City of Rochester Hills 2024 Transportation Asset Management Plan

A plan describing the City of Rochester Hills' transportation assets and conditions.

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EXECUTIVE SUMMARY

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

This plan identifies Rochester Hills' assets and condition and how Rochester Hills maintains and plans to improve the overall condition of those assets. An asset management plan is required by Michigan Public Act 325 of 2018, and this document represents fulfillment of Rochester Hills' obligations towards meeting these requirements. However, this plan and its supporting documents are intended to be much more than a fulfillment of required reporting. This asset management plan helps to demonstrate Rochester Hills' responsible use of public funds by providing elected and appointed officials as well as the general public with the inventory and condition information of Rochester Hills' assets. It gives taxpayers the information they need to make informed decisions about investing in Rochester Hills' essential transportation infrastructure.

Of Rochester Hills' 268 miles of road, 47 miles are classified as city major and 221 miles are classified as city local. Rochester Hills does not manage any roads that are classfiied as part of the National Highway System (NHS). The NHS is subject to special rules and regulations and has its own performance metrics dictated by the FHWA. In addition, Rochester Hills has 21 miles of unpaved roads.

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

Currently, the city major network has 42% of its roads in good condition, 38% in fair condition, and 21% in poor condition, and the city local network has 28% of its roads in good condition, 59% in fair condition, and 13% in poor condition. Rochester Hills' long-range goal for the city major network is to have 42% of roads in good condition, 41% in fair condition, and 19% in poor condition, and for the city local network is to have 26% of roads in good condition, 63% in fair condition, and 11% in poor condition.

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

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 Rochester Hills is supported in its use of asset management principles and processes by the Michigan Transportation Asset Management Council (TAMC), formed by the State of Michigan.

Asset management, in the context of this plan, ensures that public funds are spent as effectively as possible to maximize the condition of the road and bridge network. Asset management also provides a transparent decision-making process that allows the public to understand the technical and financial challenges of managing transportation infrastructure with a limited budget.

The City of Rochester Hills (Rochester Hills) 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. Rochester Hills is responsible for maintaining and operating over 268 centerline miles of roads and 4 bridge structures. It is also responsible for 237 culverts and 13 traffic signals.

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

Questions regarding the use or content of this plan should be directed to Bill Fritz at 1000 Rochester Hills Dr, Rochester Hills, MI 48309 or at (248) 841-2497 and/or fritzb@rochesterhills.org. A copy of this plan can be accessed on our website at https://www.rochesterhills.org.

1. PAVEMENT ASSETS

Rochester Hills is responsible for 268 centerline miles of public roads. An inventory of these miles divides them into different network classes based on road purpose/use and funding priorities as identified at the state level: city major road network, which is prioritized for state-level funding, and city local road network.

Inventory of Assets

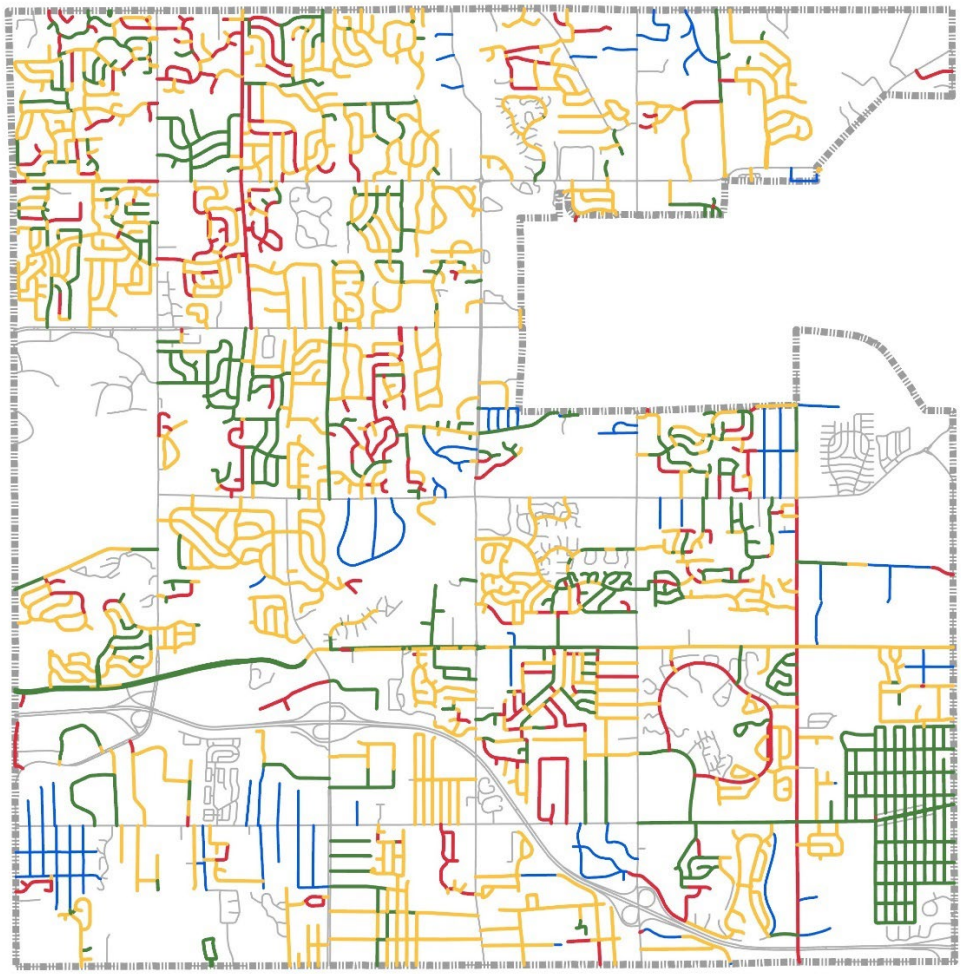


Figure 1: Map Showing Roads Managed by Rochester Hills with Current Pavement Condition

Of Rochester Hills' 268.092 miles of road, 47.126 miles are classified as city major and 220.966 miles are classified as city local. **Figure 1** identifies these paved roads in green for good (PASER 10, 9, 8), yellow for fair (PASER 7, 6, 5), and red for poor (PASER 4, 3, 2, 1) with the colors being determined based on the road segment's condition. Rochester Hills does not manage any roads that are classfiied as part of the National Highway System (NHS). The NHS is subject to special rules and regulations and has its own performance metrics dictated by the FHWA. In addition, Rochester Hills has 20.874 miles of unpaved roads. **Figure 1** identifies these unpaved roads in blue.

More details about these road assets can be found in Rochester Hills' Roadsoft database or by contacting Rochester Hills.

Types

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

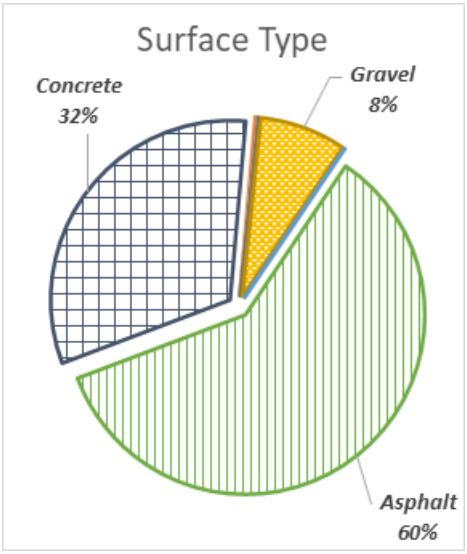


Figure 2: Pavement Type by Percentage Maintained by Rochester Hills

Condition, Goals, and Trend

Paved Roads

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

Currently, the city major network has 42% of its roads in good condition, 38% in fair condition, and 21% in poor condition, and the city local network has 28% of its roads in good condition, 59% in fair condition, and 13% in poor condition (**Figure 3** and **Figure 4**).

Rochester Hills' long-range goal for the city major network is to have 42% of roads in good condition, 41% in fair condition, and 19% in poor condition, and for the city local network is to have 26% of roads in good condition, 63% in fair condition, and 11% in poor condition. **Figure 3** and **Figure 4** illustrate the historical and current condition (solid bars) of Rochester Hills' city major and city local networks, respectively; they also illustrate the projected trend (shaded bars), the overall trend in condition (trendlines), and Rochester Hills' goal (final solid bar).

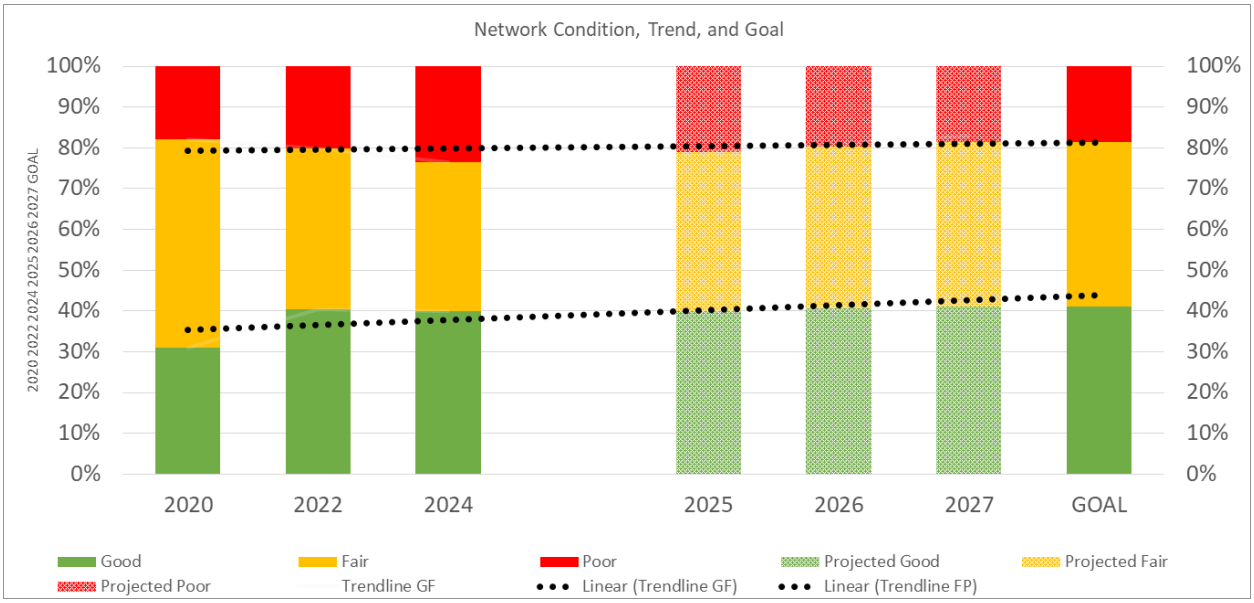


Figure 3: City Major Network Condition, Goals, and Trend

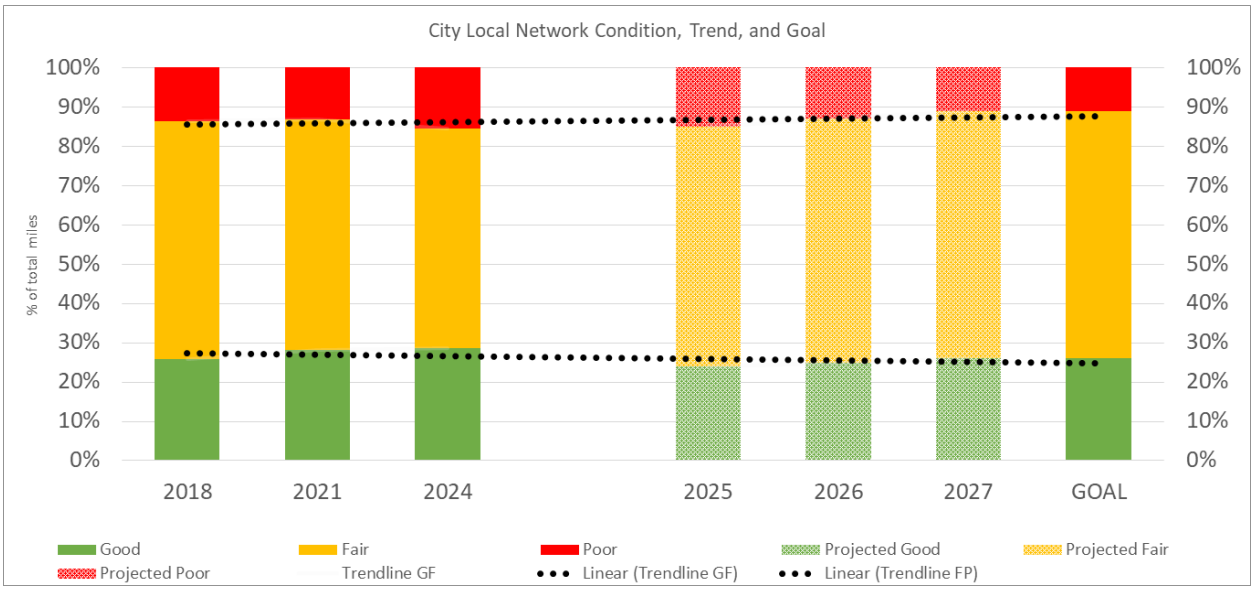


Figure 4: City Local Network Condition, Goals, and Trend

Modelled Trends, Gap Analysis, and Planned Projects

Table 1: Roadsoft Modelled Surface Definitions for Asphalt

Asphalt						
Treatment Name	**Type**	**Min Trigger**	**Max Trigger**	**Reset**	**New Surface**	**Cost/Lane Mile**
Crack Seal	PM (CPM)	6	7	8	No	$7,500.00
Rehabilitation (Mill & Overlay)	RC (SI)	3	5	9	Yes	$350,000.00
Reconstruction	RC (SI)	1	2	10	Yes	$950,000.00

Table 2: Roadsoft Modelled Surface Definitions for Concrete

Concrete						
Treatment Name	**Type**	**Min Trigger**	**Max Trigger**	**Reset**	**New Surface**	**Cost/Lane Mile**
Joint Seal	PM (CPM)	5	7	8	No	$12,500.00
Reconstruction	RC (SI)	1	4	10	Yes	$1,100,000.00

Modelled Trends & Gap Analysis

The Roadsoft network analysis of Rochester Hills' planned projects for the city major and city local networks from Rochester Hills' currently available budget does allow Rochester Hills to reach its pavement condition goals given the projects planned for the next three years. **Tables 1** and **2** list the typical treatments for asphalt and concrete, respectively, that Rochester Hills performs to improve their road network. The Minimum and Maximum Triggers indicate the PASER rating when each treatment should be considered from a modelling (Roadsoft) standpoint. The Reset Value is the expected PASER Rating on the segment when that treatment is implemented.

Results from the Roadsoft for the city major and city local network condition models indicate that the necessary work needed to meet the agency condition goal would cost approximately $10 million per year. **Table 3** shows a breakdown of the total and per year budgets by major vs local roads.

Table 3: City Major and Local Budgets

Road Network	Projected Budget 2024	
	2025 - 2027	Per Year
City Major Network	$11,259,270	$3,753,090
City Local	$19,155,000	$6,385,000
Total	$30,414,270	$10,138,090

Unpaved Road Conditions Trends

Rochester Hills currently does not rate its unpaved roads. The city improves unpaved roads on an as-needed basis to provide service or to address safety concerns. The expected condition trend for the city's unpaved road network will be to improve or maintain at their current condition for the next three years. **Figure 5** shows the locations of the unpaved roads.

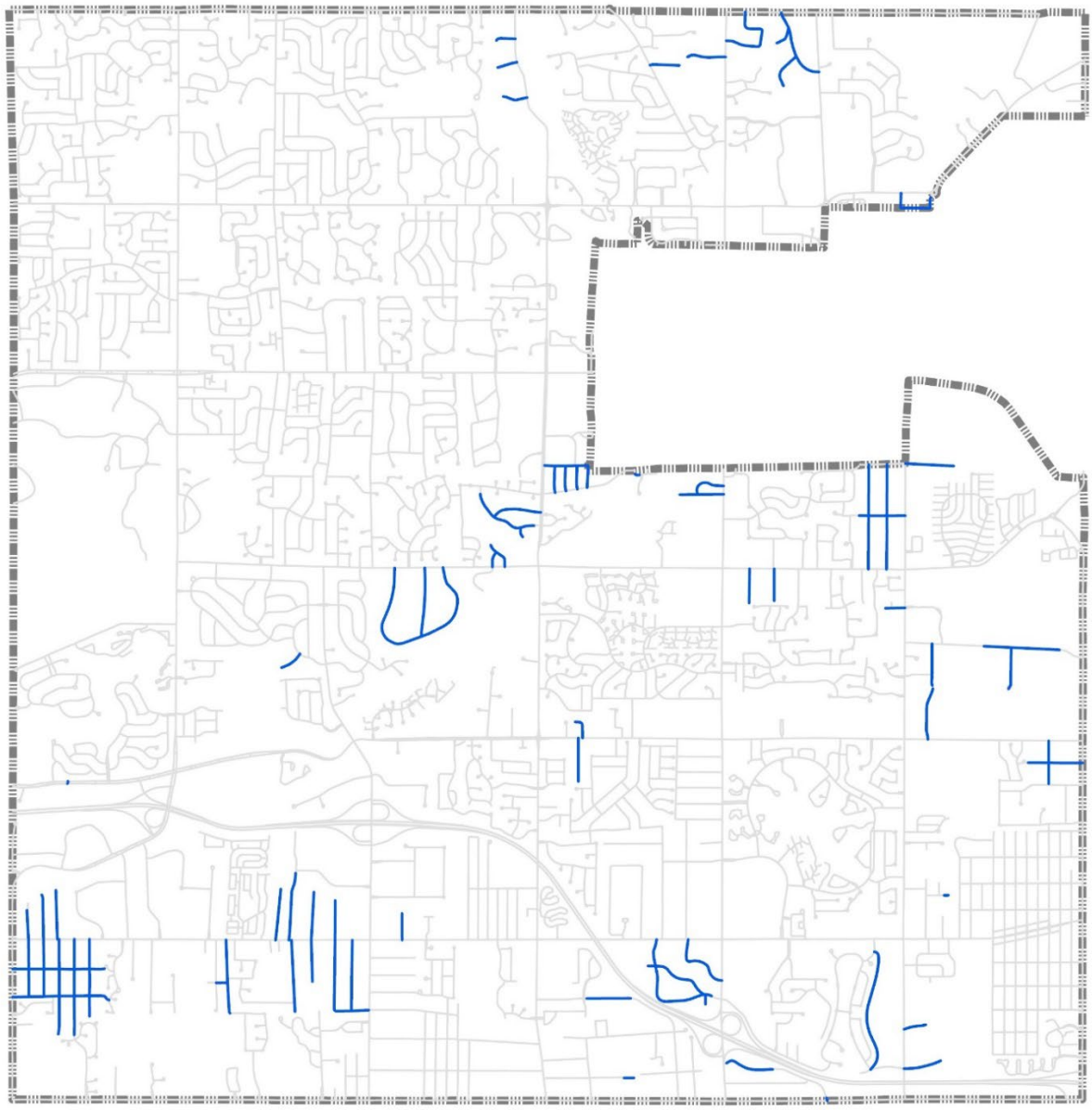


Figure 5: Map of Unpaved Road Locations

Planned Projects

Rochester Hills has projects planned for the next three years. These projects are identified in **Figure 6**. Segments highlighted in blue, green, and brown represent road projects in 2025, 2026, and 2027 in **Figures 6 – 11**, respectively.

Figure 6: Map Illustrating Planned Projects for Pavement Assets

The total cost of the projects illustrated in **Figure 6** is approximately $11.3 million for the city major network and $19.2 million for the city local network. **Table 4** shows a breakdown of the projects reflected in **Figure 6**.

Table 4: Planned Projects for Pavement Assets

Planned Projects for Pavement Assets								
City Road Project	Year	Road Type	City Road Project	Year	Road Type	City Road Project	Year	Road Type
Skyview Sub	2025	Asphalt	Manchester Knolls Sub	2026	Asphalt	Rochester Glens Sub	2027	Asphalt
Ashford Farms Sub	2025	Asphalt	Shadow Woods Sub	2026	Asphalt	Butler Ridge Sub	2027	Asphalt
Rookery Woods	2025	Asphat	Knorrwood Hills	2026	Asphalt	Arcadia Park Sub	2027	Apshalt
Pinetrail sub	2025	Asphalt	Lake Forest (Ct & Dr)	2026	Concrete	Nawakwa Rd	2027	Asphalt
Pheasant Ring Dr	2025	Concrete	Kentucky Dr	2026	Concrete	Lake Forest (Ct & Dr)	2027	Concrete
Eagle Dr	2025	Concrete	Grovecrest	2026	Concrete	Fox Woods Ln	2027	Concrete
Independence Dr	2025	Concrete	River Bend Dr	2026	Concrete	Forest View Ct	2027	Concrete
Cedar Shake Dr	2025	Concrete	Ravine Terrace	2026	Concrete	Woodfield Way	2027	Concrete
Lakewood Dr	2025	Concrete	Brompton Rd	2026	Concrete	Ten Point Dr	2027	Concrete
Norton Rd	2025	Concrete	Tanglewood Dr	2026	Concrete	Rocky Crest Dr	2027	Concrete
Flanders Dr	2025	Concrete						
Spartan Dr	2025	Concrete						
Langley Dr	2025	Concrete						
Sugar Pine Rd	2025	Concrete						

Figures 7 – 11 breaks down the projects by year and major vs local.

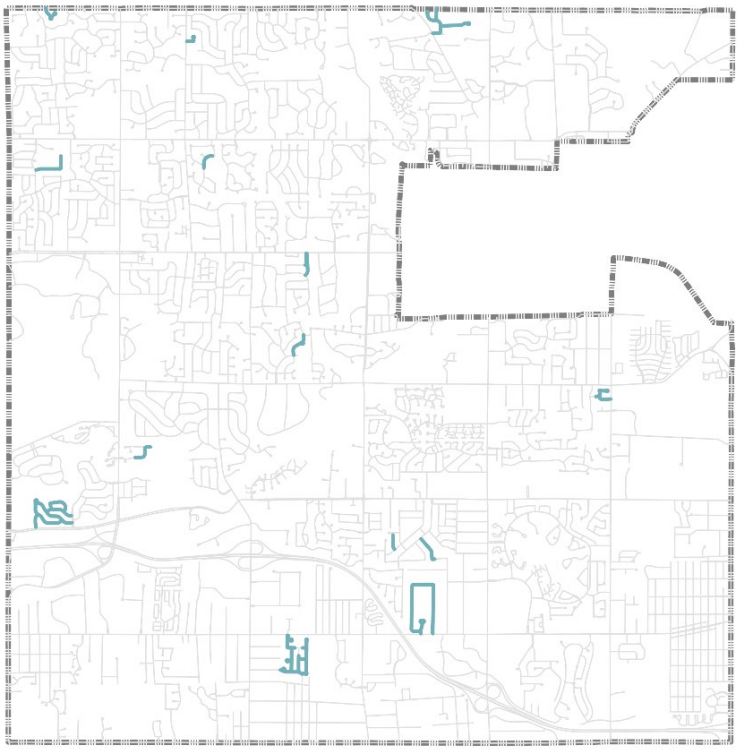


Figure 7: Map Illustrating Planned Projects for 2025 City Local Roads

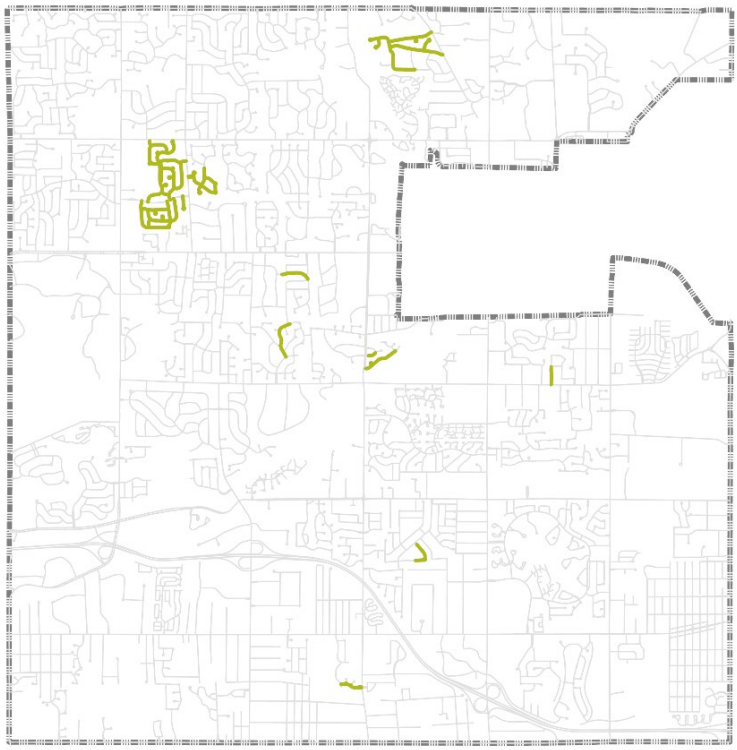


Figure 8: Map Illustrating Planned Projects for 2026 City Local Roads

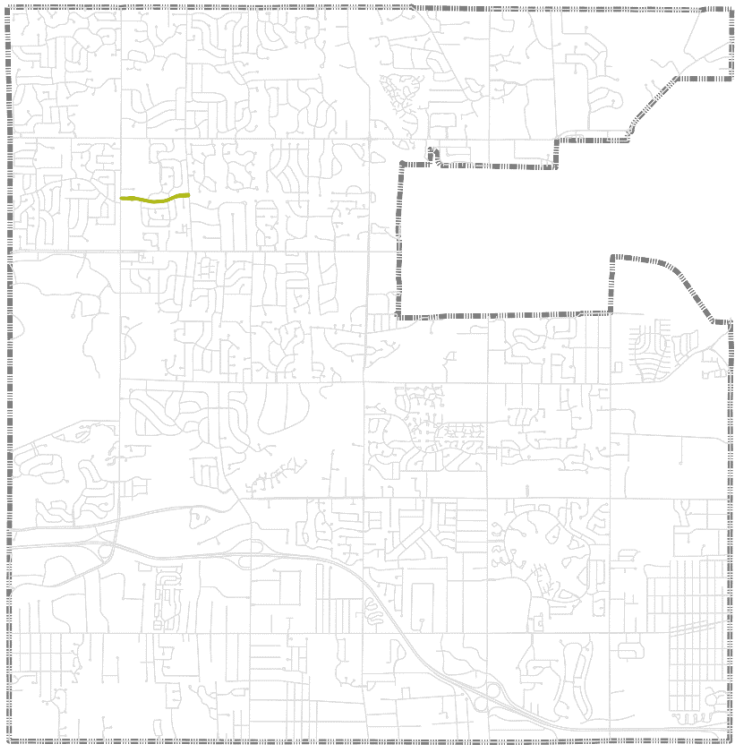


Figure 9: Map Illustrating Planned Projects for 2026 City Major Roads

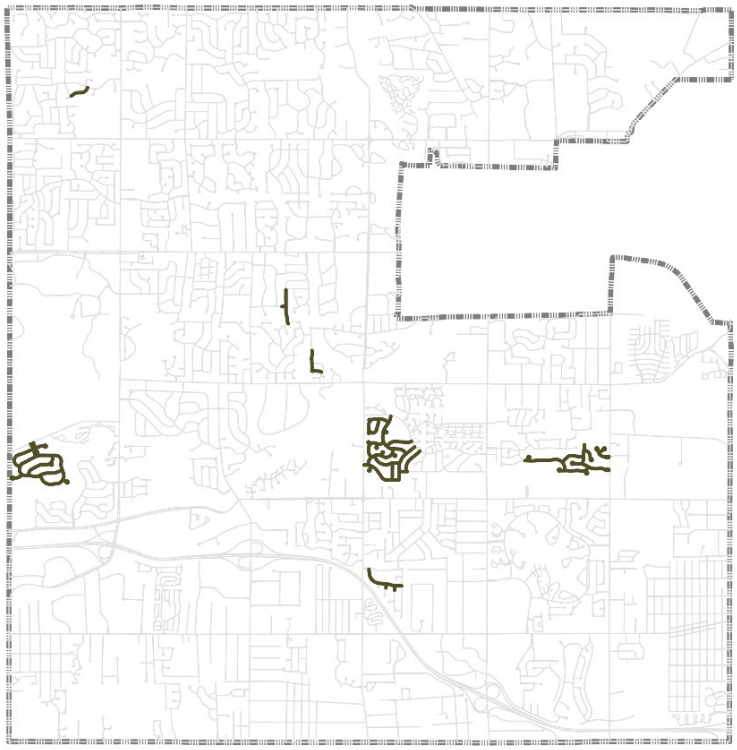


Figure 10: Map Illustrating Planned Projects for 2027 City Local Roads

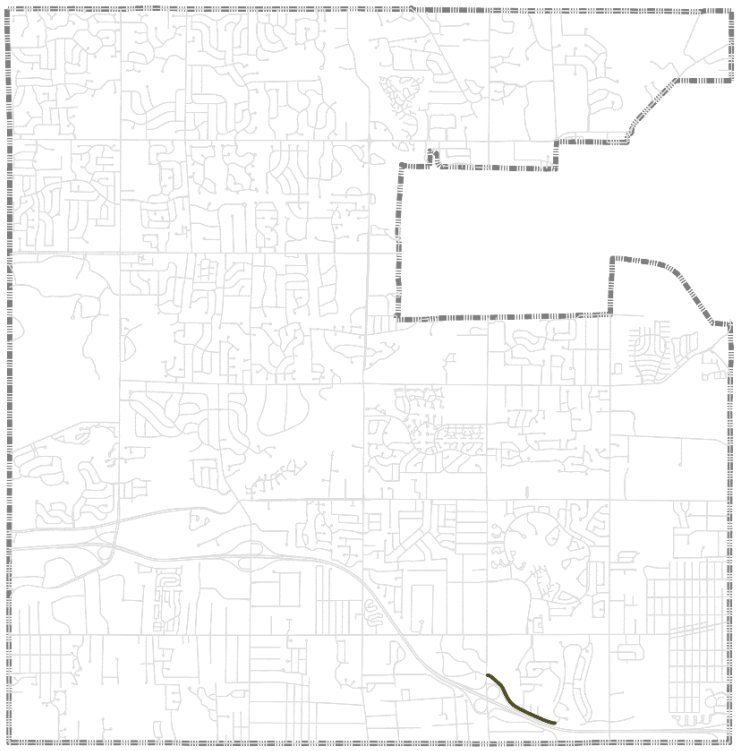
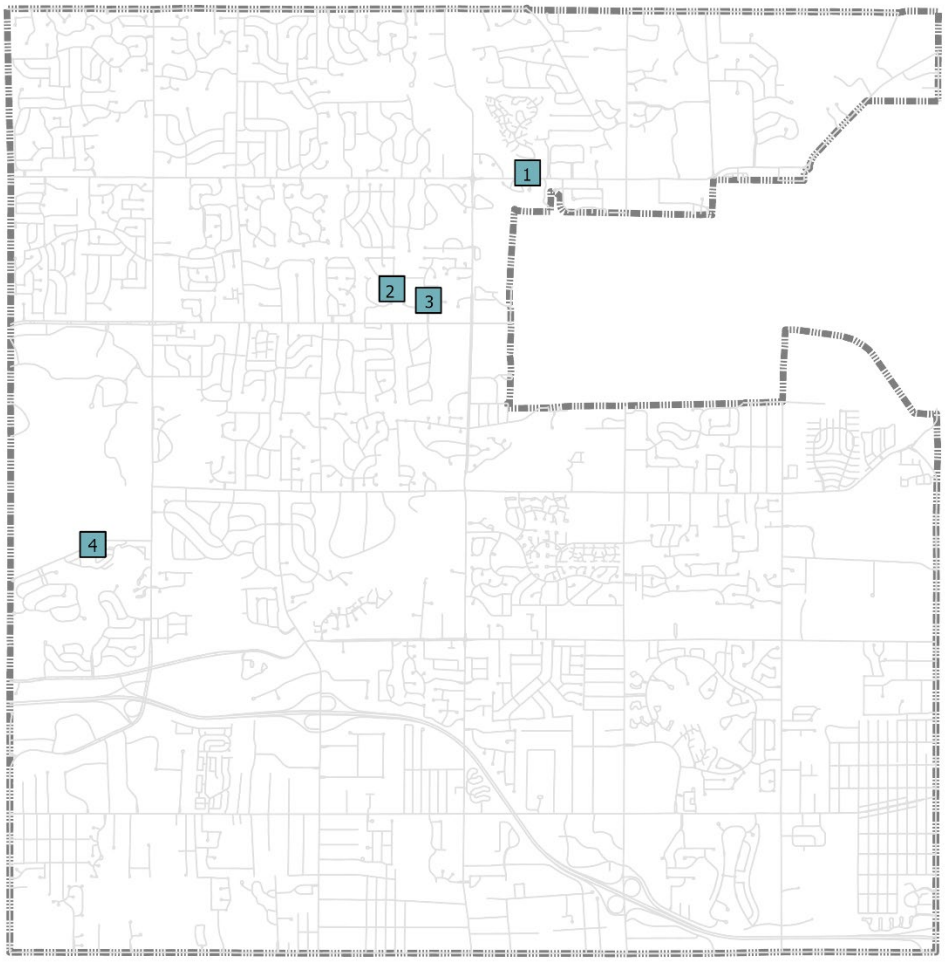


Figure 11: Map Illustrating Planned Projects for 2027 City Major Roads

2. BRIDGE ASSETS

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

Inventory of Assets



Bridge	ID
Kings Cove Rd	1
Shagbark Rd	2
Rochdale Rd	3
Butler Rd	4

Figure 12: Map Illustrating Locations of Rochester Hills' Bridge Assets

Rochester Hills has four total bridges in its road and bridge network; these bridges connect various points of the road network, as illustrated in **Figure 12**. These bridge structures can be summarized by type, size, and condition, which are detailed in **Table 5**. More information about each of these structures can be found in Rochester Hills' MiBRIDGE database or by contacting Rochester Hills.

Table 5: Type, Size, and Condition of Rochester Hills' Bridge Assets								
Bridge Type	Total Number of Bridges	Total Deck Area (sq ft)	Condition: Structurally Deficient, Posted, or Closed			Condition		
			Struct. Deficient	Posted	Closed	Poor	Fair	Good
Concrete - Culvert	3	3,512	0	0	0	0	0	3
Prestressed Concrete – Box Beam/Girders – Multiple	1	2,820	0	0	0	0	0	1
Total SD/Posted/Closed			**0**	**0**	**0**			
Total	**4**	**6,332**				**0**	**0**	**4**
Percentage (%)			**0%**	**0**	**0**	**0**	**0**	**100%**

Condition, Goals, and Trend

Bridges in Michigan are given a good, fair, or poor rating based on the National Bridge Inspection Standards (NBIS) rating scale, which was created by the Federal Highway Administration to evaluate a bridge's deficiencies and to ensure the safety of road users. The current condition of Rochester Hills' bridge network based on the NBIS is four structures rated good and no structures rated fair or poor (**Table 5**).

Bridges are designed to carry legal loads in terms of vehicles and traffic. Due to a decline in condition, a bridge may be "posted" with a restriction for what would be considered safe loads passing over the bridge. On occasion, posting a bridge may also restrict other load-capacity-related elements like speed and number of vehicles on the bridge, but this type of posting designates the bridge differently. Rochester Hills has no structures that are posted for load restriction (**Table 5**). Designating a bridge as "posted" has no influence on its condition rating. A "closed" bridge is one that is closed to all traffic. Closing a bridge is contingent upon its ability to carry a set minimum live load. Rochester Hills has no structures that are closed (**Table 5**).

The goal of the program is the preservation and safety of Rochester Hills' bridge network.

Figure 13 illustrates the baseline condition, projected trend, and goal that Rochester Hills has for its good/fair and its structurally deficient bridges.

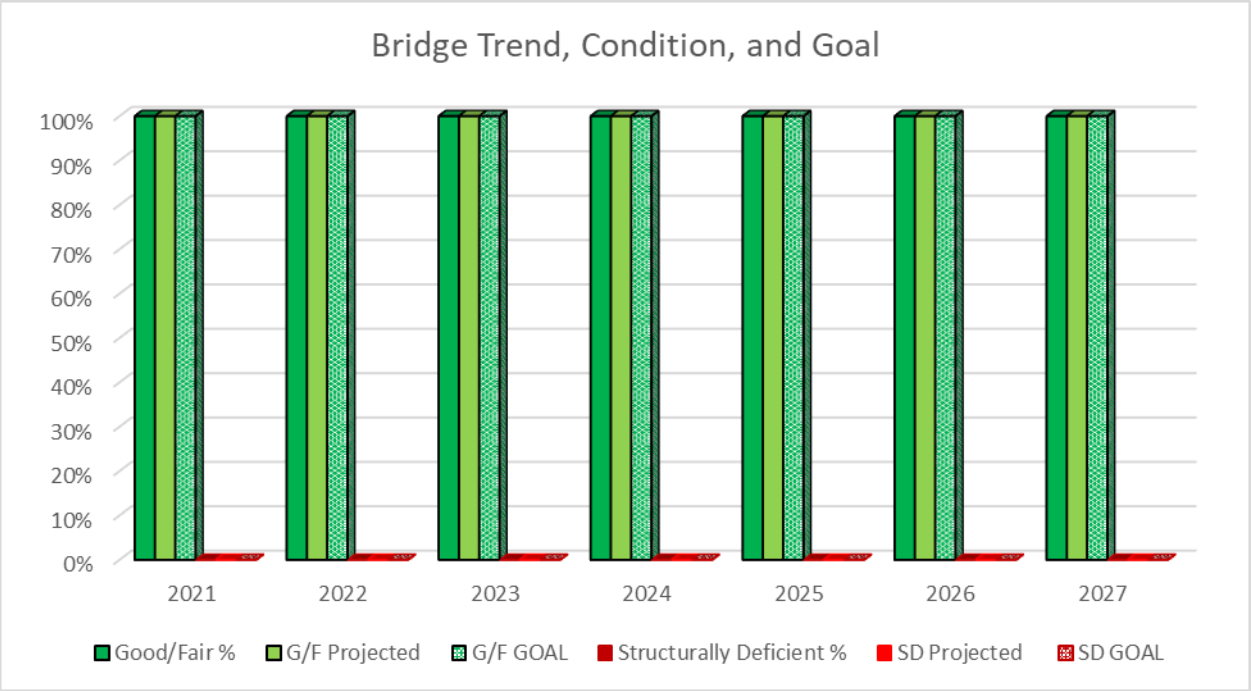


Figure 13: Condition, Projected Trend, and Goal for Rochester Hills' Bridges

Programmed/Funded Projects, Gap Analysis, and Planned Projects

Rochester Hills will receive $215,000 in total funding for the years 2024-2027. Preventive maintenance is a more effective use of these funds than the costly alternative of major rehabilitation or replacement. Since Rochester Hills recognizes that limited funds are available for improving the bridge network, it seeks to identify those bridges that will benefit from a planned maintenance program, and it plans to spend $71,000 per year for the next three years on preventive maintenance of bridges. Rochester Hills plans to replace no bridges within the next three years. By performing the aforementioned preventive maintenance and replacement of bridge structures, Rochester Hills may achieve its goal of keeping its overall bridge network at the same condition.

Rochester Hills completed rehabilitation and capital preventative maintenance on all four of its bridges in 2021. Rochester Hills does not have any planned projects for the next three years beyond routine maintenance as identified by its biennial inspections. Bridge projects, including routine maintenance, are funded through the city’s Capital Improvement Project (CIP) as part of its annual budget.

3. CULVERT ASSETS

Inventory of Assets

In 2018, Rochester Hills took inventory and condition data of its culvert assets. Rochester Hills has inventoried 237 culverts, which is 100 percent of the culverts that Rochester Hills owns. Of Rochester Hills' 236 tracked and rated culverts, Rochester Hills has 59 culverts considered good, 159 culverts considered fair, 12 culverts considered poor, and 6 culverts considered failed based on the culvert rating system that Rochester Hills uses (see Appendix A *Culvert Asset Management Plan Supplement*).

More details about these culvert assets can be found in Rochester Hills' Roadsoft database or by contacting Rochester Hills.

Goals

The goal of Rochester Hills' asset management program is the preservation of its culvert network. Rochester Hills is responsible for preserving 237 inventoried culverts as well as any un-inventoried culverts that underlie its entire road network.

Planned Projects

Rochester Hills' policy is to replace or repair culvert assets concurrent with projects affecting road segments carried by the particular culverts.

4. SIGNAL ASSETS

Inventory of Assets

At present, Rochester Hills has an inventory of 13 traffic signals with 100 percent ownership and 55 additional signals the city co-owns or shares in the cost of maintenance. Maintenance and replacement of all traffic signals in the city is performed by the Road Commission for Oakland County (RCOC)

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

Goals

The goal of Rochester Hills' asset management program is the preservation of its traffic signals. Rochester Hills is responsible for preserving inventoried traffic signals as well as any un-inventoried traffic signals along its entire road network.

Planned Projects

Rochester Hills' policy is to evaluate traffic signal assets based on condition assessment for replacement or repair during any reconstruction, rehabilitation, preventive maintenance, of schedule maintenance activities on the roadway affected by the particular signal. It also conducts replacements or repairs for those traffic signal assets reported as non-functional or as performing with reduced function. Rochester Hills adheres to regular maintenance and servicing policies outlined in the *Michigan Manual of Uniform Traffic Control Devices*. See Appendix B, *Traffic Signals Asset Management Plan Supplement.*

5. FINANCIAL RESOURCES

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

Anticipated Revenues & Expenses

Rochester Hills receives funding from the following sources:

- **State funds** – Rochester Hills' principal source of transportation funding is received from the Michigan Transportation Fund (MTF). This fund is supported by vehicle registration fees and the state's per-gallon gas tax. Allocations from the MTF are distributed to state and local governmental units based on a legislated formula, which includes factors such as population, miles of certified roads, and vehicle registration fees for vehicles registered in the agency's jurisdiction. Examples of state grants also include local bridge grants, economic development funds, and metro funds.
- **Federal and state grants for individual projects** – These are typically competitive funding applications that are targeted at a specific project type to accomplish a specific purpose. These may include safety enhancement projects, economic development projects, or other targeted funding. Examples of federal funds include Surface Transportation Program (STP) funds, C and D funds, bridge funds, MDOT payments to private contractors, and negotiated contracts.

- **Local government entities or private developer contributions to construction projects for specific improvements** – This category includes funding received to mitigate the impact of commercial developments as a condition of construction of a specific development project and can also include funding from a special assessment district levied by another governmental unit. Examples of contributions from local units include city, village, and township contributions to the county; special assessments; county appropriations; bond and note proceeds; contributions from counties to cities and villages; city general fund transfers; city municipal street funds; capital improvement funds; and tax millages (see below).
- **Local tax millages** – Many local agencies in Michigan use local tax millages to supplement their road-funding budget. These taxes can provide for additional construction and maintenance for new or existing roads that are also funded using MTF or MDOT funds. Rochester Hills has local tax millages in its road-funding budget. One local street millage up to 1.0965 mill (limited to 1.0625 mill by Headlee rollback) for 10 years through FY 2030 for local street improvements and maintenance.
- **Interest** – Interest from invested funds.
- **Permit fees** – Generally, permit fees cover the cost of a permit application review.
- **Other** – Other revenues can be gained through salvage sales, property rentals, land and building sales, sundry refunds, equipment disposition or installation, private sources, and financing.
- **Charges for services** – Funds from partner agencies who contract with Rochester Hills to construct or maintain its roads, or roads under joint or neighboring jurisdictions, including state trunkline maintenance and non-maintenance services and preservation.

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

- **Construction/Capacity Improvement Funds** – According to PA 51 of 1951, this financial classification of projects includes, "new construction of highways, roads, streets, or bridges, a project that increases the capacity of a highway facility to accommodate that part of traffic having neither an origin nor destination within the local area, widening of a lane width or more, or adding turn lanes of more than 1/2 mile in length."[1]
- **Preservation and Structural Improvement Funds** – Preservation and structural improvements are "activities undertaken to preserve the integrity of the existing roadway system."[2] Preservation includes items such as a reconstruction of an existing road or bridge, or adding structure to an existing road.
- **Routine and Preventive Maintenance Funds** – Routine maintenance activities are "actions performed on a regular or controllable basis or in response to uncontrollable events upon a

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

highway, road, street, or bridge".[3] Preventive maintenance activities are "planned strategies of cost-effective treatments to an existing roadway system and its appurtenances that preserve assets by retarding deterioration and maintaining functional condition without significantly increasing structural capacity".[4]

- **Winter Maintenance Funds** – Expenditures for snow and ice control.
- **Trunkline Maintenance Funds** – Expenditures spent under Rochester Hills' maintenance agreement with MDOT for maintenance it performs on MDOT trunkline routes.
- **Administrative Funds** – There are specific items that can and cannot be included in administrative expenditures as specified in PA 51 of 1951. The law also states that the amount of MTF revenues that are spent on administrative expenditures is limited to 10 percent of the annual MTF funds that are received.
- **Other Funds** – Expenditures for equipment, capital outlay, debt principal payment, interest expense, contributions to adjacent governmental units, principal, interest and bank fees, and miscellaneous for cities and villages.

The tables below detail the revenues and expenditures for Rochester Hills.

Table 6: Annual Fiscal-Year Revenues per Fiscal Year

Revenues	
Funding Source	**Budget 2024 Estimated $**
Tax Levy (Local Streets)	$4,671,520
State Funds	$9,858,500
Contributions from Local Units	$426,670
Interest, Rent, and Other	$6,231,780
Charges for Services	$333,740
Total Revenues	**$21,522,210**

Table 7: Annual Fiscal-Year Expenditures per Fiscal Year

Item	Budget 2024 Estimated $
Preservation & Structural Improvement	$16,661,140
Routine Maintenance	$5,334,530
Winter Maintenance	$1,398,050
Administrative	$1,253,980
Total Expenses	**$24,647,700**

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

6. RISK OF FAILURE ANALYSIS

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

- **Geographic divides:** Areas where a geographic feature (river, lake, hilly terrain, or limited access road) limits crossing points of the feature; bridge failures, in particular, can create loss of access to entire regions of the state
- **Emergency alternate routes for high-volume roads and bridges:** Roads and bridges that are routinely used as alternate routes for high-volume assets are included in an emergency response plan
- **Limited access areas:** Roads and bridges that serve remote or limited access areas that result in long detours if closed
- **Main access to key commercial districts:** Areas with a large concentration of businesses or where large-size business will be significantly impacted if a road is unavailable
- Our road network includes the following critical assets: Hamlin Road, E Auburn Road (Rochester Road to Dequindre Road), John R Road, Barclay Circle, Hampton Circle, Butler Road, Old Perch Road, Brewster Road, and Tienken Road (Adams Road west to city limits)
- Roads within the city under RCOC's jurisdiction and critical to road users include the following assets: Livernois Road, Tienken Road, Walton Boulevard, Dequindre Road, South Boulevard, Adams Road, Crooks Road, and Avon Road

- Roads within the city under MDOT's jurisdiction and critical to road users include the following assets: M-59, Auburn Road, and Rochester Road
- Our bridge network includes the following critical assets: Butler Bridge over Galloway Creek, Kings Cove Bridge over Paint Creek, Rochdale Bridge over Sargent Creek, and Shagbark Bridge over Sargent Creek. Overall, all four bridges are in good to fair condition with a rating of seven to six, but did receive a scour critical rating of three during the last inspection which took place in 2022. Inspections take place on "even years" and repairs on "odd years". Necessary repairs and preventative maintenance as identified in the 2022 inspection report are scheduled for 2025.

Figure 14 illustrates the key transportation links in Rochester Hills' road and bridge network.

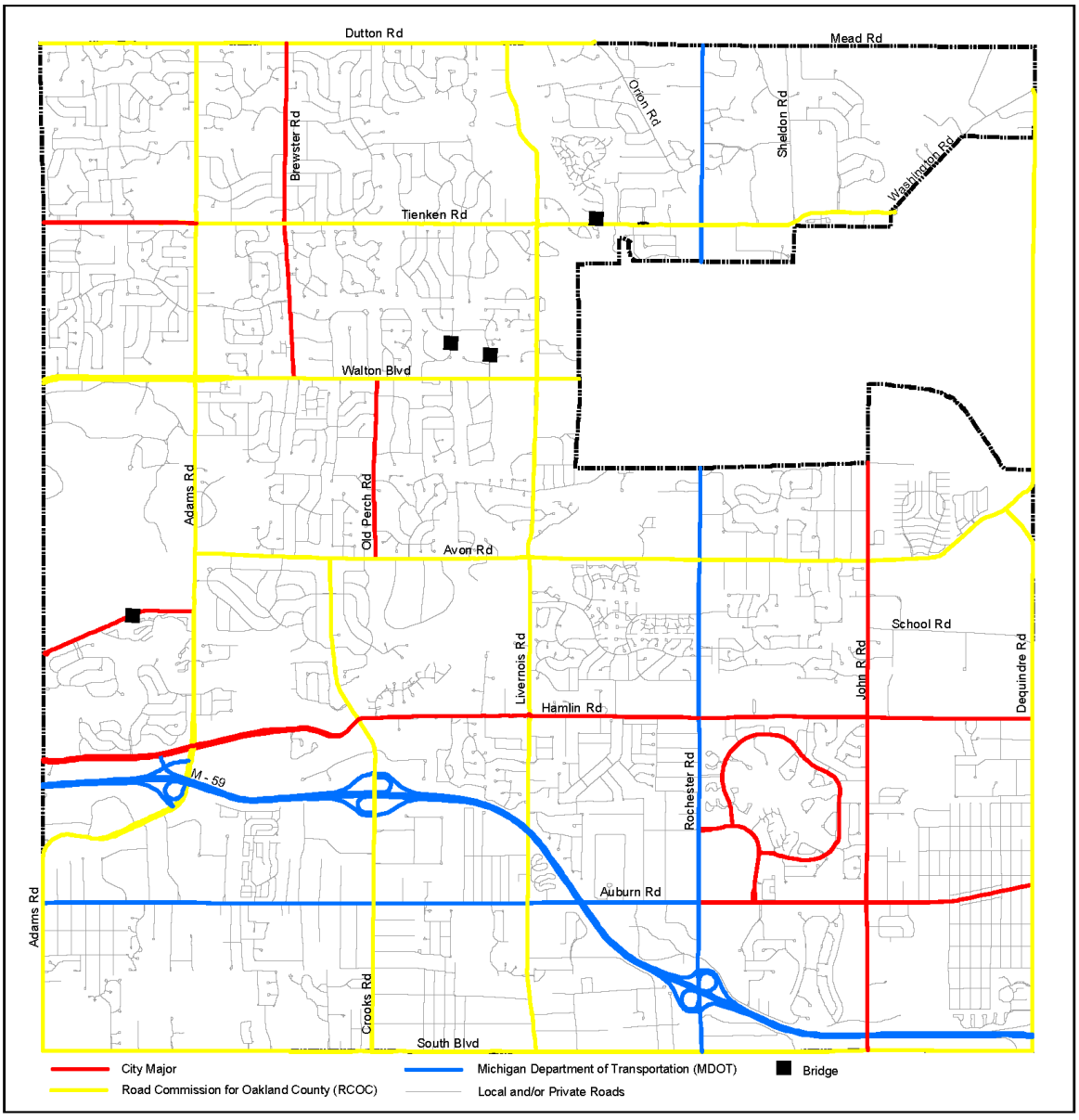


Figure 14: Key Transportation Links in Rochester Hills' Road and Bridge Network

7. COORDINATION WITH OTHER ENTITIES

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

INTERNAL COORDINATED PLANNING

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

Planned projects for sub-surface infrastructure that Rochester Hills owns are listed in the Capital Improvement Plan (CIP). Sub-surface utility plans are coordinated with the transportation infrastructure plans to maximize value and minimize service disruptions and cost to the public.

Rochester Hills takes advantage of coordinated infrastructure work to reduce cost and maximize value using the following policies:

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

COORDINATION WITH OUTSIDE AGENCIES

Rochester Hills meets with multiple outside agencies to share upcoming planned projects. Rochester Hills attends a biannual coordination meeting hosted by MDOT to coordinate and mitigate disruption to transportation services. Mitigation measures could include rescheduling and coordinating projects to maximize value and minimize disruptions and cost to the public. This meeting is also attended by RCOC and various other agencies.

Rochester Hills also attends quarterly Oakland County Water Resource Commission meetings where projects are discussed.

Coordination with private utility companies is becoming more prevalent but does not happen on an annual basis. There are multiple private utility companies within the city with various priorities and it can be difficult to plan projects accordingly. However, Rochester Hills maintains communication with private utility companies and coordinates projects when feasible.

8. PROOF OF ACCEPTANCE

PUBLIC ACT 325

CERTIFICATION OF TRANSPORTATION ASSET MANAGEMENT PLAN

Certification Year: 2024

Local Road-owning Agency Name: City of Rochester Hills

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

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

Signature		Signature	
Printed Name		Printed Name	
Title	Date	Title	Date

Due every three years based on agency submission schedule

Submittal Date: _____

See attached council meeting minutes and/or resolution.

A. CULVERT ASSET MANAGEMENT PLAN SUPPLEMENT

Culvert Primer

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

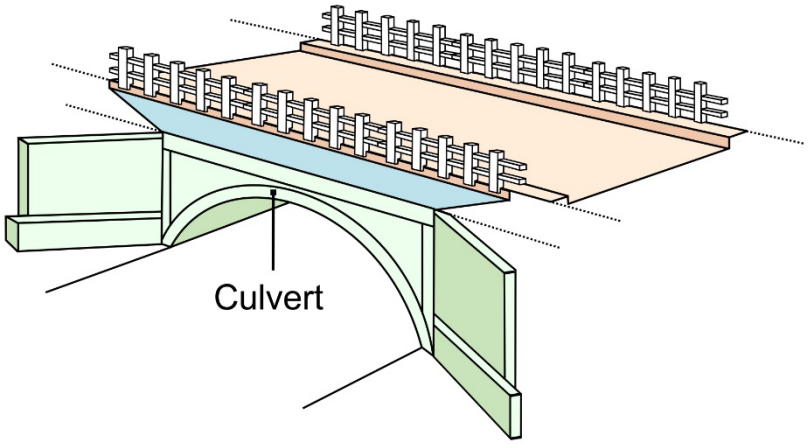


Figure C-1: Diagram of a culvert structure

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

Culvert Types

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

Culvert Condition

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

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

Culvert Treatments

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

B. TRAFFIC SIGNALS ASSET MANAGEMENT PLAN SUPPLEMENT

Traffic Signals Primer

Types

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

Figure D-1: Example of traffic signals

Condition

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

Treatments

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

C. GLOSSARY & ACRONYMS

Glossary

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

Asset management: A process that uses data to manage and track road assets in a cost-effective manner using a combination of engineering and business principles. Public Act 325 of 2018 provides a legal definition: "an ongoing process of maintaining, preserving, upgrading, and operating physical assets cost effectively, based on a continuous physical inventory and condition assessment and investment to achieve established performance goals".[6]

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

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

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

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

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

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

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

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

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

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

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

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

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

CPM: See *Capital preventive maintenance*.

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

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

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

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

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

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

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

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

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

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

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

FHWA: See *Federal Highway Administration*.

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

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

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

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

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

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

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

HMA: See *hot-mix asphalt pavement*.

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

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

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

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

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

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

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

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

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

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

IRT: See *Investment Reporting Tool*.

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

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

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

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

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

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

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

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

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

MDOT: See *Michigan Department of Transportation*.

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

MGF: See *Michigan Geographic Framework*.

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

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

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

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

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

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

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

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

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

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

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

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

MTF: See *Michigan Transportation Fund*.

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

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

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

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

NBIS: See *National Bridge Inspection Standards*.

NCPP: See *National Center for Pavement Preservation*.

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

NFC: See *National Functional Class*.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Rigid pavement: See *concrete pavement*.

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

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

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

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

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

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

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

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

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

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

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

TAMC: See *Michigan Transportation Asset Management Council*.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

List of Acronyms

CPM: capital preventive maintenance

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

FHWA: Federal Highway Administration

HMA: hot-mix asphalt

I: trunkline abbreviation for routes on the Interstate system

IBR: Inventory-based Rating

M: trunkline abbreviation for Michigan state highways

MDOT: Michigan Department of Transportation

MTF: Michigan Transportation Fund

NBIS: National Bridge Inspection Standards

NCPP: National Center for Pavement Preservation

NHS: National Highway System

PA 51: Michigan Public Act 51 of 1951

PASER: Pavement Surface Evaluation and Rating

R&R: reconstruction and rehabilitation programs

TAMC: (Michigan) Transportation Asset Management Council

US: trunkline abbreviation for routes on the US Highway system