City of Traverse City

2025/26 Pavement Asset Management Plan

A plan describing the City of Traverse City's roadway assets and condition

CITY OF TRAVERSE CITY

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CONTENTS

Table of Figures ii
Table of Tables iv
Executive Summary v
Introduction 1
Pavement Primer *2*
1. Pavement Assets 11
Inventory *12*
Goals *24*
Modelled Trends *26*
Planned Projects *29*
Gap Analysis *30*
2. Financial Resources 33
City Major Network *33*
City Local Network *33*
3. Risk of Failure Analysis 34
Probability of Failure (PoF) *34*
Consequence of Failure (CoF) *35*
4. Coordination with Other Entities 37
Appendix A: 2026 - 2029 Paved City Major Road Planned Projects 38
Appendix B: 2026 - 2029 Paved City Local Road Planned Projects 39

TABLE OF FIGURES

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. 5

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. 6

Figure 3: Examples of reconstruction treatments—(left) reconstructing a road and (right) road prepared for full-depth repair. 7

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. 8

Figure 5: Examples of capital preventive maintenance treatments—(from left) crack seal, fog seal, chip seal, and slurry seal/microsurface. 9

Figure 6: Examples of capital preventive maintenance treatments, cont'd—(from left) gravel road undergoing maintenance grading, and gravel road receiving dust control application (dust control photo courtesy of Weld County, Colorado, weldgov.com). 10

Figure 7: Map showing location of City of TC's paved roads (i.e., those managed by City of TC) 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 City of TC's unpaved roads in blue 11

Figure 8: Percentage of city major and city local roads for the City of TC. 12

Figure 9: Miles of roads managed by the City of TC that are part of the National Highway System and condition. 13

Figure 10: Pavement type by percentage maintained by the City of TC. 13

Figure 11: (A) Left: The City of TC paved city major road network conditions by percentage of good, fair, or poor, and (B) Right: paved city local road network conditions by percentage of good, fair, or poor 15

Figure 12: (A) Left: Statewide paved city major road network conditions by percentage of good, fair, or poor, and (B) Right: paved city local road network conditions by percentage of good, fair, or poor 15

Figure 13: The City of TC paved city major road network conditions. Bar graph colors correspond to good/fair/poor TAMC designations. 16

Figure 14: The City of TC paved city local network condition by PASER rating. Bar graph colors correspond to good/fair/poor TAMC designations. 16

Figure 15: Map of the current paved road condition in good (PASER 10, 9, 8) shown in green, fair (PASER 7, 6, 5) shown in yellow, and poor (PASER 4, 3, 2, 1) shown in red. Only Roads owned by the City of TC are shown. 17

Figure 16: Historical City of TC paved city major road network condition trend. 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 18

Figure 17: Historical statewide city major road network condition trend....19
Figure 18: Historical City of TC paved city local road network condition trend....20
Figure 19: Historical statewide paved city local road network condition trend....20
Figure 20: The City of TC'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.....21
Figure 21: 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 the City of TC are shown.....22
Figure 22: 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 the City of TC are shown.....22
Figure 23: 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 the City of TC are shown.....22
Figure 24: 2025 alley PASER ratings....23
Figure 25: The City of TC's 2025 major road network condition by percentage of good/fair/poor....24
Figure 26: The City of TC 2025 paved city local road network condition by percentage of good/fair/poor....25
Figure 27: Forecast good/fair/poor changes to the City of TC network condition from planned projects on the city major road network.....27
Figure 28: Forecast good/fair/poor changes to City of TC network condition from planned projects on the paved city local road network.....28
Figure 29: Map showing proposed road projects planned for 2026/27 through 2028/29....30
Figure 30: Risk of Failure Analysis Calculation....34
Figure 31: Emergency Routes (Primary and Secondary) are key transportation links in the City of TC's road network.....36

TABLE OF TABLES

Table 1: Roadsoft Modelled Trends, Planned Projects, and Gap Analysis for City of TC's Road Assets—Modelled Trends: Roadsoft Annual Work Program for the Paved City Major Road Network Forecast 27

Table 2: Roadsoft Modelled Trends, Planned Projects, and Gap Analysis for City of TC's Road Assets—Modelled Trends: Roadsoft Annual Work Program for the Paved City Local Road Network Forecast 27

Table 3: Roadsoft Modelled Trends, Planned Projects, and Gap Analysis for City of TC's Road Assets—Pavement Condition Forecast and Gap Analysis: Roadsoft Annual Work Program for Paved City Major Road Network Forecast 31

Table 4: Roadsoft Modelled Trends, Planned Projects, and Gap Analysis for City of TC's Road Assets—Pavement Condition Forecast and Gap Analysis: Roadsoft Annual Work Program for Paved City Local Road Network Forecast 31

Table 5: Probability of Failure Ratings 35

Table 6: Consequence of Failure Ratings 35

EXECUTIVE SUMMARY

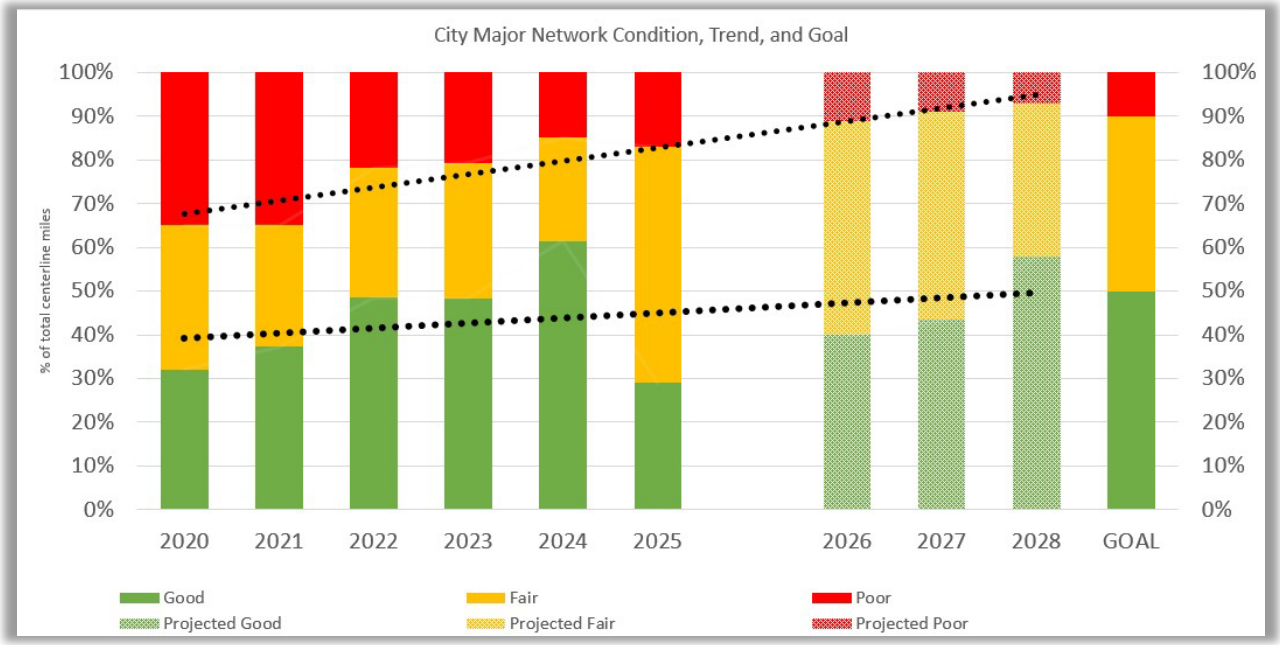
As conduits for commerce and connections to vital services, roads are among the most important assets in any community along with other assets like bridges, culverts, traffic signs, traffic signals, and utilities that support and affect roads. The City of Traverse City's (City of TC) roads, other transportation 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 the City of TC is meeting its obligations to maintain the public assets for which it is responsible.

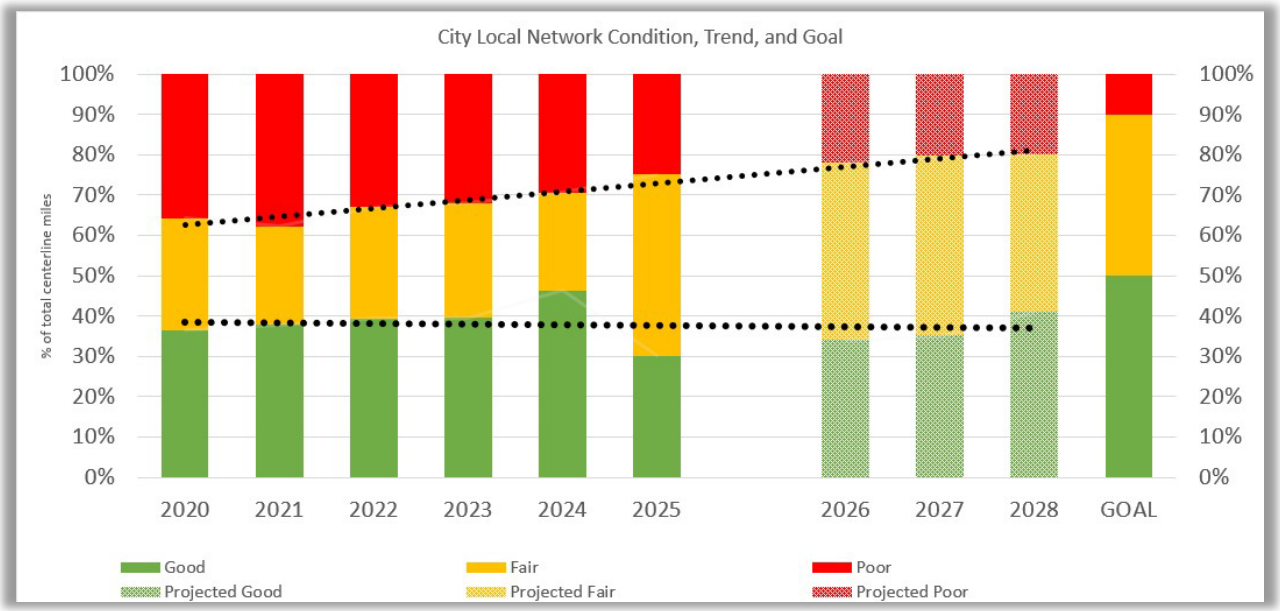
This plan overviews the City of TC's road assets and condition, and explains how the City of TC works to maintain and improve the overall condition of those assets. These explanations can help answer the following questions:

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

The City of TC owns and/or manages 78.4 centerline of roads. This road network can be divided into the city major network, the city 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 the City of TC historical and current network conditions, projected trends, and goals (as explained in the Goals section on pg. 25) for city major network and city local network can be seen in the two figures below:





Additional discussion of projected network performance, funding scenarios, gap analysis results, and associated budget implications can be found in the "Gap Analysis" section (pg. 30) and "Financial Resources" section (pg. 33).

This asset management plan helps demonstrate the City of TC's responsible use of public funds by providing elected and appointed officials as well as the general public with inventory and condition information of the City of TC'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). The City of TC 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 City of Traverse City (City of TC) 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. The City of TC is responsible for maintaining and operating over 78.4 centerline of roads.

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

Questions regarding the use or content of this plan should be directed to Christine Black at 625 Woodmere Ave, Traverse City, Michigan, 49686 or cblack@traversecitymi.gov. A copy of this plan can be accessed on our website at www.traversecitymi.gov/government/city-departments/asset-management/.

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 (when compared to other pavement types), 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. The City of TC's typical HMA pavement design life will provide

service for 25 years before major rehabilitation is necessary. The vast majority of local-agency-owned pavements are HMA pavements.

- **Composite pavement:** Composite pavement is a combination of concrete and asphalt layers. Typically, composite pavement is old concrete pavement exhibiting ride-related issues that was 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 has 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 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. The City of TC 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, historical 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

The City of TC 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. The City of TC 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 City of TC 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, the City of TC collects 100 percent of its road network data yearly using its own staff and resources.

Unpaved Road Condition Rating System (IBR System™)

The condition of unpaved roads can be rapidly changing, which makes it difficult to obtain a consistent surface condition rating over the course of weeks or even days. The PASER system works well on most paved roads, which have a relatively stable surface condition over several months, but it is difficult to adapt to unpaved roads. To address the need for a reliable condition assessment system for unpaved roads, the TAMC adopted the Inventory Based Rating (IBR) System™, and City of TC 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 roads by evaluating three features—surface width, drainage adequacy, and structural adequacy—in comparison to a baseline, or generally considered “good”, road. These three assessments come together to generate an overall 1-10 IBR number. A high IBR number reflects a road with wide surface width, good drainage, and a well-designed and well-constructed base, whereas a low IBR number reflects a narrow road with no ditches and little gravel. A good, fair, or poor assessment of each feature is not an endorsement or indictment of a road’s suitability for use but simply provides context on how these road elements compare to a baseline condition.

Figure 2: *Top*– Road with IBR number of 1 road that has poor surface width, poor drainage adequacy, and poor structural adequacy. *Middle*– Road IBR number of 7 that has fair surface width, fair drainage adequacy, and fair structural adequacy. *Bottom*– Road with IBR number of 9 road that has good surface width, good drainage adequacy, and good structural adequacy.

Figure 2 illustrates the range over which features may be assessed. The top example in Figure 2 shows an unpaved road with a narrow surface width, little or no drainage, and very little gravel thickness. Using the IBR System™, these

assessments would yield an IBR number of "1" for this road. The middle example in Figure 2 shows a road with fair surface width, fair drainage adequacy, and fair structural adequacy. These assessments would yield an IBR number of "7" for this road. The bottom example in Figure 2 shows a road with good surface width, good drainage adequacy, and good structural adequacy. These assessments would yield an IBR number of "9" for this road.

Unpaved roads are constructed and used differently throughout Michigan. A narrow, unpaved road with no ditches and very little gravel (low IBR number) may be perfectly acceptable at 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 numbers 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 the City of TC—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 25 years and costs between $500,000 and $2,010,000 per lane mile. The following descriptions outline the main reconstruction treatments used by the City of TC.

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

Structural Improvement

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

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

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

An HMA overlay is a layer of new asphalt (liquid asphalt and stones) placed on an existing pavement (Figure 4). Depending on the overlay thickness, this treatment can add significant structural strength. This treatment also creates a new wearing surface for traffic and seals the pavement from water, debris, and sunlight damage. An HMA overlay lasts approximately five to ten years. The top layer of severely damaged pavement can be removed by 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 as the curb and gutter that is not being raised or reinstalled in the project. HMA Overlay with Milling typically cost between $150,000 and $320,000 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 City of TC.

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). The City of TC 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 one year and costs between $1,300 and $5,200 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 the City of TC looks at what crack filling costs per year of the treatment's life.

Cape Seal

A Cape seal is a two-step treatment that combines the structural benefits of a chip seal with the smoothness of a micro-surface overlay. First, a chip seal, also known as a sealcoat, 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 help to prevent further surface deterioration. Chip seals are best applied to pavements that are not exhibiting problems with strength, and their purpose is to help preserve that strength. After the chip seal a micro-surface is applied to protect existing pavement from being damaged by water and sunlight. The primary ingredients are modified liquid asphalt (micro-surface), small stones, water and Portland cement applied in a very thin (less than a half an inch) layer (Figure 5). The micro-surfacing provides different curing and durability properties, which allows it to be used for filling pavement ruts and 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. This treatment lasts approximately eight years and typically costs between $40,000 and $60,000 per lane mile.

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

Maintenance Grading (for Unpaved Roads)

Maintenance grading involves regrading an unpaved road to remove isolated potholes, wash boarding, 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 two times per year and each grading costs approximately $250 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 times per year and each application costs approximately $300 per mile.

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 City of TC is responsible for a total of 78.4 centerline of public roads, as shown in Figure 7.

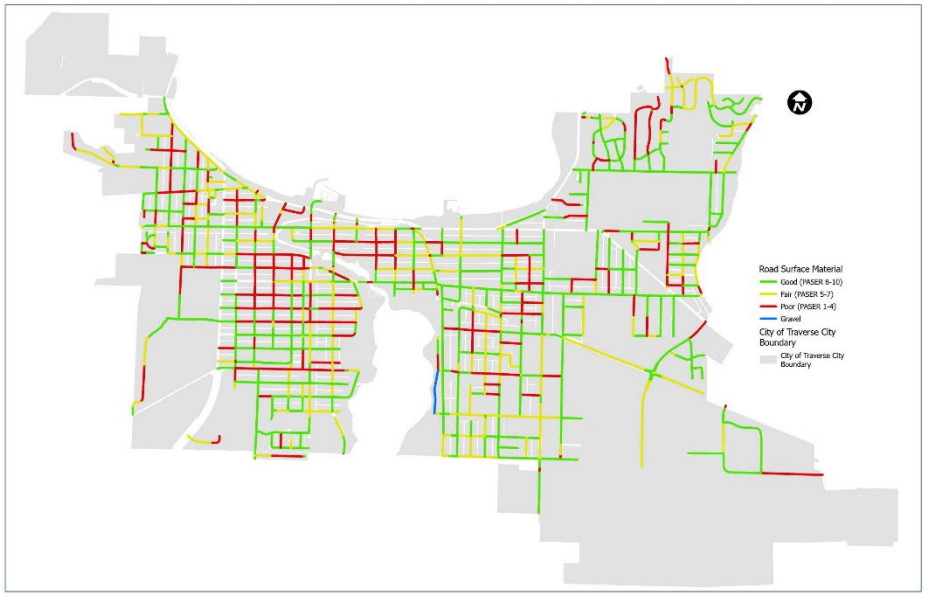


Figure 7: Map showing location of City of TC's paved roads (i.e., those managed by City of TC) and their current condition for paved roads with green for good (i.e., PASER 10, 9, 8), yellow for fair (i.e., PASER 7, 6, 5), and red for poor (i.e., PASER 4, 3, 2, 1), as well as the location of City of TC's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

Inventory

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

Figure 8 illustrates the percentage of roads owned by the City of TC that are classified as city major and city local roads.

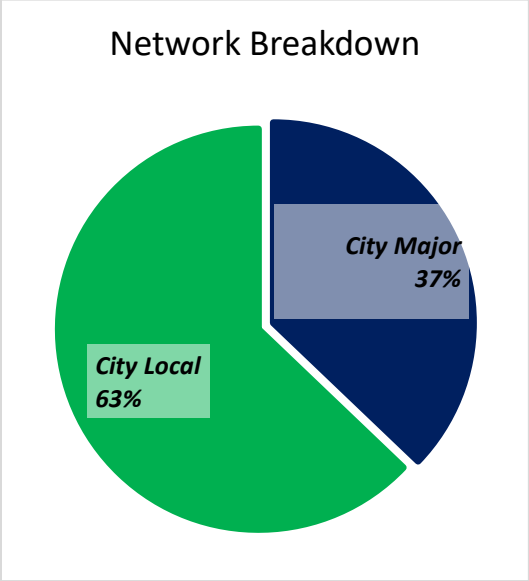


Figure 8: Percentage of city major and city local roads for the City of TC.

The City of TC manages 0.644 miles of roads (Airport Access Rd) 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, the City of TC manages a percentage of those roads located in its jurisdiction, as shown in Figure 9.

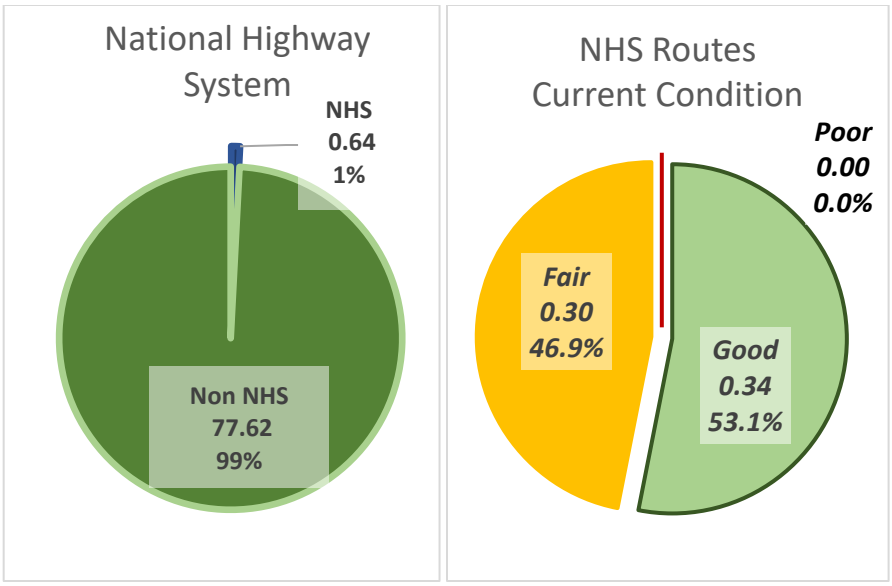


Figure 9: Miles of roads managed by the City of TC that are part of the National Highway System and condition.

The City of TC also owns and manages 0.262 miles of unpaved roads.

Types

The City of TC has multiple types of pavements in its jurisdiction, including asphalt, concrete, brick/block; 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 10 illustrates the percentage of various pavement types that the City of TC has in its network.

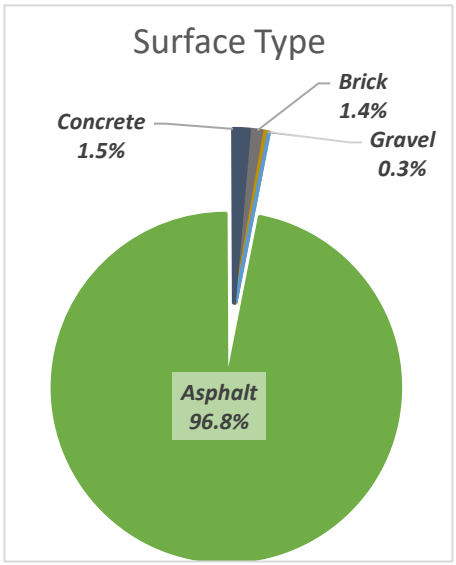


Figure 10: Pavement type by percentage maintained by the City of TC.

Locations

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

Condition

The road characteristic that road users most readily notice is pavement condition. Pavement condition is a major factor in determining the most cost-effective treatment—that is, routine maintenance, capital preventive maintenance, or structural improvement—for a given section of pavement. The City of TC 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 the City of TC 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

The City of TC 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. The City of TC 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.

The City of TC collects PASER data on 100 percent of our paved and unpaved roads yearly using its own staff and resources. In addition, the City of TC along with a team including the Grand Traverse County Road Commission and Networks Northwest collect PASER data yearly on all federal-aid-eligible roads within the city limits.

The City of TC's 2025 paved city major road network has 29 percent of roads in the TAMC good condition category, 54 percent in fair, and 17 percent in poor (Figure 11A). The paved city local road network has 30 percent in good, 45 percent in fair, and 25 percent in poor (Figure 11B).

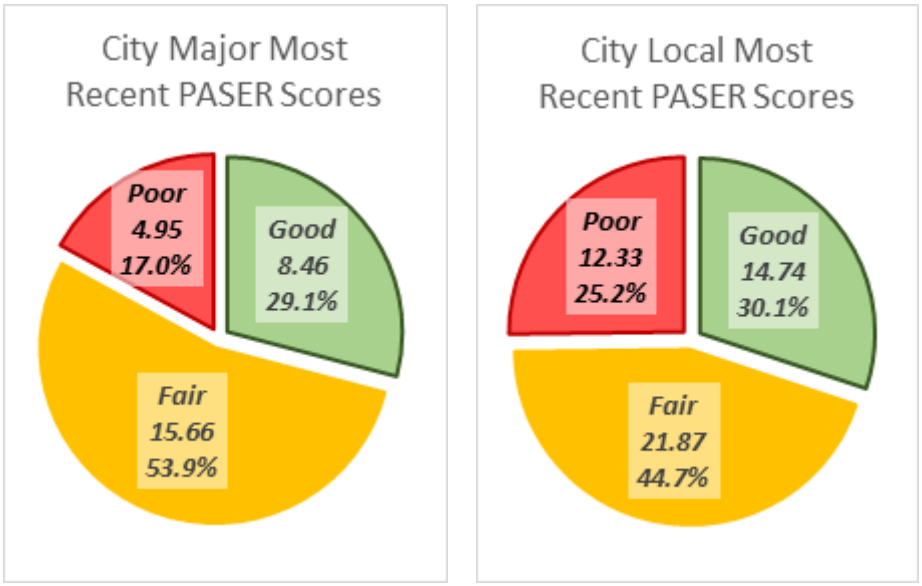


Figure 11: (A) Left: The City of TC paved city major road network conditions by percentage of good, fair, or poor, and (B) Right: paved city local road network conditions by percentage of good, fair, or poor

In comparison, the statewide paved city major road network has 28 percent of roads in the TAMC good condition category, 41 percent in fair, and 31 percent in poor (Figure 12A). The statewide paved city local road network has 20 percent in good, 37 percent in fair, and 43 percent in poor (Figure 12B). Comparing Figure 11A and Figure 12A shows that City of TC's paved city major road network is better than similarly-classified roads in the rest of the state, while Figure 11B and Figure 12B show that City of TC's paved city local road network is better than similarly-classified roads in the rest of the state. Other road condition graphs can be viewed on the TAMC pavement condition dashboard at: http://www.mcgi.state.mi.us/mitrp/Data/PaserDashboard.aspx.

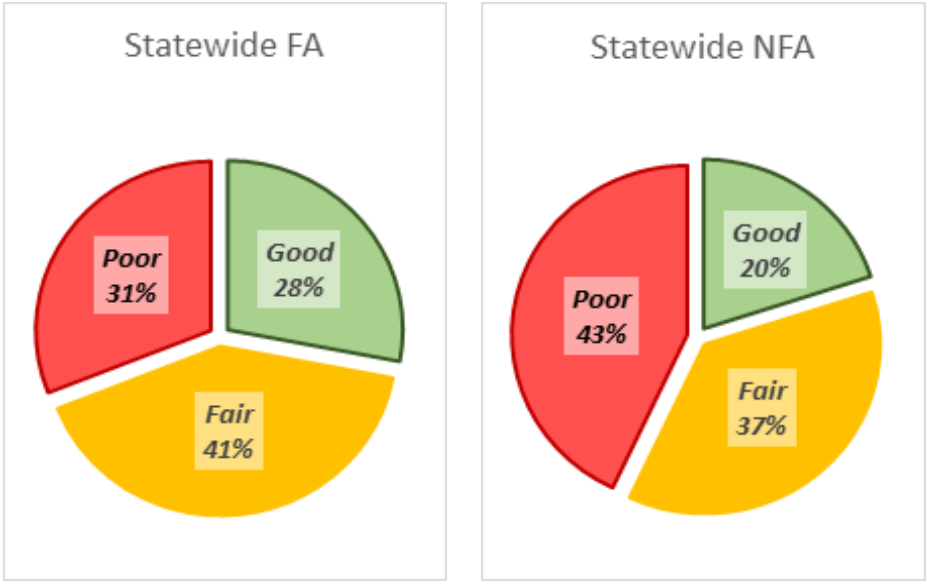


Figure 12: (A) Left: Statewide paved city major road network conditions by percentage of good, fair, or poor, and (B) Right: paved city local road network conditions by percentage of good, fair, or poor

The City of TC's road conditions differ from statewide averages due to a combination of local factors, including urban traffic patterns, lower heavy truck volumes, proactive treatment of climate and soil challenges, and consistent investment in pavement preservation. These factors, combined with data-driven maintenance and rehabilitation practices, have resulted in fewer roads in poor condition and stronger overall network performance.

Figure 13 and Figure 14 show the number of miles for the City of TC's roads with PASER scores expressed in TAMC definition categories for the paved city major road network (Figure 13) and the paved city local road network (Figure 14). The City of TC 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.

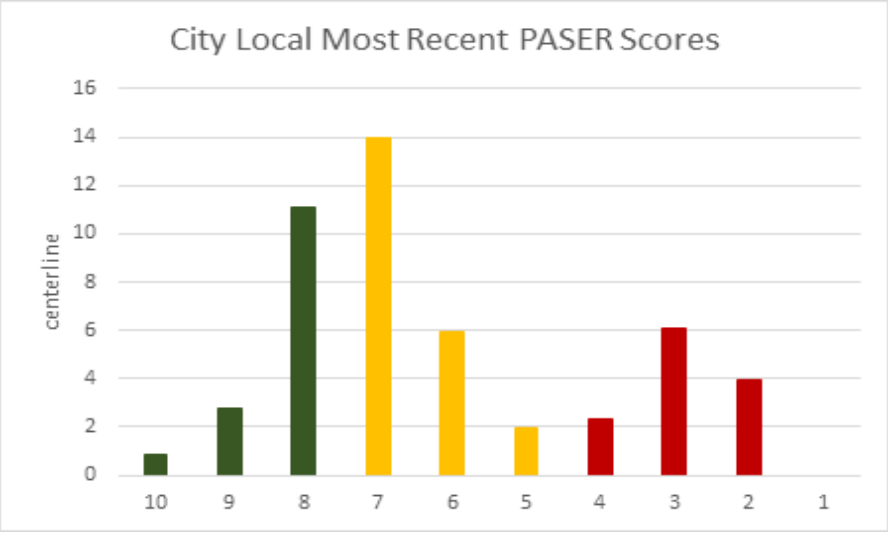


Figure 13: The City of TC paved city major road network conditions. Bar graph colors correspond to good/fair/poor TAMC designations.

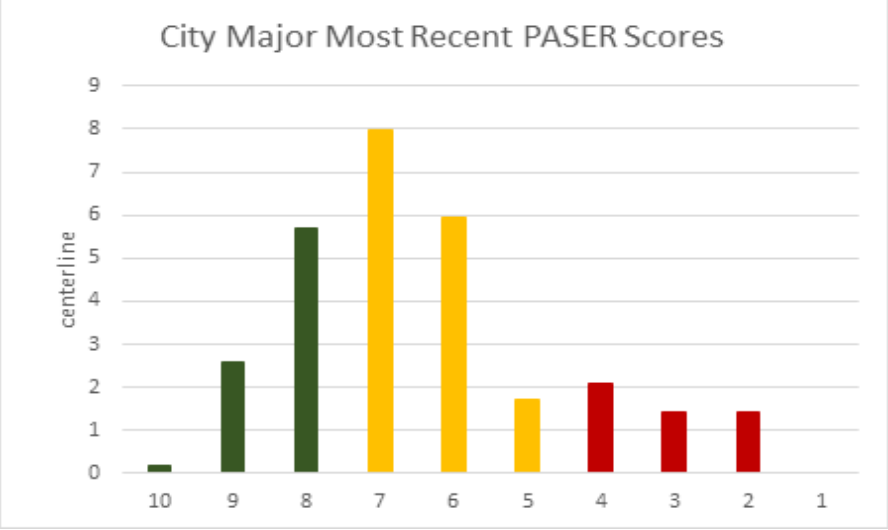


Figure 14: The City of TC paved city local network condition by PASER rating. Bar graph colors correspond to good/fair/poor TAMC designations.

Figure 15 provides a map illustrating the geographic location of paved roads and their respective PASER condition. An online version of the most recent 2025 PASER data and every year back to 2013 is located at https://experience.arcgis.com/experience/6955b91835914d1da17efdbc510df4f9/ .

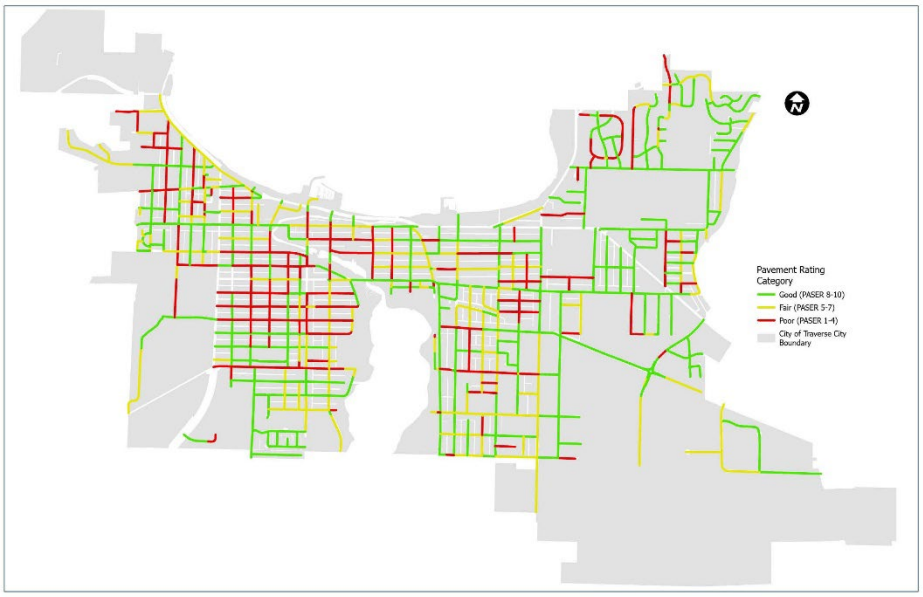


Figure 15: Map of the current paved road condition in good (PASER 10, 9, 8) shown in green, fair (PASER 7, 6, 5) shown in yellow, and poor (PASER 4, 3, 2, 1) shown in red. Only Roads owned by the City of TC are shown.

Figure 15 illustrates the current distribution of pavement conditions across the City of TC's roadway network. While the network contains a substantial share of roads in good and fair conditions, 17 percent of major roads and 25 percent of locals remain in the poor condition category, requiring reconstruction.

The cost estimates presented in this report are limited to pavement-related reconstruction or preservation and assume replacement of existing street conditions. Actual project costs are frequently higher because projects often include additional elements that are not captured in pavement-only analyses.

In particular, the increased desire from the commission and now the Complete Streets Policy to **accommodate bicycle traffic as part of roadway projects**, regardless of roadway classification. These accommodations may include changes to lane widths, striping, signage, pavement markings, or geometric adjustments. While these improvements are important for safety and mobility, **their costs are not explicitly accounted for in this Pavement Asset Management Plan**, which focuses solely on pavement-related construction, rehabilitation, and preservation costs and assumes replacement of existing conditions.

As a result, projects on roads in poor condition often require **additional funding beyond pavement needs alone**, reducing the City's ability to advance as many reconstruction or rehabilitation projects as pavement condition data alone would suggest. This creates a financial risk where poor condition roads remain untreated longer than desired, potentially accelerating deterioration and increasing long-term costs.

Because this plan addresses only pavement infrastructure and the cost to restore existing roadway conditions, actual **project costs may exceed those shown elsewhere in this document** when multimodal or safety-related improvements are incorporated. This limitation reinforces the importance of prioritizing preventive maintenance on fair-condition roads, where lower-cost treatments can delay or avoid the need for full reconstruction and associated multimodal upgrades.

This data highlights the growing gap between pavement preservation needs and the full scope of modern roadway project requirements. Addressing this gap will require either additional funding sources, adjustments to project scope, or coordination with other planning efforts that address multimodal infrastructure separately from pavement condition alone.

Historically, the overall quality of the City of TC's paved city major roads have been increasing, as can be observed in Figure 16. Over time, the condition of the City's major road network has shifted toward higher PASER ratings. From 2016 through approximately 2020, a larger share of centerline miles fell into the fair and poor categories. Beginning around 2021, the proportion of roads in good condition increased steadily, while the share of poor-condition roads declined.

By the most recent years shown, a significantly greater percentage of major roads are rated good, indicating that investment and preservation efforts have been effective in improving overall system condition.

Comparing the City of TC's paved city major road condition trends illustrated in Figure 16 with overall statewide condition trends for similarly classified roads, which are illustrated in Figure 17, shows a different trend locally as in the rest of the state.

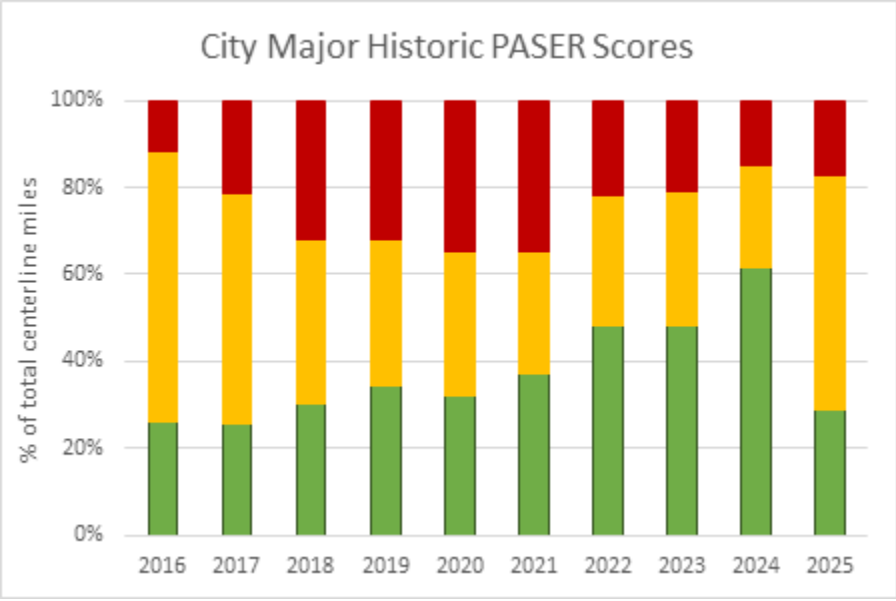


Figure 16: Historical City of TC paved city major road network condition trend. Good (PASER 10, 9, 8) shown in green, fair (PASER 7, 6, 5) shown in yellow, and poor (PASER 4, 3, 2, 1) shown in red

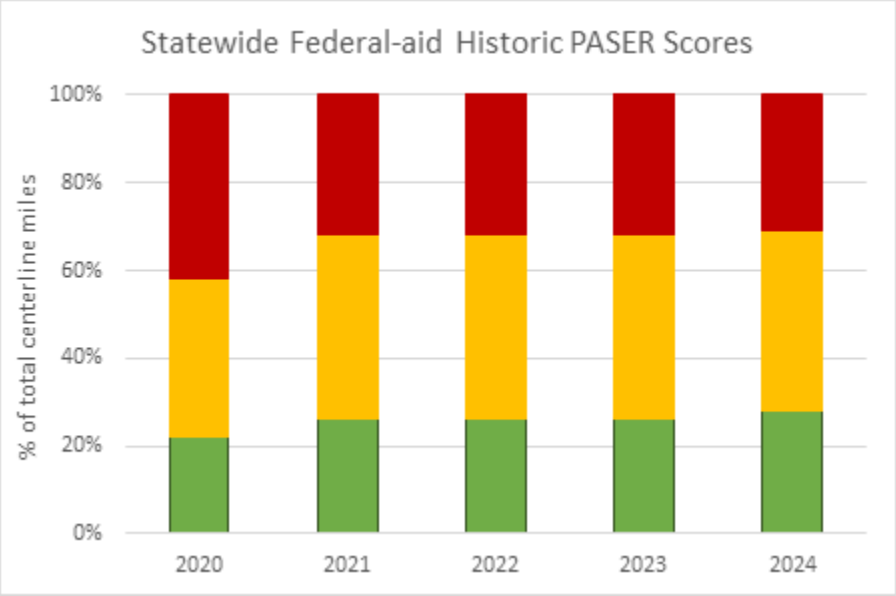


Figure 17: Historical statewide city major road network condition trend

Historically, the overall quality of the City of TC's paved city local roads have been increasing slower than the paved city major road network. Figure 18 illustrates the condition of the paved city local road network in the City of TC while Figure 19 illustrates these conditions statewide.

Comparing the City of TC's paved city local road condition trends illustrated in Figure 18 with overall statewide condition trends for all paved city local roads illustrated in Figure 19 indicates a different trend locally as in the rest of the state. While statewide data indicates a continued shift of local roads into the poor condition category, the City's local road network has remained relatively stable, with modest improvement over time rather than widespread decline.

This difference is primarily due to the City's **targeted use of limited funding** and a preservation-focused approach on local streets. The City has prioritized maintaining fair condition local roads through preventive maintenance and selective rehabilitation to slow deterioration, recognizing that once local roads fall into poor condition, reconstruction becomes significantly more expensive and difficult to fund.

However, improvement in the local road network has occurred more gradually than on major roads due to **budget constraints and increasing project complexity**. Local road projects frequently require coordination with utilities, drainage improvements, and multimodal accommodations, which increases overall project costs and limits the number of pavement-focused projects that can be completed each year. As a result, while the City has been able to prevent widespread deterioration, progress toward improving poor-condition local roads has been slower.

Overall, the City's local road condition trend reflects a balance between preservation and fiscal constraints. The data shows that the City has been successful in stabilizing its local road network relative to statewide trends but also highlights the ongoing risk that without additional funding, improvements to poor-condition local roads will remain limited.

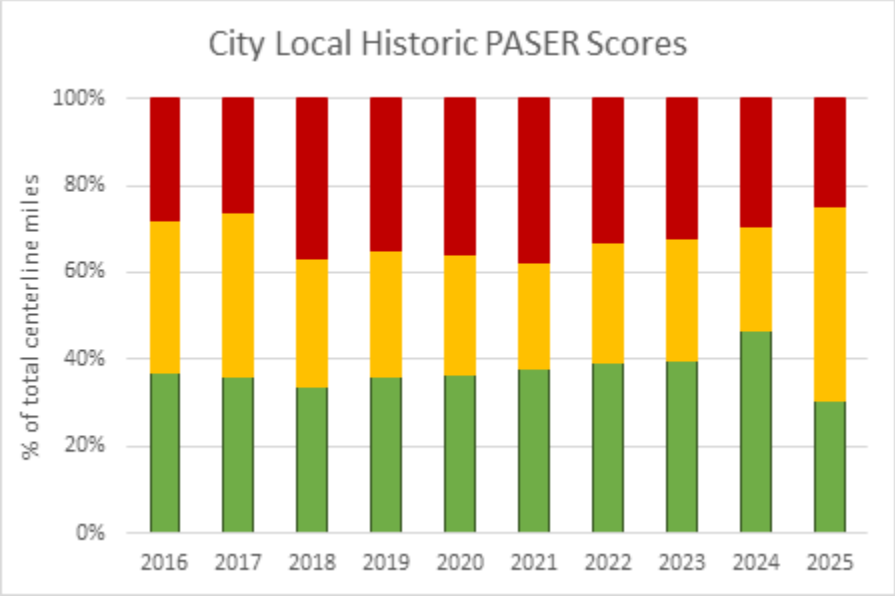


Figure 18: Historical City of TC paved city local road network condition trend

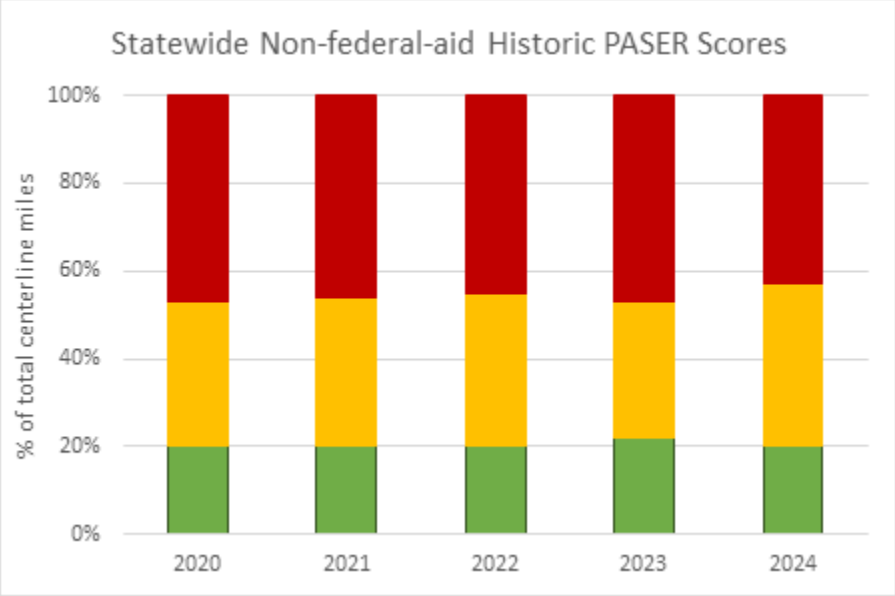


Figure 19: Historical statewide paved city local road network condition trend

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 City of TC uses the IBR System™ for rating its unpaved roads. More information regarding the IBR System™ can be found in Introduction's Pavement Primer.

The City of TC has historically had very few unpaved roads and has been actively working to pave the remaining segments as development and funding allow, with the long-term goal of eliminating unpaved roads from the network.

Figure 20 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 20 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.

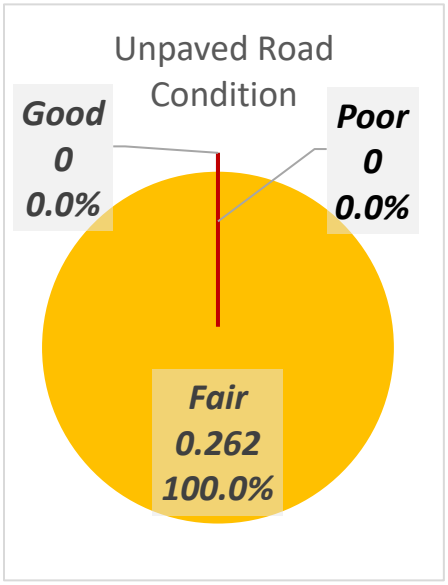


Figure 20: The City of TC's unpaved road network condition by percentage of roads with IBR numbers of 10, 9, and 8; roads with IBR numbers of 7, 6, and 5; and IBR numbers of 4, 3, 2, and 1.

Figure 21, Figure 22, and Figure 23 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 21: 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 the City of TC are shown.

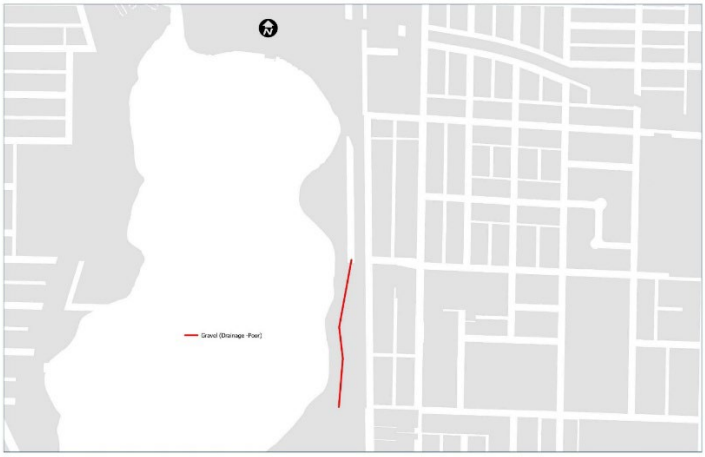


Figure 22: Map of the current IBR for drainage adequacy with good (2’ or more) shown in green, fair (0.5’ to less than 2’) shown in orange, and poor (less than 0.5’) shown in red. Only unpaved roads owned by the City of TC are shown.

Figure 23: 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 the City of TC are shown.

Residential and Commercial Alleys (Special Assessment Assets)

The City of Traverse City maintains approximately 10 miles of residential and commercial alleys that provide secondary access to properties throughout the community. While these alleys are part of the City's overall transportation system, they are managed under a different policy and funding framework than paved and unpaved city major and city local streets.

In accordance with the City's adopted Infrastructure Strategy Policy, alley improvements are not funded through the City's pavement program. Instead, all alley improvements are completed through special assessment, with costs shared between the City and adjacent property owners. Only petitioned alley improvements with majority property owner support are considered for construction, and commercial users may be assessed at a higher proportion based on benefit received, as determined by the City Assessor.

Because alley improvements are initiated through a petition and special assessment process, alleys are not included in the pavement condition modeling, funding analyses, planned project lists, or gap analyses presented in this Pavement Asset Management Plan. Their exclusion from these analyses should not be interpreted as a lack of condition awareness, but rather as a reflection of the City's adopted infrastructure funding strategy.

The condition of alleys is monitored to support informed decision-making when petitions are received and to assist property owners in understanding the potential scope and cost of improvements. Documentation of alley conditions also supports long-term infrastructure planning and helps ensure transparency regarding assets that fall outside the City-funded pavement program. Figure 24 shows the PASER ratings for City Alleys.

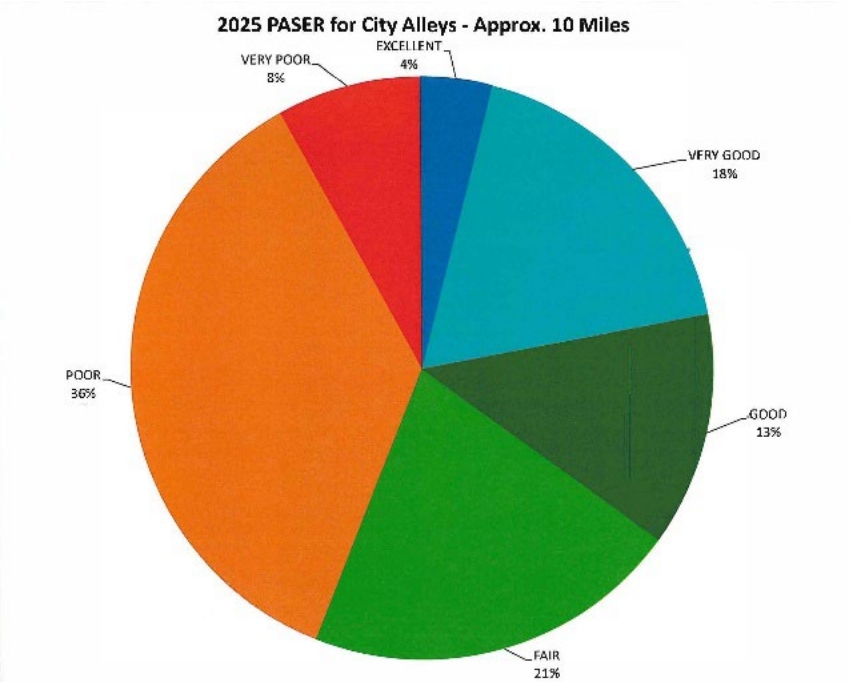


Figure 24: 2025 alley PASER ratings

Goals

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

The pavement condition goals shown below are based on a combination of industry best practices and the expectations of the community. These goals were informed by a review of targets used by peer agencies across Michigan, as well as staff's professional assessment of what level of service aligns with community expectations in Traverse City.

At a minimum, the City of TC's objective is to maintain current pavement conditions or improve them over time. Allowing overall network condition to decline would result in higher long-term costs, reduced service levels, and greater disruption to the public. Asset management best practices consistently demonstrate that preserving roads in good and fair condition is more cost-effective than allowing them to deteriorate into poor condition and require costly reconstruction. For this reason, maintaining or improving condition is not only a goal, but a necessary strategy for responsible asset management.

Goals for Paved City Major Roads

The overall goal for the City of TC's paved city major road network is to maintain or improve road conditions network-wide at 2025 levels. The baseline condition for this goal is illustrated in Figure 25.

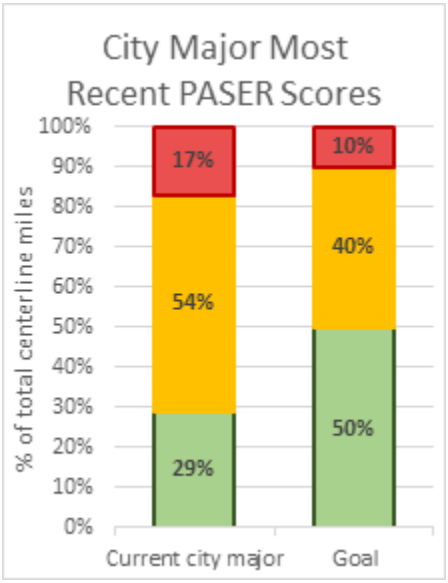


Figure 25: The City of TC's 2025 major road network condition by percentage of good/fair/poor

The City of TC's network-level pavement condition strategy for paved city major roads is:

1. Prevent its good and fair (PASER 10 - 5) paved city major from becoming poor (PASER 4 - 1). This means preventing them from falling below a 5.
2. Move 7 percent of paved city major roads out of the poor category which will entail reconstruction.

Goals for Paved City Local Roads

The overall goal for the City of TC's paved city local road network is to maintain or improve road conditions network-wide at 2025 levels. The baseline condition for this goal is illustrated in Figure 26.

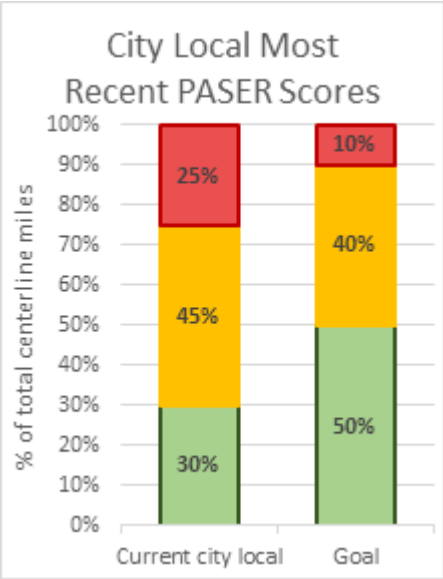


Figure 26: The City of TC 2025 paved city local road network condition by percentage of good/fair/poor

City of TC's network-level pavement condition strategy for paved city local roads is:

1. Prevent its good and fair (PASER 10 - 5) paved city local roads from becoming poor (PASER 4 - 1). This means preventing them from falling below a 5.
2. Move 15 percent of paved city local roads out of the poor category which will entail many miles of reconstruction.

Goals for Unpaved Roads

The overall goal for the City of TC's unpaved road network is to maintain or improve road conditions network-wide at 2025 levels until the end goal of paving the last one is achieved.

The City of TC has been actively working towards the goal of paving 100% of our unpaved roads. However, until then our year-round unpaved roads will be maintained at their current structural adequacy assessments and current drainage adequacy assessments for roads where these two IBR elements are assessed as good or fair. Currently, 100 percent of the City of TC's year-round unpaved roads have good or fair structural adequacy and 100 percent have good or fair drainage adequacy.

Modelled Trends

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

The City of TC 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 the City of TC'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). 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 is a guide for identifying potential projects; however, it should not be the sole criteria for pavement treatment selection. Other information such as future development, traffic volume, emergency routes, utility projects, and budget plays a role in project selection.

Roadsoft Pavement Condition Forecast to Forecast Future Trends

City of TC uses Roadsoft, an asset management software suite, to manage road-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.

Paved City Major Roads

Table 1 illustrates the network-level model inputs for Roadsoft on the paved city major road network. Other pavement types in this network were neglected due to their small numbers relative to HMA pavements. The treatments outlined in Table 1 are the average treatment volume of planned projects scheduled to be completed in 2025-2028. See Appendix A of this plan for details on planned projects.

Table 1: Roadsoft Modelled Trends, Planned Projects, and Gap Analysis for City of TC's Road Assets—Modelled Trends: Roadsoft Annual Work Program for the Paved City Major Road Network Forecast

Treatment Name	Annual Miles of Treatment	Years of Life	Trigger-Reset
Crack Seal	6	1	7,8,9–7,8,9
Cape Seal	1	8	5, 6-9
Mill & Fill	0	10	4 - 9
Reconstruction	0	25	1,2,3-10

Results from the Roadsoft network condition model for the city major roads are shown in Figure 27. The Roadsoft network analysis of the City of TC's planned projects from its currently available budget does allow the City of TC to reach its pavement condition goals for major roads given the projects planned for the next three years.

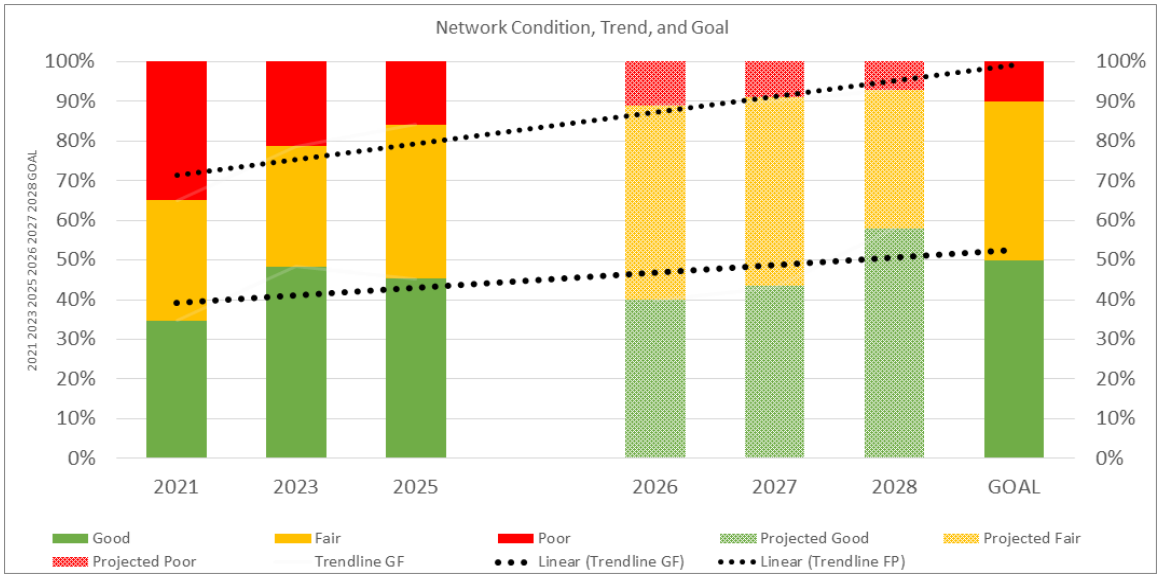


Figure 27: Forecast good/fair/poor changes to the City of TC network condition from planned projects on the city major road network.

Paved City Local Road

Table 2 illustrates the network-level model inputs for Roadsoft on the paved city 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 2 are the average treatment volume of planned projects scheduled to be completed in 2025-2028.

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

Treatment Name	Annual Miles of Treatment	Years of Life	Trigger-Reset
Crack Seal	6	1	7,8,9–7,8,9
Cape Seal	4	8	5, 6-8
Mill & Fill	0	10	4 - 9
Reconstruction	0	25	1,2,3-10

Results from the Roadsoft network condition model for the paved city local roads are shown in Figure 28. The Roadsoft network analysis of City of TC's planned projects from its currently available budget does not allow City of TC to reach its pavement condition goal for local roads given the projects planned for the next three years.

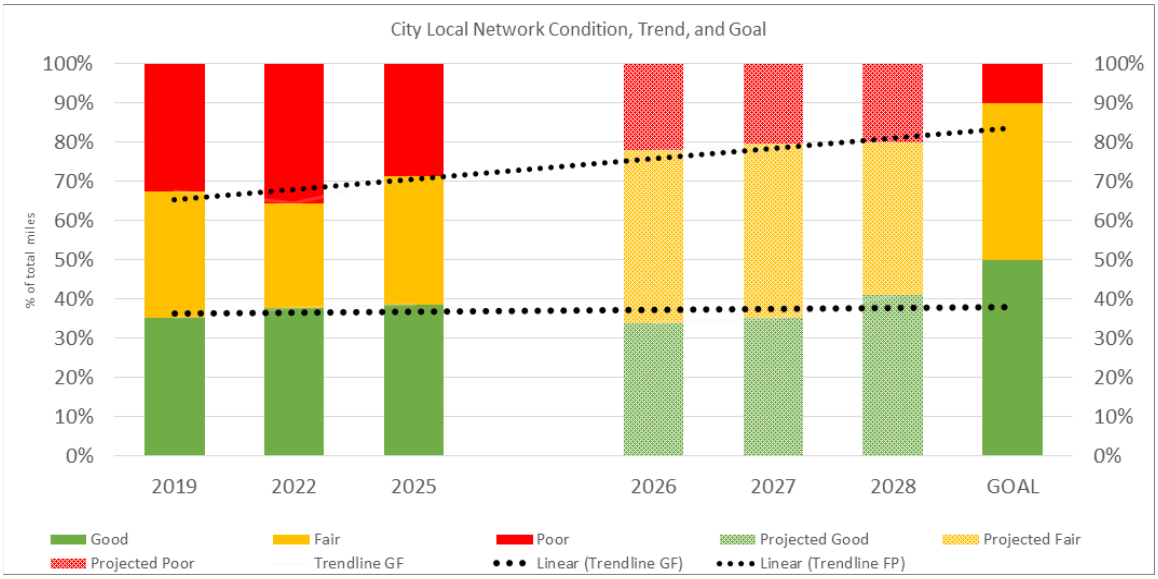


Figure 28: Forecast good/fair/poor changes to City of TC network condition from planned projects on the paved city local road network.

The City of TC's pavement network, particularly the local road system, has generally remained stable with only modest improvement over time. While the major road network experienced more noticeable gains in overall condition since approximately 2021, the local road network improved at a slower rate due to funding limitations and increasing project complexity.

The Roadsoft model results shown in Figure 28 reflects these same trends. Under the current funding levels and planned mix of fixes, the model indicates that the overall condition of the local road network is expected to slightly decline or remain relatively flat over the forecast period rather than improve. This occurs because the amount of work being completed is not sufficient to fully offset the natural deterioration of pavements over time.

The projected decrease (or lack of improvement) in condition is primarily due to the following factors:

- Insufficient treatment levels relative to network needs: Although the City is applying preventive maintenance treatments such as crack sealing and cape seals, the model shows that there is little to no reconstruction or mill & fill work planned for local roads. These lower-cost treatments help slow deterioration but do not significantly improve roads that are already in poor condition.
- Backlog of poor-condition roads: A portion of the local network is already in poor condition, and without enough reconstruction funding, these roads continue to deteriorate faster than they can be improved. This contributes to a gradual shift of roads from fair to poor over time.
- Budget constraints and completing project costs: As discussed in earlier sections, local road projects often include additional costs such as utility coordination, drainage improvements, and

multimodal accommodations. These factors reduce the number of pavement-focused projects that can be completed, limiting overall condition gains.

- Preventive maintenance-focused strategy: The City of TC has prioritized preserving fair-condition roads to prevent further decline, which helps stabilize the network but does not substantially increase the percentage of roads in good condition. This strategy aligns with asset management best practices but results in slower visible improvement at the network level.

The decrease (or limited improvement) in condition shown in Figure 28 is therefore not unexpected – it reflects the gap between current funding levels and the level of investment required to both preserve existing roads and significantly improve those already in poor condition.

Planned Projects

City of TC works to plan 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 city major road network. This includes planning and programming requirements from state and federal agencies that must be met prior to starting a project and can include studies on environmental and archeological impacts, review of construction and design documents and plans, documentation of rights-of-way ownership, planning and permitting for storm water discharges, and other regulatory and administrative requirements.

Per PA 499 of 2002 (later amended by PA 199 of 2007), road projects for the upcoming three years are required to be reported annually to the TAMC. Planned projects represent the best estimate of future activity; however, changes in design, funding, and permitting may require City of TC to alter initial plans. Project planning information is used to predict the future condition of the road networks that City of TC 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 2026-2029, City of TC plans to do the following projects:

Paved City Major Projects

City of TC is currently planning the construction and maintenance projects listed in Appendix A for the paved city major road network. The locations of these projects are shown in Figure 30, and the total cost of these projects is approximately $3,427,000.

Paved City Local Projects

City of TC is currently planning the construction and maintenance projects listed in Appendix B for the paved city local road network. The locations of these projects are shown in Figure 30, and the total cost of these projects is approximately $2,304,500.

Unpaved Road Projects

City of TC is not currently planning and construction projects for unpaved roads as there is only one and it is adjacent to a new development. This road will not be considered as a project until the development is completed, and no construction equipment will be using it.

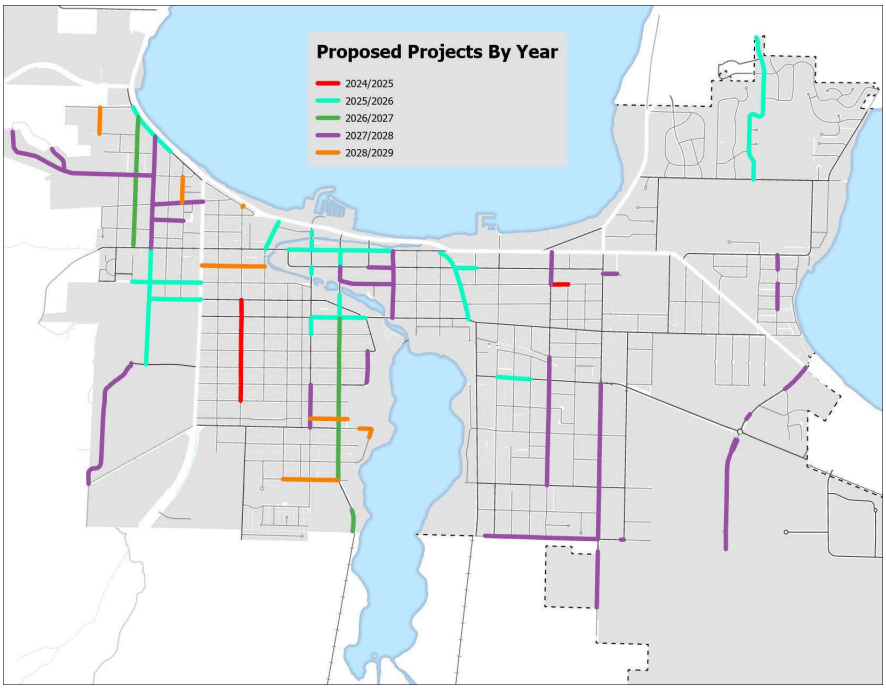


Figure 29: Map showing proposed road projects planned for 2026/27 through 2028/29

Gap Analysis

The analysis presented in the Modelled Trends section demonstrates that current funding levels are not sufficient to fully achieve these goals, particularly for the paved city local road network. While the City of TC has been successful in slowing deterioration through a preservation-focused approach, available resources limit the ability to perform the level of reconstruction and rehabilitation needed to significantly reduce the number of roads in poor condition.

As a result, a gap exists between:

- The desired condition outcome of maintaining or improving overall network condition, and
- The projected outcome under current funding results in stabilization in some areas and gradual decline in others.

This gap is further influenced by increasing constructions costs and the need to incorporate multimodal improvements, which further limits the number of pavement-focused projects that can be completed annually.

Closing this gap will require a combination of increased investment, continued prioritization of cost-effective treatments, and coordination with other infrastructure initiatives. Without these adjustments, portions of the network-particularly roads currently in fair or poor condition-are expected to decline over time.

Ultimately, this gap analysis reinforces a key principle of asset management: the level of investment directly determines the long-term condition of the network. Maintaining or improving current conditions will require sustained and potentially increased funding aligned with the City of TC's established goals and community expectations.

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, City of TC 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 city major road network, the paved city local road network, and the unpaved road network:

Roadsoft Pavement Condition Forecast for the Paved City Major and City Local Network

The City of TC used Roadsoft to forecast the necessary additional construction and maintenance work for meeting agency goals on the paved city major and city local road networks. Table 3 and Table 4 illustrate the network-level model inputs used for this simulation.

Table 3: Roadsoft Modelled Trends, Planned Projects, and Gap Analysis for City of TC's Road Assets—Pavement Condition Forecast and Gap Analysis: Roadsoft Annual Work Program for Paved City Major Road Network Forecast

Pavement Condition Forecast			
Treatment Name	**Annual Miles of Treatment**	**Years of Life**	**Trigger-Reset**
Crack Seal	3	1	7,8,9–7,8,9
Cape Seal	3	8	5, 6-8
Mill & Fill	1	10	4 - 9
Reconstruction	0	25	1,2,3-10
Additional Work Necessary to Overcome Deficit			
Treatment	**Annual Miles of Treatment**	**Years of Life**	**Trigger-Reset**
Crack Seal	13	1	7,8,9–7,8,9
Cape Seal	5	8	5, 6-8
Mill & Fill	1	10	4 - 9
Reconstruction	3	25	1,2,3-10

Table 4: Roadsoft Modelled Trends, Planned Projects, and Gap Analysis for City of TC's Road Assets—Pavement Condition Forecast and Gap Analysis: Roadsoft Annual Work Program for Paved City Local Road Network Forecast

Pavement Condition Forecast			
Treatment Name	**Annual Miles of Treatment**	**Years of Life**	**Trigger-Reset**
Crack Seal	6	1	7,8,9–7,8,9
Cape Seal	1	8	5, 6-8
Mill & Fill	1	10	4 - 9
Reconstruction	1	25	1,2,3-10
Additional Work Necessary to Overcome Deficit			
Treatment	**Annual Miles of Treatment**	**Years of Life**	**Trigger-Reset**
Crack Seal	22	1	7,8,9–7,8,9
Cape Seal	7	8	5, 6-8
Mill & Fill	2	10	4 - 9
Reconstruction	9	25	1,2,3-10

Results for the paved city local and major road network from the Roadsoft network condition model given the inputs in Tables 3 and 4 indicate that the necessary additional work needed to meet the agency condition goal would cost an additional $44,240,563.

The condition trends shown in the previous sections reflect the results of the Roadsoft model and demonstrate how the transportation network is expected to perform overtime under current funding levels and treatment strategies. Overall, the model shows that pavement conditions remain relatively stable in the short term due to City of TC's continued focus on preventative maintenance and capital investment; however, portions of the network are projected to gradually decline as aging infrastructure continues to outpace available funding.

Where the model shows decreases in overall network condition, the primary cause is the limited ability to address roads that are already in fair or poor condition before further deterioration occurs. Ass pavements age, deterioration accelerates and treatment costs increase significantly. Current funding levels are sufficient to preserve many roads that are in good condition, but they are not adequate to fully rehabilitate or reconstruct all roads reaching the end of their service life. As a result, some segments continue to decline over the modeled period.

The model also reflects increases or stabilization in condition within portions of the network where preventative maintenance treatments are applied at the appropriate time. Activities such as crack sealing, overlays, and surface preservation help extend pavement life and slow deterioration at a lower cost than reconstruction. These strategies improve the overall efficiency of the pavement program and allow the City of TC to maintain a larger portion of the network in fair to good condition.

Additional factors influencing condition trends include inflation in construction costs and the inclusion of multimodal improvements such as bicycle and pedestrian accommodations within roadway projects. While these improvements provide important community benefits, they also increase project costs and reduce the total number of roadway segments that can be addressed each year.

Overall, the Roadsoft model indicates that the City of TC's current asset management strategy is helping to slow system-wide deterioration; however, without additional investment, portions of the network will continue to experience gradual declines in condition over time.

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. The City of TC 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.traversecitymi.gov/government/city-departments/treasurer/ or by request submitted to our agency contact (listed in this plan).

The City of TC has a total annual budget for pavement asset management of $2,000,000, on average over the last 9 years.

City Major Network

The City of TC has historically spent $460,153 annually on pavement-related projects. Over the next three years, the City of TC plans to spend $1,380,458 on city major-network projects consisting of, but not limited to, reconstruction, overlay, culvert replacement, and preventive maintenance. Spending on projects depends on revenue from Michigan Transportation Fund (MTF), millages, and federal/state programs.

City Local Network

The City of TC has historically spent $1,167,300 annually on pavement-related projects. Over the next three years, the City of TC plans to spend $3,501,900 on city local-network projects consisting of, but not limited to, reconstruction, overlay, culvert replacement, and preventive maintenance. Spending on projects depends on revenue from Michigan Transportation Fund (MTF), millages, and federal/state programs Many local agencies in Michigan use local tax millages to supplement their road-funding budget. These taxes can provide for additional construction and maintenance for new or existing roads that are also funded using MTF or MDOT funds. The City of TC's funding sources include contributions from the City's General Operating Fund, State Metro Authority Fee contributions, a share of the County Wide Road Millage Dollars, and when available Tax Increment Financing (TIF) contributions; however, it does not have local tax millages in its road-funding budget.

3. RISK OF FAILURE ANALYSIS

Determining the roads most critical to system operation allows for risk management, support for Capital Improvement Plans (CIP), and efficiently allocating Operation & Maintenance (O&M) funds. The two key factors used to determine Risk of Failure are Probability of Failure (PoF) and Consequence of Failure (CoF). PoF and CoF are multiplied to determine the Risk of Failure (RoF) as shown in the figure below (Figure 31).

Taking this information along with other information like budget and other infrastructure projects allows creation of a process that prioritizes projects while being repeatable. The City of TC uses the following process, which was introduced to our commission at the May 19, 2025, study session.

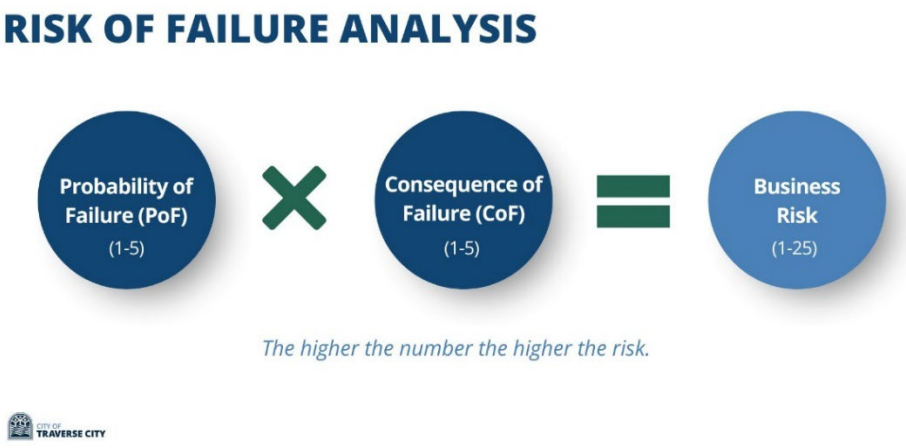


Figure 30: Risk of Failure Analysis Calculation

Probability of Failure (PoF)

The likelihood that a road will fail is the common way to change the total risk that roads pose to the City. While changing the consequence of failure usually requires a redesign of a network or complete changes to the roads in use, likelihood can be changed more easily. Likelihood can be changed by rebuilding an asset or improving maintenance procedures. The successful application of preventive maintenance can also reduce the likelihood of failure. These are all things that can be done without the need for major asset replacement or network redesigns.

PoF measures the likelihood that a pavement segment will deteriorate to a point of functional or structural failure within a given time frame if no action is taken. The City of TC has been using the PASER system for many years to condition assess the road network and ratings are based on the type of treatment needed to extend life. Therefore, the use of this data, which is an industry standard condition assessment, has been used in the table below to assign the probability of failure rating. (see Table 5)

Table 5: Probability of Failure Ratings

PoF Rating	PASER Rating	Description
0	10	None
1	9	Improbable
2	8 - 7	Remote, unlikely but possible
3	6 - 5	Possible
4	4 - 3	Probable, likely
5	2 - 1	Imminent, likely in near future

Consequence of Failure (CoF)

The Consequence of Failure (CoF) assesses the impact or severity of a street's failure or deterioration if it is not repaired or maintained in time based on the following factors. The system of interconnecting roads and bridges maintained by the City of TC is designed to be resilient and 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 and/or impede emergency access if unexpectedly closed to traffic. 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 routinely used as alternate routes for high volume roads or roads 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 a large number or large sized businesses will be significantly impacted if a road is unavailable.

These situations along with the National Functional Classification which categorizes public roadways based on the type of traffic service they provide (primarily focusing on access and mobility) into 4 categories: Major Collector, Minor Arterial, Other Principal Arterial and Local and the city's Emergency Routes (Figure 37) were also taken into account when the City of TC created its CoF scale below. Emergency routes were given the heaviest weight since they have been determined to be imperative to effective emergency management.

Table 6: Consequence of Failure Ratings

Classification	CoF Rating
Emergency Route	5
Major Collector*	4
Minor Arterial*	3
Other Principal Arterial*	2
Local*	1

*as per the National Function Classifications

City of TC's road network includes the following critical assets: see Figure 31 below.

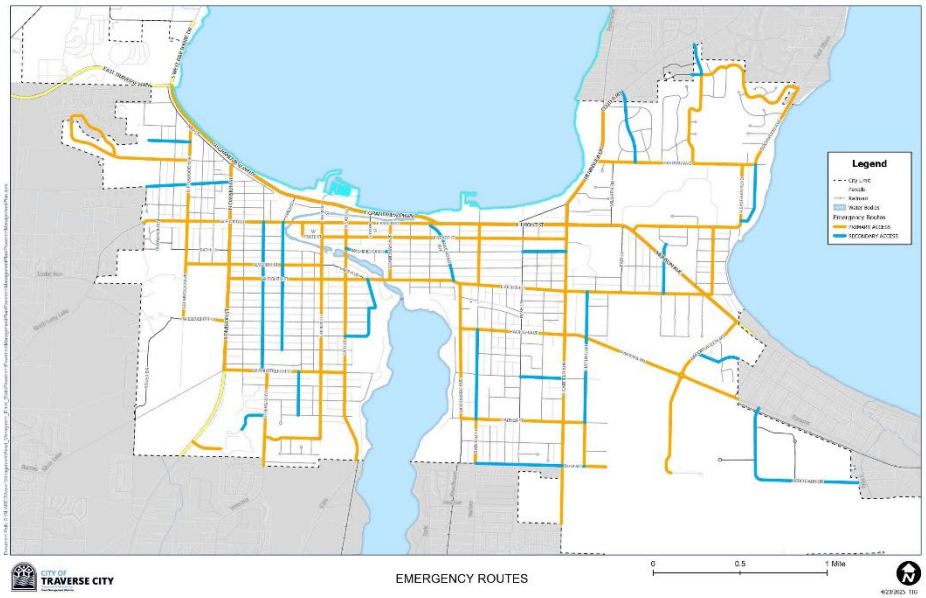


Figure 31: Emergency Routes (Primary and Secondary) are key transportation links in the City of TC's road network.

4. COORDINATION WITH OTHER ENTITIES

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

The City of TC maintains drinking water, sanitary and storm sewer assets in addition to transportation assets. The City of TC follows an asset management process for all of its assets by coordinating the upgrade, maintenance, and operation of all major assets.

Planned projects for subsurface infrastructure that the City of TC owns are listed in the following asset management plans: Water System Asset Management Plan, Wastewater Asset Management Plan, Stormwater Asset Management Plan (available on our website). These three sub-surface utility plans are coordinated with the transportation infrastructure plans to maximize value and minimize service disruptions and cost to the public.

The City of TC takes advantage of coordinated infrastructure work to reduce cost and maximize value using the following guiding principles:

- 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 40 years of remaining service life.

APPENDIX A: 2026 - 2029 PAVED CITY MAJOR ROAD PLANNED PROJECTS

ROAD NAME	FROM	TO	TREATMENT	MILES
2025/2026				
6th St	Beaumont St	Division St	Cape Seal	0.29
8th St	Union St	Lake Ave	Cape Seal	0.236
Bay St	M-72	Spruce St	Cape Seal	0.38
Cass St	N. Cass St Bridge	State St	Cape Seal	0.225
Cass St	S. Cass St Bridge	8th St	Cape Seal	
Elmwood Ave	Front St	11th St	Mill & Fill/Cape Seal	0.562
Front St	Pine St	Boardman Ave	Cape Seal	0.506
Hall St	Grandview PKWY	W Front St	Cape Seal	0.15
Hannah Ave	Barlow St	Bates St	Cape Seal	0.161
Railroad Ave	Franklin St	8th St	Cape Seal	0.361
State St	Railroad Ave	Hope St	Cape Seal	0.101
Union St	8th St	9th St	Cape Seal	0.396
Union St	Garland St	S. Union St Bridge	Cape Seal	
2026/2027				
Cass St	City Limit	Condition Change	Mill & Fill	**0.881**
Cass St	17th St	Condition Change South of Eighth St Intersection	Mill & Fill	
2027/2028				
Airport Access Rd	Laner split North of Roundabout	Indian Trail	Cape Seal	**0.176**
Airport Access Rd	Westminster	Munson Ave	Cape Seal	
Boardman Ave	Eighth St	Front St	Reconstruction	**0.322**
Boon	Condition Change West of Hastings	Hastings	In-House Mill & Fill	**0.015**
Cass St	Washington St	State	Mill & Fill	**0.065**
Lake Ave	12th St	10th St	In-House Mill & Fill	**0.152**
N Elmwood Ave	Front St	Bay St	Cape Seal	**0.537**
Rose St	Baldwin	Boyd	Cape Seal	**0.9**
Rose St	Washington St	Front St	Cape Seal	
Garfield Ave	City/Twp Line	Condition Change Near entrance to Serra	Cape Seal	**1.012**
Garfield Ave	Boon St	Hannah Ave	Cape Seal	
S Union St	14th St	12th St	Cape Seal	**0.207**
Silver Dr	Silver Lake Rd	11th st	Cape Seal	**0.673**
2028/2029				
Washington St	Boardman Ave	Cass St	Reconstruction	**0.260**
E State St	Park St	Boardman Ave	Reconstruction	**0.120**

APPENDIX B: 2026 - 2029 PAVED CITY LOCAL ROAD PLANNED PROJECTS

ROAD NAME	FROM	TO	TREATMENT	MILES
2025/2026				
Huron Hills Dr	Arrowhead Dr	Center Rd	Cape Seal	**0.299**
Quail Ridge Dr	Eastern Ave	Arrowhead Dr	Cape Seal	**0.461**
2026/2027				
N Monroe St	Front St	Bay St	Reconstruction	**0.618**
2027/2028				
Airport Access Rd	Dead End	Great Lakes Central Railroad	Cape Seal	**0.597**
Boon St	Garfield Ave	Barlow St	Cape Seal	**0.499**
Boon St	Alley East of Woodmere Ave	Woodmere Ave	Cape Seal	**0.044**
Incochee Rd	Wayne/Incochee Intersection	Condition Change	Cape Seal	**0.128**
Incochee Rd	Condition Change	City Limit	Cape Seal	
Randolph St	Division St	N. Elmwood Ave	Cape Seal	**0.244**
Wayne St	N Elmwood Ave	Wayne/Incochee Intersection	Cape Seal	**0.783**
Wenonah St	Senica	Iroquois	Cape Seal	**0.195**
Wenonah St	Shawnee	E Front St	Cape Seal	
West Civic Center Dr	Garfield Ave	East to start of sidewalk on south side	Cape Seal	**0.068**
Boon St	Alley West of Barlow St	Barlow St	In-House Mill & Fill	**0.045**
2nd St	Cedar St	N. Elmwood Ave	In-House Mill & Fill	**0.152**
2028/2029				
Cherokee St	Willow St	Ramsdell St	In-House Mill & Fill	**0.127**
Cedar St	Randolph St	Wayne St	Mill & Fill	**0.125**
5th St	Wadsworth St	Division St	Mill & Fill	**0.303**
E 14th St	Condition Change West of Great Lake Railroad	Lake Ridge Dr	In-House Mill & Fill	**0.059**
17th St	Cass St	Pine St	Mill & Fill	**0.267**
E Griffin St	Union St	Terminus East of Cass St	In-House Mill & Fill	**0.180**
Lake Ridge Dr	Lake Ridge Cir	E 14th St	In-House Mill & Fill	**0.041**
N Oak St	Grandview PKWY	Bay St	In-House Mill & Fill	**0.008**