hart	3.507 3.761	0.254	2	0.508	22.00	\$52,751
755306	Lake Pleasant Rd	Hart Williams	3.761 3.858	0.097	3	0.291	22.00	\$30,217
755306	Lake Pleasant Rd	Peppermill N Lake Pleasant Rd	3.941 3.978	0.037	3	0.111	22.00	\$11,526
755306	Lake Pleasant Rd	N Lake Pleasant Rd Attica	3.978 4.008	0.030	2	0.060	22.00	\$6,230
755306	Lake Pleasant Rd	Attica North	4.008 4.169	0.161	2	0.322	22.00	\$33,436
755306	Lake Pleasant Rd	North Lane Widening	4.169 4.962	0.793	2	1.586	22.00	\$164,690
757309	Lum Rd	Bearanger Long Lake Rd	0.000 0.503	0.503	2	1.006	22.00	\$104,463
757309	Lum Rd	Long Lake Rd Harrington Rd	0.503 1.492	0.989	2	1.978	22.00	\$205,396
759604	Bearinger Rd	Daley Lum	1.005 1.500	0.495	2	0.990	22.00	\$102,802
761309	Lippincott Rd	Bullock Wood	3.958 4.204	0.246	2	0.492	22.00	\$51,089
761309	Lippincott Rd	Wood Alexander	4.204 4.320	0.116	2	0.232	22.00	\$24,091

Project Planner Detailed Projects By Year Report

Planner Name: AMP-3Yr

761309	Lippincott Rd	Alexander Highland	4.320 4.509	0.189	2	0.378	22.00	\$39,252
761309	Lippincott Rd	Highland Lake Nepessing	4.509 5.396	0.887	2	1.774	22.00	\$184,212
761309	Lippincott Rd	Lake Nepessing Vasa	5.396 5.892	0.496	2	0.992	22.00	\$103,009
761309	Lippincott Rd	Vasa Baldwin	5.892 6.139	0.247	2	0.494	22.00	\$51,297
761802	Burnside Rd	Fish Lake Windward Dr	6.904 7.119	0.215	2	0.430	22.00	\$44,651
761802	Burnside Rd	Windward South Wood	7.119 7.198	0.079	2	0.158	22.00	\$16,407
761802	Burnside Rd	South Wood Meadow Breeze	7.198 7.272	0.074	2	0.148	22.00	\$15,368
761802	Burnside Rd	Meadow Breeze Lawndale	7.272 7.357	0.085	2	0.170	22.00	\$17,653
761802	Burnside Rd	Lawndale Cobblestone Dr	7.357 7.647	0.290	2	0.580	22.00	\$60,227
761802	Burnside Rd	Cobblestone Dr Five Lakes	7.647 7.906	0.259	2	0.518	22.00	\$53,789
761802	Burnside Rd	Five Lakes Jones	7.906 8.384	0.478	2	0.956	22.00	\$99,271
761802	Burnside Rd	Old State Jefferson	9.373 9.887	0.514	2	1.028	22.00	\$106,748
761802	Burnside Rd	Jefferson Lake Pleasant	9.887 10.877	0.990	2	1.980	22.00	\$205,603
762203	Clifford Rd	City/Twp Line Sharp	4.343 4.859	0.516	2	1.032	22.00	\$107,163

Project Planner Detailed Projects By Year Report

Planner Name: AMP-3Yr

762203	Clifford Rd	Sharp Soper	4.859 5.381	0.522	2	1.044	22.00	\$108,409
762203	Clifford Rd	Soper Slattery	5.381 5.902	0.521	2	1.042	22.00	\$108,201
762203	Clifford Rd	Slattery Cargill	5.902 6.937	1.035	2	2.070	22.00	\$214,949
762801	Pratt Rd	Hasler Lake Corey	0.676 1.416	0.740	2	1.480	22.00	\$153,683
762801	Pratt Rd	Corey Green Corners	1.416 1.675	0.259	2	0.518	22.00	\$53,789
762801	Pratt Rd	Green Corners Ivory	1.675 2.358	0.683	2	1.366	22.00	\$141,845
762801	Pratt Rd	Ivory	2.358 2.593	0.235	2	0.470	22.00	\$48,805
762801	Pratt Rd		2.593 2.810	0.217	2	0.434	22.00	\$45,067
762801	Pratt Rd	2nd 1st	2.810 2.858	0.048	2	0.096	22.00	\$9,969
3440055	Daley Rd	Five Lakes Bearanger	3.987 4.453	0.466	2	0.932	22.00	\$96,779
3440073	Marlette Rd	Village Limit Cemetery Rd	1.649 1.956	0.307	2	0.614	22.00	\$63,758
3440073	Marlette Rd	Cemetery Rd Sharp	1.956 2.148	0.192	2	0.384	22.00	\$39,875
3440073	Marlette Rd	Sharp Smith	2.148 2.457	0.309	2	0.618	22.00	\$64,173
3440073	Marlette Rd	Smith Clothier	2.457 2.959	0.502	2	1.004	22.00	\$104,255

Project Planner Detailed Projects By Year Report

Planner Name: AMP-3Yr

3440073	Marlette Rd	Clothier Slattery	2.959 3.140	0.181	2	0.362	22.00	\$37,590
3440073	Marlette Rd	Slattery White Creek	3.140 3.963	0.823	2	1.646	22.00	\$170,921
3440073	Marlette Rd	White Creek Page	3.963 4.127	0.164	2	0.328	22.00	\$34,060
HMA Overlay - 2.5" Totals:				17.968		36.07		\$3,745,509
Asphalt-Prim-Rd Totals:				20.291		40.716		\$4,550,258
Year 2023 Totals:				20.291		40.716		\$4,550,258

Project Planner Detailed Projects By Year Report

Planner Name: AMP-3Yr

2024 Asphalt-Prim-Rd

HMA Overlay - 2.5"



Project	Key	PR Number	Road Name	From/To Desc	Bmp/Emp	Length	Lanes	Lane Length	Width	Surface Cost
		755510	North Branch Rd	Hart Lake	0.221	0.688	2	1.376	22.00	\$142,884
				Project Limits (2016)	0.909					
		755510	North Branch Rd	Project Limits (2016)	1.326	0.886	2	1.772	22.00	\$184,004
				Marathon	2.212					

Project Planner Detailed Projects By Year Report

Planner Name: AMP-3Yr

755510	North Branch Rd	Marathon Folsom Ln	2.212 2.921	0.709	2	1.418	22.00	\$147,245
755510	North Branch Rd	Folsom Ln Klam	2.921 3.203	0.282	2	0.564	22.00	\$58,566
755510	North Branch Rd	Klam Fostoria	3.203 4.200	0.997	2	1.994	22.00	\$207,057
755510	North Branch Rd	Fostoria Willits	4.200 5.218	1.018	2	2.036	22.00	\$211,418
755510	North Branch Rd	Willits Oliver	5.218 6.119	0.901	2	1.802	22.00	\$187,120
755510	North Branch Rd	Oliver O Brian	6.119 6.621	0.502	2	1.004	22.00	\$104,255
756305	Armstrong Rd	Summers Blacks Corners	0.000 0.992	0.992	2	1.984	22.00	\$206,019
756305	Armstrong Rd	Blacks Corners Caldwell	0.992 1.492	0.500	2	1.000	22.00	\$103,840
756305	Armstrong Rd	Caldwell Van Dyke Rd (M-53)	1.492 1.960	0.468	2	0.936	22.00	\$97,194
757206	Summers Rd	Armstrong Lum	8.107 8.595	0.488	2	0.976	22.00	\$101,348
757309	Lum Rd	Project Limits (2015) Spaulding Rd	2.540 2.998	0.458	2	0.916	22.00	\$95,117
757309	Lum Rd	Spaulding Rd School	2.998 3.363	0.365	2	0.730	22.00	\$75,803
757309	Lum Rd	Polly Ann Irons	3.555 3.615	0.060	2	0.120	22.00	\$12,461
757309	Lum Rd	Irons Soliman	3.615 3.674	0.059	2	0.118	22.00	\$12,253

Project Planner Detailed Projects By Year Report

Planner Name: AMP-3Yr

757309	Lum Rd	Soliman Youngs Rd	3.674 4.248	0.574	2	1.148	22.00	\$119,208
757309	Lum Rd	Youngs Rd Slattery Rd	4.248 4.501	0.253	2	0.506	22.00	\$52,543
757309	Lum Rd	Slattery Rd Summers	4.501 5.502	1.001	2	2.002	22.00	\$207,888
761802	Burnside Rd	Jefferson Lake Pleasant	9.887 10.877	0.990	2	1.980	22.00	\$205,603
761802	Burnside Rd	Lake Pleasant Cedar Creek	10.877 11.859	0.982	2	1.964	22.00	\$203,942
761802	Burnside Rd	Cedar Creek Slattery	11.859 12.850	0.991	2	1.982	22.00	\$205,811
761802	Burnside Rd	Slattery Patrick	12.850 13.348	0.498	2	0.996	22.00	\$103,425
761802	Burnside Rd	Patrick Summers	13.348 13.845	0.497	2	0.994	22.00	\$103,217
761802	Burnside Rd	Summers Marsh	13.845 14.074	0.229	2	0.458	22.00	\$47,559
761802	Burnside Rd	Marsh Blacks Corners	14.074 14.821	0.747	2	1.494	22.00	\$155,137
761802	Burnside Rd	Blacks Corners Lane Widening	14.821 15.739	0.918	2	1.836	22.00	\$190,650
762203	Clifford Rd	Marlette Silverwood	0.000 0.245	0.245	2	0.490	22.00	\$50,882
762203	Clifford Rd	Silverwood Willard	0.245 0.350	0.105	2	0.210	22.00	\$21,806
762203	Clifford Rd	Willard City/Twp Line	0.350 0.760	0.410	2	0.820	22.00	\$85,149

Project Planner Detailed Projects By Year Report

Planner Name: AMP-3Yr

762203	Clifford Rd	City/Twp Line Merrill	0.760 1.245	0.485	2	0.970	22.00	\$100,725
762203	Clifford Rd	Merrill DeArcy	1.245 1.532	0.287	2	0.574	22.00	\$59,604
762203	Clifford Rd	DeArcy Hathaway	1.532 1.765	0.233	2	0.466	22.00	\$48,389
762203	Clifford Rd	Hathaway Jefferson	1.765 2.800	1.035	2	2.070	22.00	\$214,949
762203	Clifford Rd	Jefferson City/Twp Line	2.800 3.314	0.514	2	1.028	22.00	\$106,748
HMA Overlay - 2.5" Totals:			20.367			40.734		\$4,229,819
Asphalt-Prim-Rd Totals:			20.367			40.734		\$4,229,819
Year 2024 Totals:			20.367			40.734		\$4,229,819

Project Planner Detailed Projects By Year Report

Planner Name: AMP-3Yr

2025 Asphalt-Prim-Rd

Crush & Shape / 4" Resurface



Project	Key	PR Number	Road Name	From/To Desc	Bmp/Emp	Length	Lanes	Lane Length	Width	Surface Cost
		759309	Fish Lake Rd	North Branch Rd (M-90) Castle	10.611 11.221	0.610	2	1.220	22.00	\$211,320
Crush & Shape / 4" Resurface Totals:						0.61		1.22		\$211,320

Project Planner Detailed Projects By Year Report

Planner Name: AMP-3Yr

2025 Asphalt-Prim-Rd

HMA Overlay - 2.5"



Project	Key	PR Number	Road Name	From/To Desc	Bmp/Emp	Length	Lanes	Lane Length	Width	Surface Cost
		755010	Genesee Rd	Hadley	2.551	0.557	2	1.114	22.00	\$115,678
				Bassett	3.108					
		755010	Genesee Rd	Bassett	3.108	1.101	2	2.202	22.00	\$228,656
				Golf	4.209					

Project Planner Detailed Projects By Year Report

Planner Name: AMP-3Yr

755010	Genesee Rd	Golf Rd Canadian National Railway	4.209 4.510	0.301	2	0.602	22.00	\$62,512
755010	Genesee Rd	Canadian National Railway S Hayes Rd	4.510 4.775	0.265	2	0.530	22.00	\$55,035
755506	Brown City Rd	Shaw Kohler	5.287 6.291	1.004	2	2.008	22.00	\$208,511
755506	Brown City Rd	Kohler Bohms	6.291 7.292	1.001	2	2.002	22.00	\$207,888
755506	Brown City Rd	Bohms Abbott	7.292 7.794	0.502	2	1.004	22.00	\$104,255
755506	Brown City Rd	Abbott Clear Lake	7.794 8.742	0.948	2	1.896	22.00	\$196,881
756305	Armstrong Rd	Caldwell Van Dyke Rd (M-53)	1.492 1.960	0.468	2	0.936	22.00	\$97,194
756506	Hadley Rd	Lippincott Curtiss	2.503 3.110	0.607	2	1.214	22.00	\$126,062
756506	Hadley Rd	Curtiss concrete	3.110 3.255	0.145	2	0.290	22.00	\$30,114
756506	Hadley Rd	End of Conc Bridge 5328	3.506 3.583	0.077	2	0.154	22.00	\$15,991
756506	Hadley Rd	Bridge 5328 Genesee	3.624 3.901	0.277	2	0.554	22.00	\$57,527
759303	Roods Lake Rd	Kamax Project Limits Haines	0.419 1.006	0.587	2	1.174	22.00	\$121,908
759309	Fish Lake Rd	Daley Rd Louise Dr	1.004 1.464	0.460	2	0.920	22.00	\$95,533
759309	Fish Lake Rd	Louise Dr King Rd	1.464 2.009	0.545	2	1.090	22.00	\$113,186

Project Planner Detailed Projects By Year Report

759309	Fish Lake Rd	King Rd Teri Lyn	2.009 2.085	0.076	2	0.152	22.00	\$15,784
759309	Fish Lake Rd	Teri Lyn Buttonhorn	2.085 2.211	0.126	2	0.252	22.00	\$26,168
759309	Fish Lake Rd	Buttonhorn David	2.211 2.230	0.019	2	0.038	22.00	\$3,946
759309	Fish Lake Rd	Buttonhorn Ln David Ln	2.230 2.436	0.206	2	0.412	22.00	\$42,782
759309	Fish Lake Rd	David Ln Vernor Rd	2.436 2.512	0.076	2	0.152	22.00	\$15,784
759309	Fish Lake Rd	Vernor Rd Judy Conn	2.512 3.566	1.054	2	2.108	22.00	\$218,895
759309	Fish Lake Rd	Judy Conn Byers Rd	3.566 4.019	0.453	2	0.906	22.00	\$94,079
759309	Fish Lake Rd	Byers Rd Kings Mill Rd	4.019 4.524	0.505	2	1.010	22.00	\$104,878
760209	Columbiaville Rd	Village Limit Klam	0.392 0.883	0.491	2	0.982	22.00	\$101,971
760209	Columbiaville Rd	Klam 2016 Project Limits	0.883 2.485	1.602	2	3.204	22.00	\$332,703
761403	Jefferson Rd	City/Twp Line Castle	6.589 6.714	0.125	2	0.250	22.00	\$25,960
761403	Jefferson Rd	Castle Kennedy	6.714 7.214	0.500	2	1.000	22.00	\$103,840
761403	Jefferson Rd	Kennedy Peck	7.214 7.706	0.492	2	0.984	22.00	\$102,179
761403	Jefferson Rd	Peck Law	7.706 8.205	0.499	2	0.998	22.00	\$103,632
761403	Jefferson Rd	Law Barnes	8.205 8.707	0.502	2	1.004	22.00	\$104,255
HMA Overlay - 2.5" Totals:				15.571		31.142		\$3,233,785

Project Planner Detailed Projects By Year Report

Asphalt-Prim-Rd Totals:	<u>16.181</u>	<u>32.362</u>	<u>\$3,445,106</u>
Year 2025 Totals:	16.181	32.362	\$3,445,106
Report Totals:	<u>56.839</u>	<u>113.812</u>	<u>\$12,225,182</u>

APPENDIX B: ROADSOFT NETWORK-LEVEL MODEL INPUTS AND OUTPUTS

Primary Road Network Improvements – With Current Funding

Primary Road Network Improvements – With Increased Funding

Local Road Network Improvements – With Current Funding

Local Road Network Improvements – With Increased Funding

Strategy Comprehensive Report

Primary-Paved-Optimization - With Current Funding

Base Year 2023
 Percent Inflation 0
 Number of Years 6
 Optimized Yes
 Current Filter Primary - Paved

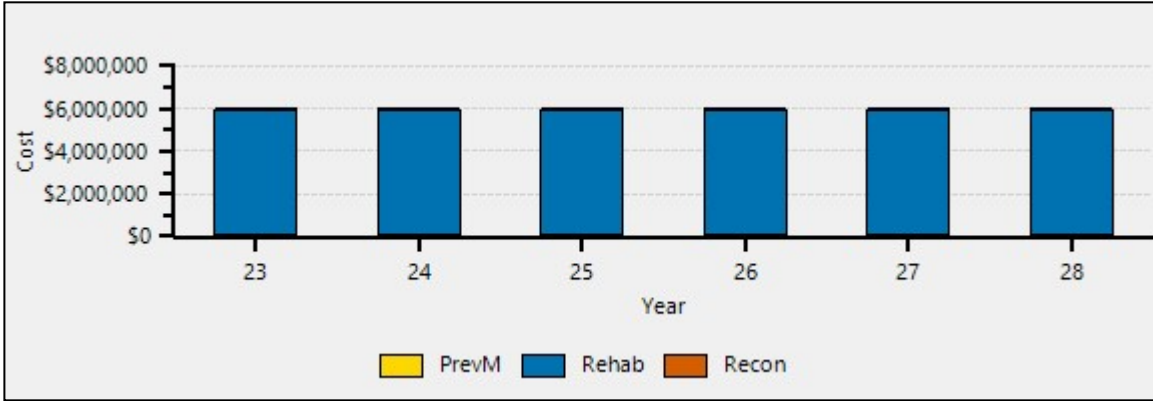
Subtype	Treatment	Trigger	Reset	Cost/Ln Mile	Budget	Lane Miles	Year
Asphalt-Prim-Rd	RH (SI) Crush & Shape / 4" Resurface	1 - 4	10	\$173,213.33	\$1,579,446	9.119	2024
					\$5,520,292	31.870	2025
					\$4,421,149	25.524	2026
					\$4,677,072	27.002	2027
					\$5,899,992	34.062	2028
	RH (SI) HMA Overlay - 2.5"	2 - 4	9	\$103,840.00	\$5,900,002	56.818	2023
					\$3,618,596	34.848	2024
					\$245,478	2.364	2025
					\$1,199,144	11.548	2026
					\$1,222,924	11.777	2027
	PM (CPM) Crack Seal	6 - 8	8	\$3,666.67	\$50,000	13.636	2023
					\$50,000	13.636	2024
					\$50,000	13.636	2025
					\$50,000	13.636	2026
					\$50,000	13.636	2027
Asphalt-Stn-22'L-2'Shldr	RH (SI) HMA Overlay - 2.5"	2 - 4	9	\$107,993.60	\$701,958	6.500	2024
					\$134,236	1.243	2025
					\$279,703	2.590	2026

Strategy Comprehensive Report

PM (CPM) Crack Seal 6 - 8 8 \$3,813.33

\$50,000	13.112	2023
\$50,000	13.112	2024
\$50,000	13.112	2025
\$50,000	13.112	2026
\$50,000	13.112	2027
\$50,000	13.112	2028

Cost Distribution

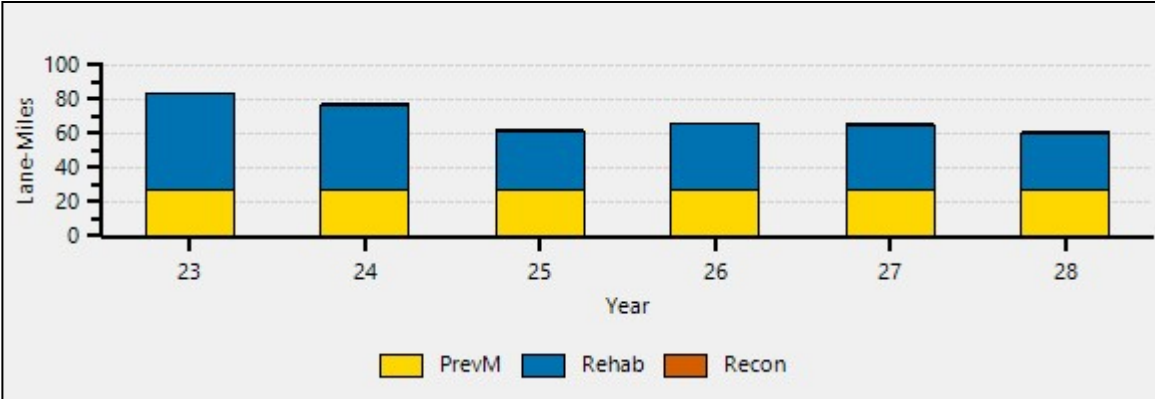


Primary-Paved-Optimization

Maintenance Type	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Prev Maint	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000				
Rehab	\$5,900,002	\$5,900,000	\$5,900,005	\$5,899,997	\$5,899,995	\$5,899,992				
Recon	\$0	\$0	\$0	\$0	\$0	\$0				
Total	\$6,000,002	\$6,000,000	\$6,000,005	\$5,999,997	\$5,999,995	\$5,999,992				

Strategy Comprehensive Report

Maintenance Performed

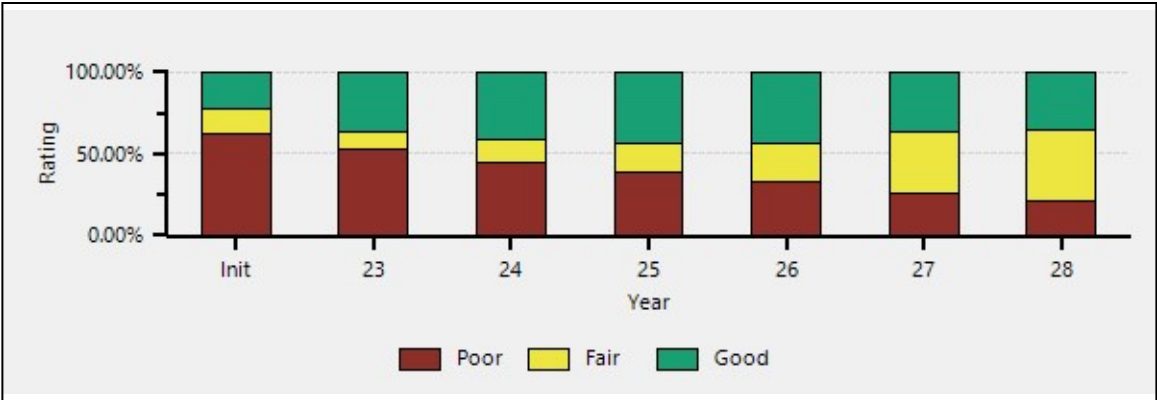


Primary-Paved-Optimization

Maintenance Type in Lane Miles	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Prev Maint	26.748	26.748	26.748	26.748	26.748	26.748				
Rehab	56.818	50.466	35.477	39.662	38.779	34.062				
Recon	0.000	0.000	0.000	0.000	0.000	0.000				
Total	83.566	77.214	62.225	66.410	65.527	60.810				

Strategy Comprehensive Report

Rating Distribution

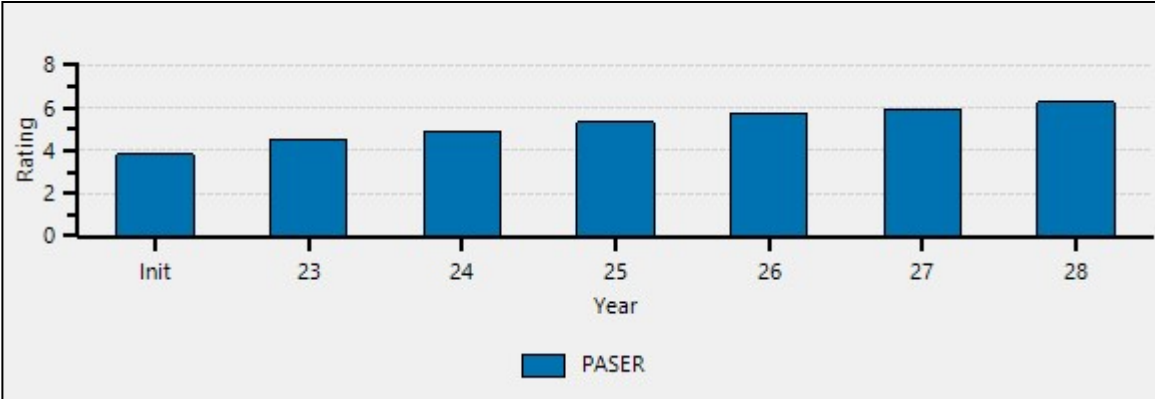


Primary-Paved-Optimization

Initial Values														
Lane Miles	%	Rating	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032		
134.075	22.4	Good	217.641	36.3	246.884	41.2	261.422	43.6	261.863	43.7	220.936	36.8	210.594	35.1
91.192	15.2	Fair	64.444	10.7	83.124	13.9	103.940	17.3	143.161	23.9	220.863	36.8	265.143	44.2
374.546	62.4	Poor	317.728	53.0	269.804	45.0	234.450	39.1	194.787	32.5	158.013	26.3	124.074	20.7
599.813	100.0	Total												

Strategy Comprehensive Report

PASER Distribution

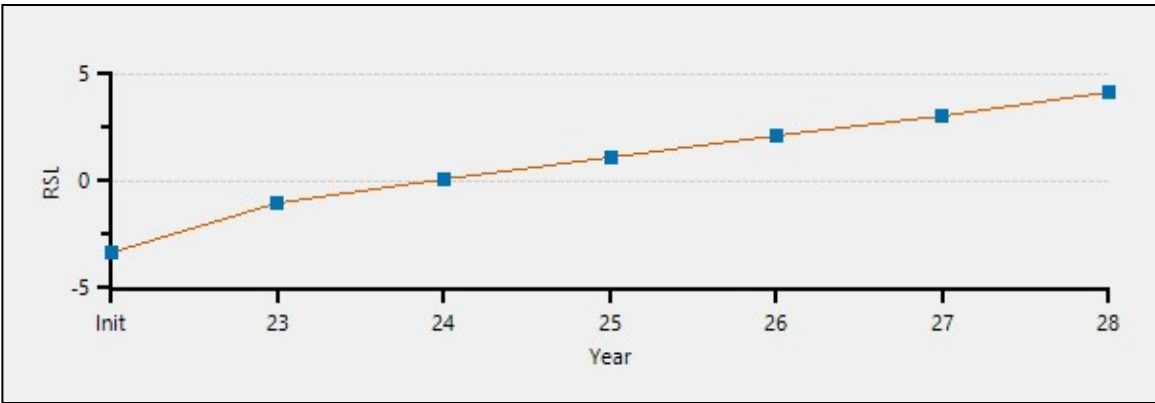


Primary-Paved-Optimization

Initial Value		2023	2024	2025	2026	2027	2028
Lane Miles	PASER						
3.056	10	3.056	9.118	31.870	25.524	27.002	34.062
22.888	9	79.706	44.404	12.725	46.008	37.301	27.002
108.131	8	134.879	193.362	216.827	190.331	156.633	149.530
62.016	7	50.918	58.478	93.053	135.922	215.505	250.954
26.511	6	10.861	24.523	8.883	5.112	0.123	9.078
2.665	5	2.665	0.123	2.004	2.127	5.235	5.112
18.602	4	18.602	8.698	2.743	2.665	2.127	2.127
32.294	3	32.294	31.154	33.199	18.602	8.698	2.743
88.204	2	31.386	3.363	3.789	4.143	4.165	8.236
235.446	1	235.446	226.589	194.719	169.377	143.023	110.968
3.820	Average	4.554	4.929	5.327	5.717	5.969	6.270

Strategy Comprehensive Report

RSL Distribution



Primary-Paved-Optimization

Initial Value		2023	2024	2025	2026	2027	2028
Lane Miles	RSL						
3.056	14	3.056	9.118	31.870	25.524	27.002	34.062
22.888	13	79.706	44.404	12.725	46.008	37.301	27.002
39.221	12	48.137	88.622	53.320	21.641	54.924	46.217
29.855	11	38.771	57.053	97.538	62.236	30.557	63.840
39.055	10	47.971	47.687	65.969	106.454	71.152	39.473
12.449	9	12.449	47.971	46.714	60.626	105.726	71.152
3.132	8	3.132	9.769	37.070	38.945	48.243	92.614
3.094	7	3.094	0.738	8.531	36.227	38.945	48.243
43.341	6	32.243	0.000	0.738	0.123	22.591	38.945
17.922	5	8.857	22.396	0.000	0.000	0.123	8.955
2.593	4	2.004	0.123	8.760	0.000	0.000	0.123
5.996	3	0.000	2.004	0.123	5.112	0.000	0.000
0.123	2	0.123	0.000	2.004	0.123	5.112	0.000
2.542	1	2.542	0.123	0.000	2.004	0.123	5.112
0.078	0	0.078	2.542	0.123	0.000	2.004	0.123
6.078	-1	6.078	0.078	2.542	0.123	0.000	2.004
12.446	-2	12.446	6.078	0.078	2.542	0.123	0.000
14.675	-3	14.675	12.446	6.078	0.078	2.542	0.123
4.033	-4	4.033	14.675	12.446	6.078	0.078	2.542
13.586	-5	13.586	4.033	14.675	12.446	6.078	0.078
33.842	-6	30.295	0.526	0.426	0.537	0.669	6.078
16.628	-7	0.647	2.007	0.526	0.426	0.537	0.669
5.581	-8	0.183	0.647	2.007	0.526	0.426	0.537
15.698	-9	0.000	0.183	0.647	2.007	0.526	0.426
16.455	-10	0.261	0.000	0.183	0.647	2.007	0.526

Strategy Comprehensive Report

21.284	-11	21.284	0.261	0.000	0.183	0.647	2.007
23.948	-12	23.948	21.284	0.261	0.000	0.183	0.647
55.442	-13	55.442	23.948	21.284	0.261	0.000	0.183
64.744	-14	64.744	55.442	23.948	21.284	0.261	0.000
51.486	-15	51.486	64.744	55.442	23.948	21.284	0.261
16.080	-16	16.080	51.486	64.744	55.442	23.948	21.284
2.462	-17	2.462	9.424	29.040	64.744	55.442	23.948
0.000	-18	0.000	0.000	0.000	3.515	41.258	55.442
0.000	-19	0.000	0.000	0.000	0.000	0.000	7.196
-3.300	Average	-0.999	0.089	1.091	2.089	3.086	4.162

Strategy Comprehensive Report

Primary-Paved-Optimization With Additional Funding

Base Year 2023
 Percent Inflation 0
 Number of Years 6
 Optimized Yes
 Current Filter Primary - Paved

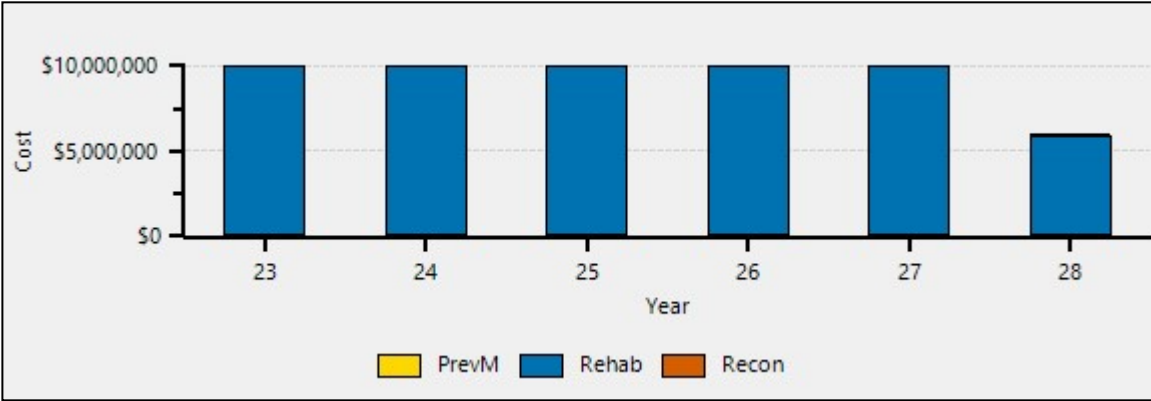
Subtype	Treatment	Trigger	Reset	Cost/Ln Mile	Budget	Lane Miles	Year
Asphalt-Prim-Rd	RH (SI) Crush & Shape / 4" Resurface	1 - 4	10	\$173,213.33	\$9,198,042	53.102	2024
					\$9,765,764	56.380	2025
					\$8,557,077	49.402	2026
					\$8,677,076	50.095	2027
					\$4,948,348	28.568	2028
	RH (SI) HMA Overlay - 2.5"	2 - 4	9	\$103,840.00	\$9,900,000	95.339	2023
					\$1,063,220	10.239	2026
					\$1,222,924	11.777	2027
	PM (CPM) Crack Seal	6 - 8	8	\$3,666.67	\$50,000	13.636	2023
					\$50,000	13.636	2024
					\$50,000	13.636	2025
					\$50,000	13.636	2026
					\$50,000	13.636	2027
	\$50,000	13.636	2028				
	Asphalt-Stn-22'L-2'Shldr	RH (SI) Crush & Shape / 4" Resurface	1 - 4	10	\$180,141.87	\$907,735	5.039
\$701,958						6.500	2024
RH (SI) HMA Overlay - 2.5"		2 - 4	9	\$107,993.60	\$134,236	1.243	2025
					\$279,703	2.590	2026

Strategy Comprehensive Report

PM (CPM) Crack Seal 6 - 8 8 \$3,813.33

\$50,000	13.112	2023
\$50,000	13.112	2024
\$50,000	13.112	2025
\$50,000	13.112	2026
\$50,000	13.112	2027
\$50,000	13.112	2028

Cost Distribution

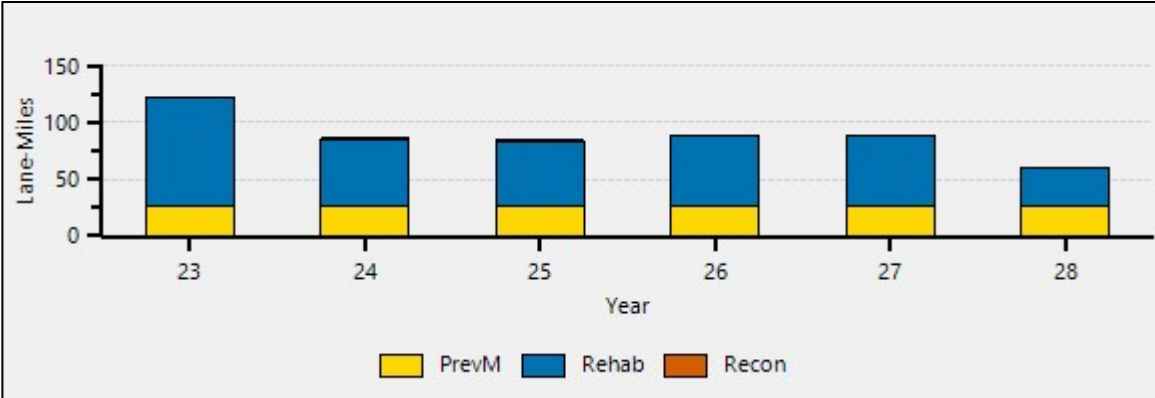


Primary-Paved-Optimization

Maintenance Type	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Prev Maint	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000				
Rehab	\$9,900,000	\$9,900,000	\$9,900,000	\$9,900,000	\$9,900,000	\$5,856,083				
Recon	\$0	\$0	\$0	\$0	\$0	\$0				
Total	\$10,000,000	\$10,000,000	\$10,000,000	\$10,000,000	\$10,000,000	\$5,956,083				

Strategy Comprehensive Report

Maintenance Performed

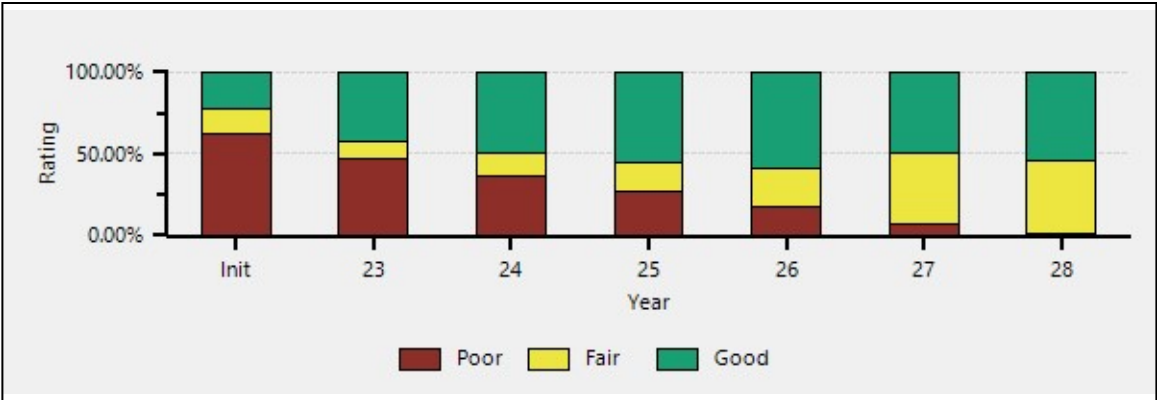


Primary-Paved-Optimization

Maintenance Type in Lane Miles	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Prev Maint	26.748	26.748	26.748	26.748	26.748	26.748				
Rehab	95.339	59.602	57.623	62.231	61.872	33.607				
Recon	0.000	0.000	0.000	0.000	0.000	0.000				
Total	122.087	86.350	84.371	88.979	88.620	60.355				

Strategy Comprehensive Report

Rating Distribution

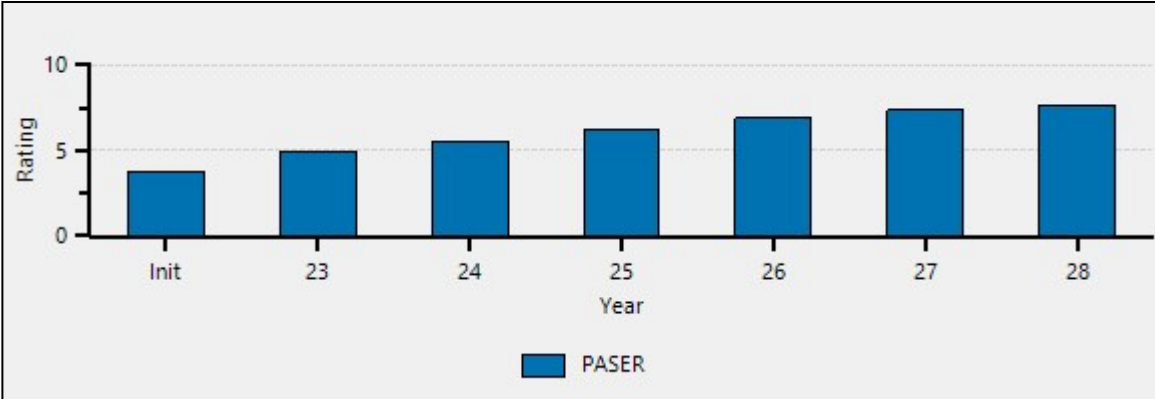


Primary-Paved-Optimization

Initial Values														
Lane Miles	%	Rating	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032		
134.075	22.4	Good	256.162	42.7	294.541	49.1	331.225	55.2	354.235	59.1	297.880	49.7	321.931	53.7
91.192	15.2	Fair	64.444	10.7	83.124	13.9	103.940	17.3	143.161	23.9	259.384	43.2	268.816	44.8
374.546	62.4	Poor	279.207	46.6	222.147	37.0	164.647	27.5	102.416	17.1	42.548	7.1	9.064	1.5
599.813	100.0	Total												

Strategy Comprehensive Report

PASER Distribution

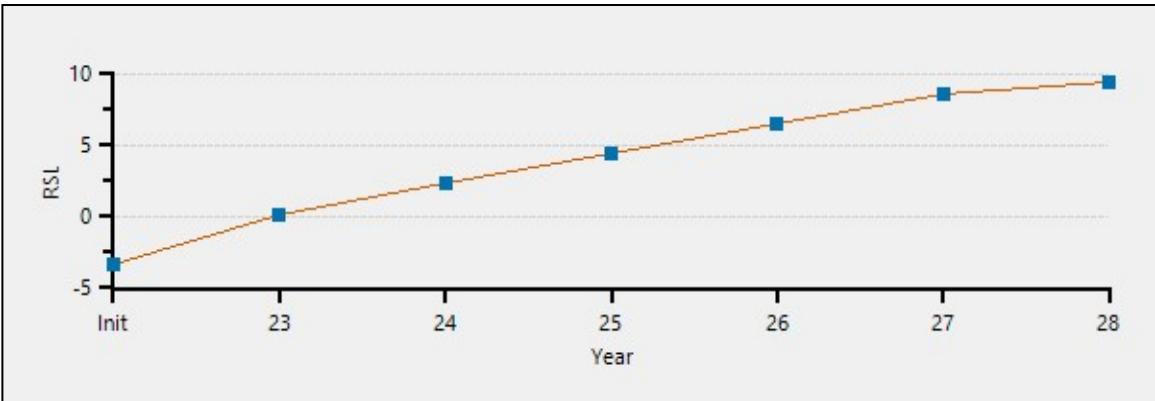


Primary-Paved-Optimization

Initial Value		2023	2024	2025	2026	2027	2028
Lane Miles	PASER						
3.056	10	3.056	53.102	56.380	49.402	50.095	33.607
22.888	9	118.227	9.556	54.345	69.209	61.179	50.095
108.131	8	134.879	231.883	220.500	235.624	186.606	238.229
62.016	7	50.918	58.478	93.053	135.922	254.026	254.627
26.511	6	10.861	24.523	8.883	5.112	0.123	9.078
2.665	5	2.665	0.123	2.004	2.127	5.235	5.112
18.602	4	18.602	8.698	2.743	2.665	2.127	2.127
32.294	3	22.061	27.481	31.890	18.602	8.698	0.350
88.204	2	3.098	3.363	3.789	4.143	4.165	2.334
235.446	1	235.446	182.605	126.225	77.006	27.558	4.253
3.820	Average	4.986	5.561	6.289	6.913	7.369	7.625

Strategy Comprehensive Report

RSL Distribution



Primary-Paved-Optimization

Initial Value		2023	2024	2025	2026	2027	2028
Lane Miles	RSL						
3.056	14	3.056	53.102	56.380	49.402	50.095	33.607
22.888	13	118.227	9.556	54.345	69.209	61.179	50.095
39.221	12	48.137	127.143	18.472	63.261	78.125	70.095
29.855	11	38.771	57.053	136.059	27.388	72.177	87.041
39.055	10	47.971	47.687	65.969	144.975	36.304	81.093
12.449	9	12.449	47.971	46.714	60.626	144.247	36.304
3.132	8	3.132	9.769	37.070	38.945	48.243	131.135
3.094	7	3.094	0.738	8.531	36.228	38.945	48.243
43.341	6	32.243	0.000	0.738	0.123	22.591	38.945
17.922	5	8.857	22.396	0.000	0.000	0.123	8.955
2.593	4	2.004	0.123	8.760	0.000	0.000	0.123
5.996	3	0.000	2.004	0.123	5.112	0.000	0.000
0.123	2	0.123	0.000	2.004	0.123	5.112	0.000
2.542	1	2.542	0.123	0.000	2.004	0.123	5.112
0.078	0	0.078	2.542	0.123	0.000	2.004	0.123
6.078	-1	6.078	0.078	2.542	0.123	0.000	2.004
12.446	-2	12.446	6.078	0.078	2.542	0.123	0.000
14.675	-3	13.366	12.446	6.078	0.078	2.542	0.123
4.033	-4	1.669	13.366	12.446	6.078	0.078	0.227
13.586	-5	7.026	1.669	13.366	12.446	6.078	0.000
33.842	-6	2.007	0.526	0.426	0.537	0.669	0.176
16.628	-7	0.647	2.007	0.526	0.426	0.537	0.669
5.581	-8	0.183	0.647	2.007	0.526	0.426	0.537
15.698	-9	0.000	0.183	0.647	2.007	0.526	0.426
16.455	-10	0.261	0.000	0.183	0.647	2.007	0.526

Strategy Comprehensive Report

21.284	-11	21.284	0.261	0.000	0.183	0.647	2.007
23.948	-12	23.948	21.284	0.261	0.000	0.183	0.647
55.442	-13	55.442	23.948	21.284	0.261	0.000	0.183
64.744	-14	64.744	55.442	23.948	21.284	0.261	0.000
51.486	-15	51.486	64.744	55.442	23.948	21.284	0.261
16.080	-16	16.080	16.926	25.290	30.963	3.896	0.000
2.462	-17	2.462	0.000	0.000	0.367	0.920	0.788
0.000	-18	0.000	0.000	0.000	0.000	0.367	0.000
0.000	-19	0.000	0.000	0.000	0.000	0.000	0.367
-3.300	Average	0.196	2.348	4.461	6.568	8.674	9.419

Strategy Comprehensive Report

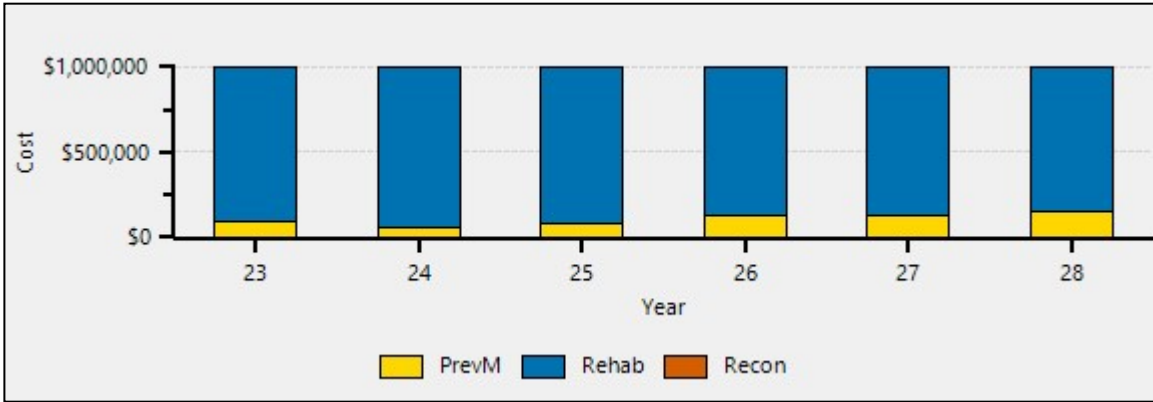
Local-Strategy - With Current Funding

Base Year 2023
 Percent Inflation 0
 Number of Years 6
 Optimized Yes
 Current Filter Local - Paved

Subtype	Treatment	Trigger	Reset	Cost/Ln Mile	Budget	Lane Miles	Year
Asphalt-Twp-Rd	RH (SI) HMA Overlay - 2.5"	2 - 4	9	\$95,532.80			
					\$902,578	9.448	2023
					\$946,482	9.907	2024
					\$917,735	9.606	2025
					\$869,614	9.103	2026
					\$872,579	9.134	2027
					\$850,000	8.897	2028
	PM (CPM) Crack Seal	6 - 8	8	\$3,373.33			
					\$97,422	28.880	2023
					\$53,518	15.865	2024
					\$82,265	24.387	2025
					\$130,386	38.652	2026
					\$127,421	37.773	2027
					\$150,000	44.466	2028

Cost Distribution

Strategy Comprehensive Report

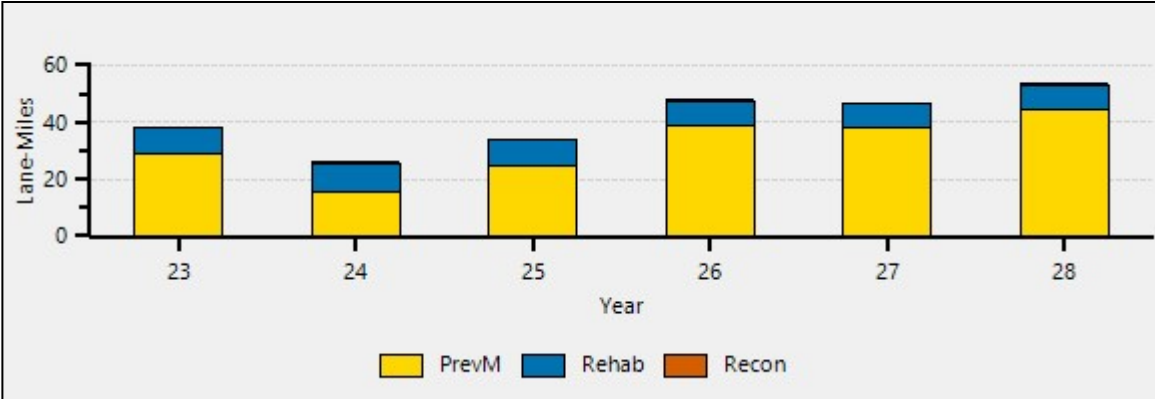


Local-Strategy

Maintenance Type	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Prev Maint	\$97,422	\$53,518	\$82,265	\$130,386	\$127,421	\$150,000				
Rehab	\$902,578	\$946,482	\$917,735	\$869,614	\$872,579	\$850,000				
Recon	\$0	\$0	\$0	\$0	\$0	\$0				
Total	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000				

Strategy Comprehensive Report

Maintenance Performed

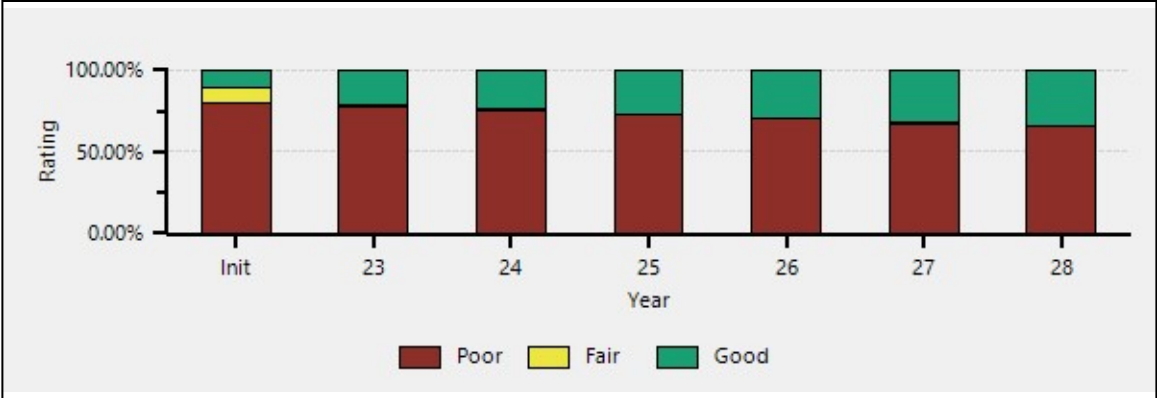


Local-Strategy

Maintenance Type in Lane Miles	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Prev Maint	28.880	15.865	24.387	38.652	37.773	44.466				
Rehab	9.448	9.907	9.606	9.103	9.134	8.897				
Recon	0.000	0.000	0.000	0.000	0.000	0.000				
Total	38.328	25.772	33.993	47.755	46.907	53.363				

Strategy Comprehensive Report

Rating Distribution

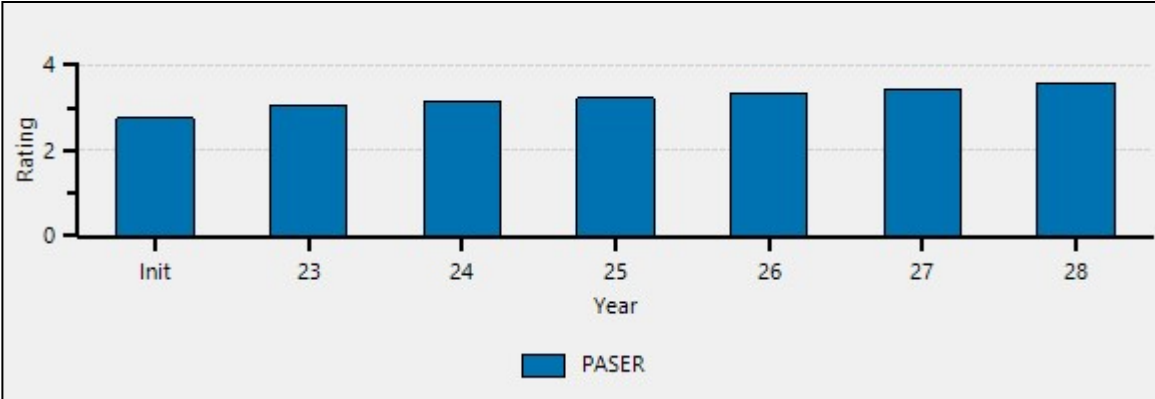


Local-Strategy

Initial Values																						
Lane Miles	%	Rating	2023		2024		2025		2026		2027		2028		2029		2030		2031		2032	
35.612	10.2	Good	73.941	21.1	83.847	23.9	93.453	26.6	102.556	29.2	111.690	31.8	119.272	34.0								
32.560	9.3	Fair	3.680	1.1	0.848	0.2	0.000	0.0	0.000	0.0	0.000	0.0	1.315	0.4								
282.819	80.6	Poor	273.371	77.9	266.296	75.9	257.537	73.4	248.434	70.8	239.301	68.2	230.403	65.6								
350.991	100.0	Total																				

Strategy Comprehensive Report

PASER Distribution

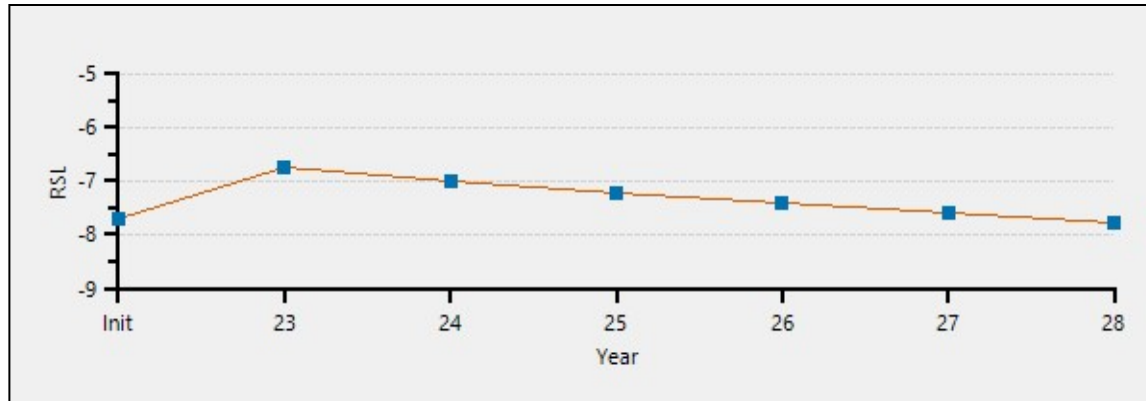


Local-Strategy

Initial Value		2023	2024	2025	2026	2027	2028
Lane Miles	PASER						
2.270	10	2.270	0.000	0.000	0.000	0.000	0.000
2.024	9	11.472	12.177	9.606	9.103	9.134	8.897
31.318	8	60.199	71.670	83.847	93.453	102.556	110.375
21.104	7	0.000	0.000	0.000	0.000	0.000	1.315
7.776	6	0.000	0.000	0.000	0.000	0.000	0.000
3.680	5	3.680	0.848	0.000	0.000	0.000	0.000
15.666	4	15.666	10.512	7.410	3.680	0.848	0.000
37.928	3	37.928	31.078	22.552	15.666	10.512	7.410
58.908	2	49.460	51.929	54.652	56.165	45.524	40.577
170.317	1	170.317	172.777	172.924	172.924	182.416	182.416
2.760	Average	3.053	3.131	3.239	3.352	3.450	3.584

Strategy Comprehensive Report

RSL Distribution



Local-Strategy

Initial Value		2023	2024	2025	2026	2027	2028
Lane Miles	RSL						
2.270	14	2.270	0.000	0.000	0.000	0.000	0.000
2.024	13	11.472	12.177	9.606	9.103	9.134	8.897
15.608	12	25.235	16.760	20.306	22.490	21.694	23.956
9.472	11	19.099	30.523	24.889	33.190	35.081	36.516
6.238	10	15.865	24.387	38.652	37.773	45.781	49.903
12.358	9	0.000	0.000	0.000	0.000	0.000	1.315
1.934	8	0.000	0.000	0.000	0.000	0.000	0.000
0.000	7	0.000	0.000	0.000	0.000	0.000	0.000
6.812	6	0.000	0.000	0.000	0.000	0.000	0.000
3.776	5	0.000	0.000	0.000	0.000	0.000	0.000
2.734	4	0.000	0.000	0.000	0.000	0.000	0.000
1.266	3	0.000	0.000	0.000	0.000	0.000	0.000
0.848	2	0.848	0.000	0.000	0.000	0.000	0.000
2.832	1	2.832	0.848	0.000	0.000	0.000	0.000
3.730	0	3.730	2.832	0.848	0.000	0.000	0.000
3.950	-1	3.950	3.730	2.832	0.848	0.000	0.000
7.986	-2	7.986	3.950	3.730	2.832	0.848	0.000
10.616	-3	10.616	7.986	3.950	3.730	2.832	0.848
12.476	-4	12.476	10.616	7.986	3.950	3.730	2.832
14.836	-5	14.836	12.476	10.616	7.986	3.950	3.730
8.744	-6	8.744	14.836	12.476	10.616	7.986	3.950
19.560	-7	19.560	8.744	14.836	12.476	10.616	7.986
8.642	-8	8.642	19.560	8.744	14.836	12.476	10.616
10.054	-9	10.054	8.642	18.596	8.744	14.446	12.476
11.908	-10	2.460	0.147	0.000	9.493	0.000	5.549

Strategy Comprehensive Report

17.762	-11	17.762	2.460	0.147	0.000	9.493	0.000
24.392	-12	24.392	17.762	2.460	0.147	0.000	9.493
12.284	-13	12.284	24.392	17.762	2.460	0.147	0.000
24.098	-14	24.098	12.284	24.392	17.762	2.460	0.147
38.594	-15	38.594	24.098	12.284	24.392	17.762	2.460
12.434	-16	12.434	38.594	24.098	12.284	24.392	17.762
3.440	-17	3.440	12.434	38.594	24.098	12.284	24.392
4.662	-18	4.662	3.440	12.434	38.594	24.098	12.284
1.360	-19	1.360	4.662	3.440	12.434	38.594	24.098
2.582	-20	2.582	1.360	4.662	3.440	12.434	38.594
0.576	-21	0.576	2.582	1.360	4.662	3.440	12.434
6.702	-22	6.702	0.576	2.582	1.360	4.662	3.440
1.734	-23	1.734	6.702	0.576	2.582	1.360	4.662
0.000	-24	0.000	1.734	6.702	0.576	2.582	1.360
19.697	-25	19.697	0.000	1.734	6.702	0.576	2.582
0.000	-26	0.000	19.697	0.000	1.734	6.702	0.576
0.000	-27	0.000	0.000	19.697	0.000	1.734	6.702
0.000	-28	0.000	0.000	0.000	19.697	0.000	1.734
0.000	-29	0.000	0.000	0.000	0.000	19.697	0.000
0.000	-30	0.000	0.000	0.000	0.000	0.000	19.697
-7.695	Average	-6.744	-7.005	-7.239	-7.422	-7.610	-7.773

Strategy Comprehensive Report

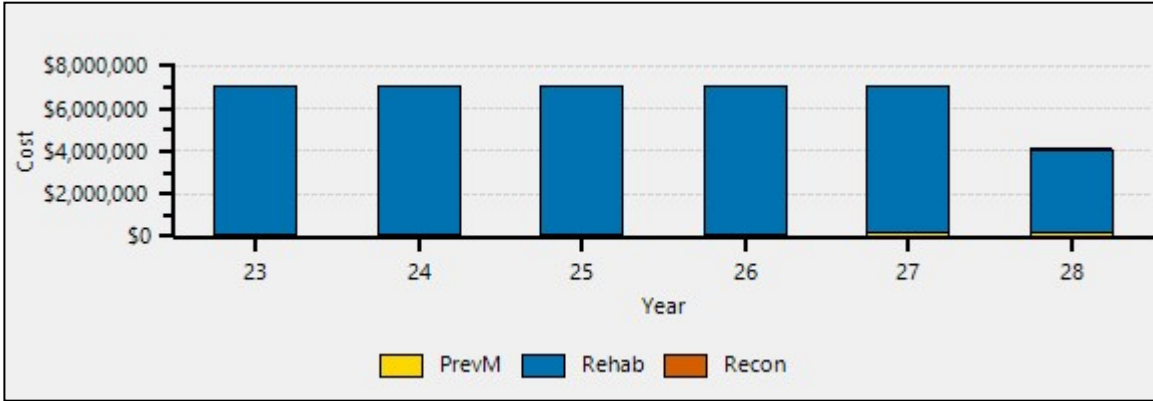
Local-Strategy - With Additional Funding

Base Year 2023
 Percent Inflation 0
 Number of Years 6
 Optimized Yes
 Current Filter Local - Paved

Subtype	Treatment	Trigger	Reset	Cost/Ln Mile	Budget	Lane Miles	Year
Asphalt-Twp-Rd	RH (SI) Crush & Shape / 4" Resurface	1 - 4	10	\$159,356.27	\$1,374,932	8.628	2023
					\$5,629,157	35.324	2024
					\$5,825,867	36.559	2025
					\$5,955,438	37.372	2026
					\$6,187,075	38.825	2027
					\$3,978,899	24.969	2028
	RH (SI) HMA Overlay - 2.5"	2 - 4	9	\$95,532.80	\$5,627,646	58.908	2023
					\$1,417,325	14.836	2024
					\$1,191,867	12.476	2025
					\$1,014,176	10.616	2026
					\$762,925	7.986	2027
					\$97,422	28.880	2023
	PM (CPM) Crack Seal	6 - 8	8	\$3,373.33	\$53,518	15.865	2024
					\$82,265	24.387	2025
					\$130,386	38.652	2026
\$150,000					44.466	2027	
\$150,000					44.466	2028	

Cost Distribution

Strategy Comprehensive Report

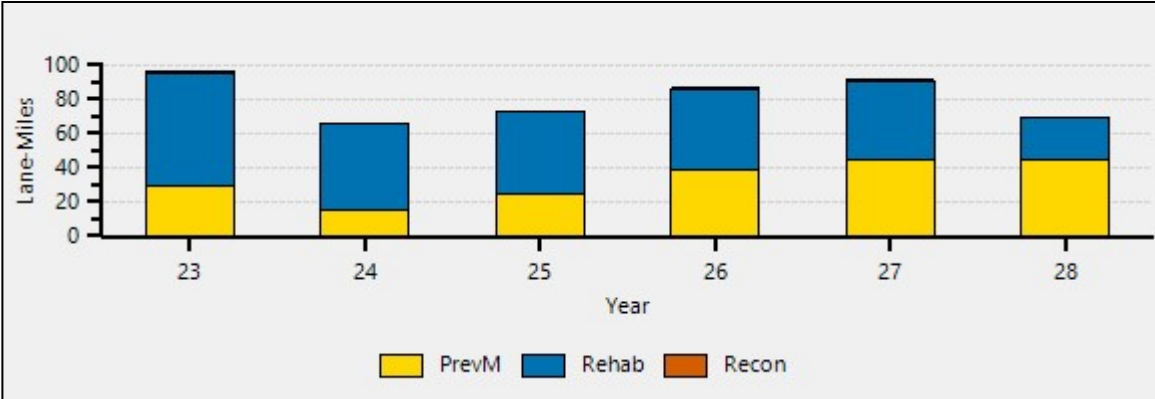


Local-Strategy

Maintenance Type	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Prev Maint	\$97,422	\$53,518	\$82,265	\$130,386	\$150,000	\$150,000				
Rehab	\$7,002,578	\$7,046,482	\$7,017,735	\$6,969,614	\$6,950,000	\$3,978,899				
Recon	\$0	\$0	\$0	\$0	\$0	\$0				
Total	\$7,100,000	\$7,100,000	\$7,100,000	\$7,100,000	\$7,100,000	\$4,128,899				

Strategy Comprehensive Report

Maintenance Performed

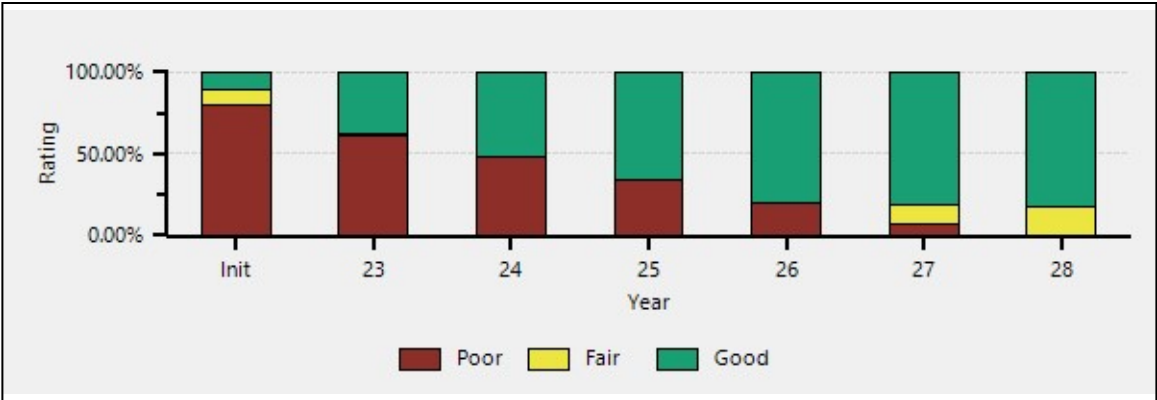


Local-Strategy

Maintenance Type in Lane Miles	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Prev Maint	28.880	15.865	24.387	38.652	44.466	44.466				
Rehab	67.536	50.160	49.035	47.988	46.811	24.969				
Recon	0.000	0.000	0.000	0.000	0.000	0.000				
Total	96.416	66.025	73.422	86.640	91.277	69.435				

Strategy Comprehensive Report

Rating Distribution

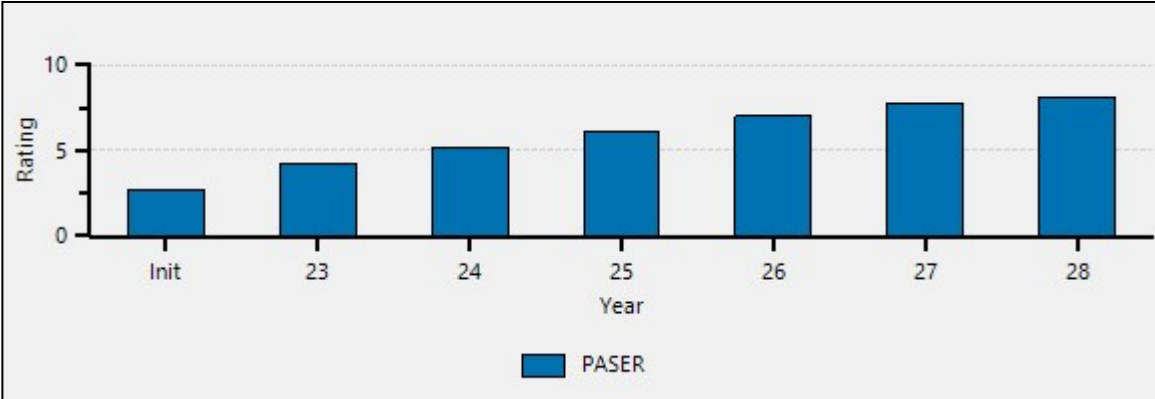


Local-Strategy

Initial Values																						
Lane Miles	%	Rating	2023		2024		2025		2026		2027		2028		2029		2030		2031		2032	
35.612	10.2	Good	132.029	37.6	182.188	51.9	231.223	65.9	279.211	79.6	283.255	80.7	291.121	82.9								
32.560	9.3	Fair	3.680	1.1	0.848	0.2	0.000	0.0	0.000	0.0	42.767	12.2	59.869	17.1								
282.819	80.6	Poor	215.283	61.3	167.955	47.9	119.768	34.1	71.780	20.5	24.969	7.1	0.000	0.0								
350.991	100.0	Total																				

Strategy Comprehensive Report

PASER Distribution

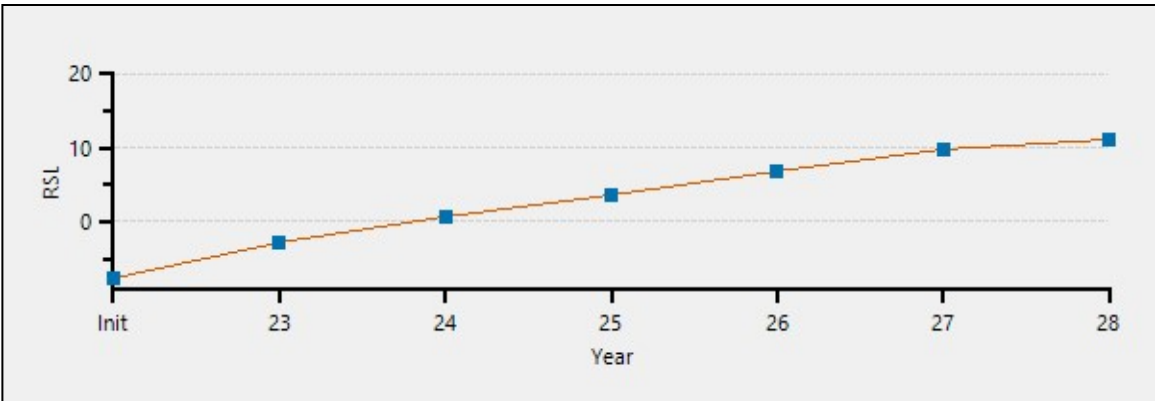


Local-Strategy

Initial Value		2023	2024	2025	2026	2027	2028
Lane Miles	PASER						
2.270	10	10.898	35.324	36.559	37.372	38.825	24.969
2.024	9	60.932	25.734	47.800	47.175	45.358	38.825
31.318	8	60.199	121.130	146.864	194.664	199.072	227.327
21.104	7	0.000	0.000	0.000	0.000	42.767	59.869
7.776	6	0.000	0.000	0.000	0.000	0.000	0.000
3.680	5	3.680	0.848	0.000	0.000	0.000	0.000
15.666	4	15.666	10.512	7.410	3.680	0.848	0.000
37.928	3	37.928	31.078	22.552	15.666	10.512	0.000
58.908	2	0.000	0.000	0.000	0.000	0.000	0.000
170.317	1	161.689	126.365	89.806	52.434	13.609	0.000
2.760	Average	4.261	5.185	6.148	7.037	7.798	8.082

Strategy Comprehensive Report

RSL Distribution



Local-Strategy

Initial Value		2023	2024	2025	2026	2027	2028
Lane Miles	RSL						
2.270	14	10.898	35.324	36.559	37.372	38.825	24.969
2.024	13	60.932	25.734	47.800	47.175	45.358	38.825
15.608	12	25.235	66.220	33.863	60.684	61.997	60.180
9.472	11	19.099	30.523	74.349	46.747	75.506	76.819
6.238	10	15.865	24.387	38.652	87.233	61.569	90.328
12.358	9	0.000	0.000	0.000	0.000	42.767	59.869
1.934	8	0.000	0.000	0.000	0.000	0.000	0.000
0.000	7	0.000	0.000	0.000	0.000	0.000	0.000
6.812	6	0.000	0.000	0.000	0.000	0.000	0.000
3.776	5	0.000	0.000	0.000	0.000	0.000	0.000
2.734	4	0.000	0.000	0.000	0.000	0.000	0.000
1.266	3	0.000	0.000	0.000	0.000	0.000	0.000
0.848	2	0.848	0.000	0.000	0.000	0.000	0.000
2.832	1	2.832	0.848	0.000	0.000	0.000	0.000
3.730	0	3.730	2.832	0.848	0.000	0.000	0.000
3.950	-1	3.950	3.730	2.832	0.848	0.000	0.000
7.986	-2	7.986	3.950	3.730	2.832	0.848	0.000
10.616	-3	10.616	7.986	3.950	3.730	2.832	0.000
12.476	-4	12.476	10.616	7.986	3.950	3.730	0.000
14.836	-5	14.836	12.476	10.616	7.986	3.950	0.000
8.744	-6	0.000	0.000	0.000	0.000	0.000	0.000
19.560	-7	0.000	0.000	0.000	0.000	0.000	0.000
8.642	-8	0.000	0.000	0.000	0.000	0.000	0.000
10.054	-9	0.000	0.000	0.000	0.000	0.000	0.000
11.908	-10	0.000	0.000	0.000	0.000	0.000	0.000

Strategy Comprehensive Report

17.762	-11	17.762	0.000	0.000	0.000	0.000	0.000
24.392	-12	24.392	17.762	0.000	0.000	0.000	0.000
12.284	-13	12.284	24.392	17.762	0.000	0.000	0.000
24.098	-14	24.098	12.284	24.392	17.762	0.000	0.000
38.594	-15	38.594	24.098	12.284	24.392	13.609	0.000
12.434	-16	12.434	38.594	24.098	10.280	0.000	0.000
3.440	-17	3.440	9.235	11.270	0.000	0.000	0.000
4.662	-18	4.662	0.000	0.000	0.000	0.000	0.000
1.360	-19	1.360	0.000	0.000	0.000	0.000	0.000
2.582	-20	2.582	0.000	0.000	0.000	0.000	0.000
0.576	-21	0.576	0.000	0.000	0.000	0.000	0.000
6.702	-22	6.702	0.000	0.000	0.000	0.000	0.000
1.734	-23	1.734	0.000	0.000	0.000	0.000	0.000
0.000	-24	0.000	0.000	0.000	0.000	0.000	0.000
19.697	-25	11.069	0.000	0.000	0.000	0.000	0.000
-7.695	Average	-2.889	0.643	3.712	6.834	9.856	11.008

APPENDIX C: MEETING MINUTES VERIFYING PLAN ACCEPTANCE BY GOVERNING BODY